CITY OF FRIENDSWOOD
ENGINEERING DEPARTMENT

PROJECT MANUAL FOR

BLACKHAWK BOULEVARD RECONSTRUCTION PHASE II
REPACKAGE C

PROJECT No.: 10390880
CSP No.: BID No.2026-02

Divisions 00 through 03

ISSUED: MARCH, 2026

STATE OF TEXAS
NGOC KIM LE
102192
LICENSED
PROFESSIONAL ENGINEER

Ngoc Kim Le

03/02/2026

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HOUSTON, TEXAS 77081
713-622-9264

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CITY OF FRIENDSWOOD TECHNICAL SPECIFICATIONS

BOLD ITALICIZED – Item is bound within this specification manual.

Regular non-italicized – Item is not bound within this specification manual; however, item is part of the contract. All items and specifications are available on the City of Friendswood's website at "https://www.ci.friendswood.tx.us" and then:

1) Click on the "Government" button in the top bar
2) In the left side bar, click the link for "Departments"
3) In the left side bar, click the link for "Engineering"
3) In the left side bar, click the link for "Publications and Forms"
4) Scroll down to the links for the City of Friendswood's Technical Specifications

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SIGN IN SHEET

PROJECT: _____ **DATE:** _____

PURPOSE OF MEETING: _____ **TIME:** _____

Name (Print)	Initials	Department	Position	Phone Number	Cell Phone (optional)	Email Address
Jil Arias,		Engineering	Director/City Engineer	281-993-3411		jarias@friendswood.com
Michael Medwedeff		Engineering	Assistant Director Project	281-996-3402		mmedwedeff@friendswood.com
Heather Van Dine		Engineering	Assistant Director Operations	281-993-3414		hvandine@friendswood.com
Natalie Franco		Engineering	Graduate Engineer	281-996-3292		nfranco@friendswood.com
Ivan Ortega		Engineering	Project Manager	281-993-3208		iortega@friendswood.com
Tuan Nguyen		Engineering	Project Manager	281-996-3295		tnguyen@friendswood.com
Marcos Martinez		Engineering	Project Manager	281-996-3292		mmartinez@friendswood.com
Steve Vavrecka		Public Works	Director	281-996-3384		svavrecka@friendswood.com
Hailee Medwedeff		Public Works	Deputy Director	281-996-3383		mmedwedeff@friendswood.com
Marua Blackburn		Engineering	Storm Water Coordinator	281-993-3297		mblackburn@friendswood.com

Name (Print)	Company Name	Position	Phone Number	Cell Phone (optional)	Email Address

Name (Print)	Company Name	Position	Phone Number	Cell Phone (optional)	Email Address

CITY OF FRIENDSWOOD
REQUEST FOR PROPOSALS
COMPETITIVE SEALED PROPOSAL

Blackhawk Boulevard Reconstruction Phase II – Repackage C
CSP #2026-02

Competitive Sealed Proposals will be accepted either electronically or physically for the above-referenced project. This Request for Proposals, construction documents, specifications, and all necessary information may be obtained from the following: https://www.ci.friendswood.tx.us/Bids.aspx or www.civcastusa.com.

Sealed competitive proposals plainly marked **CSP #2026-02 Blackhawk Boulevard Reconstruction Phase II – Repackage C** shall be addressed to the City Secretary's Office, 910 S. Friendswood Drive, Friendswood, Texas 77546-4856. Submittals shall be accepted until **2:00 P.M., Tuesday, March 31, 2026**, at which time there will be a public opening of the proposals where the City will read aloud the names of the offerors and any monetary proposals made by the offerors. Submittals will be accepted at the address listed above or electronically via www.civcastusa.com.

The City of Friendswood reserves the right to reject any or all submittals, to waive technical or legal deficiencies, and to accept any submittal that it may deem to be in the best interest of the City.

The City of Friendswood is asking qualified firms to prepare Competitive Sealed Proposals for the Blackhawk Boulevard Reconstruction Phase II – Repackage C

PART I: ADMINISTRATIVE INFORMATION

1.1 CITY CONTACTS

A. For all questions, legal, purchasing, technical and schedule please contact:

Name: Jildardo Arias, PE, CFM, ENV SP
Title: Director of Engineering
Phone: (281) 993-3411
Email: engineering@friendswood.com

1.2 SCHEDULE OF EVENTS

A.	Invitation to Propose Issued	March 4, 2026
B.	Non-Mandatory Pre-Proposal Meeting at 10:00 AM	March 19, 2026
C.	Site Visit (Immediately following Pre-proposal meeting)	March 19, 2026
D.	Written Questions due by 5:00 PM	March 20, 2026
E.	Submittals due by 2:00 PM	March 31, 2026
F.	Submittal Evaluation	April 1 to April 9, 2026
G.	Contract Negotiations	April 10 to April 22, 2026
H.	Posting of Recommendations to Council Agenda	April 27, 2026
I.	Council Approval	May 4, 2026

The non-mandatory pre-proposal meeting will be held at **10:00 am on Thursday, March 19, 2026, at Friendswood City Hall (910 S. Friendswood Drive, Friendswood, TX 77546).** A site visit will be held immediately following the pre-proposal meeting at the project location.

Pursuant to Resolution No. R2025-02, the City Council has delegated authority to the City Manager to determine and select the appropriate project delivery method in accordance with applicable provisions of the Texas Government Code.

PART II: PURPOSE

- The City of Friendswood is asking qualified firms to prepare Competitive Sealed Proposals for the Blackhawk Boulevard Reconstruction Phase II – Repackage C.

PART III: PROJECT SCOPE

The Project includes:

- The replacement of a four-lane curb-and-gutter concrete roadway along Blackhawk Boulevard from FM 2351 to approximately 500 feet south of Pennystone Way and Thursa Lane to FM 528. This includes pavement, drainage (24" – 42" RCP and 5'x3' RCB), and 12" PVC water line at locations that is not PVC. This project also includes installation of 24" transmission water main from FM 2351 to Edenvale Street.

PART IV: PROPOSALS

Electronic Proposal Documents**,** including Contract Documents, Plans and Technical Specifications, are available for download on the City's website and CivCast at https://www.ci.friendswood.tx.us/Bids.aspx and https://www.civcastusa.com/. The documents are viewable without registration.

No plan fees or deposits are required for plans and proposal documents obtained through the City's website or CivCast.

The anticipated contract time for this project is five hundred forty (540) calendar days. The estimated project budget is $7,500,000. These figures are provided in accordance with Section 2269.153 of the Texas Government Code**.**

Offerors accept sole responsibility for downloading all the required documents, plans, specifications, proposal forms, and addenda required for submitting a proposal.

Each proposal must be accompanied by:

1. 00145 Competitive Sealed Proposal Form
2. Relevant Project Experience within the past five (5) years
3. Proposed Project Approach
4. Company organization chart, including those working directly on this project
5. Demonstrated ability to meet the project schedule
6. List of subcontractors, qualifications, and previous work experience Contractor
7. Quality assurance and safety record
8. Current project workload
9. Certificate of Insurance
10. Certificate of Interested Parties (Form 1295)

11. Statement of Conflicts of Interest
12. Conflict of Interest Questionnaire Form
13. Government Verification Form

No proposal may be withdrawn or terminated for a period of ninety (90) days subsequent to the proposal opening date without the consent of the City of Friendswood. Unless otherwise expressly provided herein, all references to "day(s)" shall mean calendar day(s).

Performance, Payment, and Maintenance Bonds: The successful Offeror must furnish Performance and Payment Bonds as required by Chapter 2253 of the Texas Government Code or other applicable law, as amended, upon the form included in the Contract Documents, in the amount of one hundred percent (100%) of the final contract price, such bonds to be executed by a corporate surety duly authorized to do business in the State of Texas, and named in the current list of "Treasury Department Circular No. 570", naming the City of Friendswood, Texas as Obligee. Additionally, the successful Offeror shall be required to provide a one-year Maintenance Bond for the improvements installed as part of this work, as provided in the Special Conditions of Agreement.

Equal Opportunity: All responsible Offerors having submitted complete proposals will receive consideration for award of contract without regard to race, color, religion, sex, or national origin.

Selection Criteria: The contract is to be awarded based on the provision of "Best Value" to the City. Within 45 days after the date the proposals are opened, the City will evaluate and rank each proposal using the following selection criteria:

1)	Cost Proposal	50%
2)	Experience with similar projects within past 5 years	10%
3)	Proposed Project Approach (Consider construction phasing and work sequence, schedule, proposed bypass pumping, and material, equipment, and delivery)	10%
4)	Experience and qualifications of key project personnel	10%
5)	Demonstrate ability to meet schedule on similar projects	10%
6)	Subcontractor qualifications and work history with general contractor	5%
7)	Quality Assurance and Safety Record	2%
8)	Current Workload	3%
	Total	100%

The City will select the Offeror that submits the proposal that offers the best value for the City based on:

(1) the above-referenced selection criteria and the weighted value for those criteria in the request for proposal; and

(2) its ranking evaluation.

Upon selection of a primary Offeror, the City will attempt to negotiate a contract with the selected Offeror. The City may discuss with the selected Offeror options for a scope or time modification and any price change associated with the modification. If the City is unable to negotiate a contract with the selected Offeror, the City shall, formally and in writing, end negotiations with that Offeror and proceed to the next Offeror in the order of the selection ranking until a contract is reached or all proposals are rejected.

The City may make such investigations as it deems necessary to determine the ability of the Offeror to perform the work, and the Offeror shall furnish the City all such information and data for this purpose as the City may request. The City reserves the right to reject any proposal if the evidence submitted by, or investigation of, such Offeror fails to satisfy the City that such Offeror is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional proposals will not be accepted.

The City of Friendswood reserves the right to award a contract based on its sole assessment and ranking of the above factors in its own best interests or reject any or all proposals.

A proposal that has been "opened" may not be changed for the purposes of correcting an error in the proposed price.

State Sales Tax: The City qualifies for exemption from State and Local Sales Tax pursuant to Section 151.311 of the Texas Tax Code for material incorporated into the project.

PART V: PROPOSALS

Please submit one (1) marked original, along with one (1) electronic copy on flash drive or CD by proposal opening time of 2:00 PM on Tuesday, March 31, 2026**.** Flash drive or CD must contain only one (1) file in PDF format and must match the written response identically. Proposal shall be submitted to the address shown below. Submittals shall be signed in ink by a person authorized to bind the vendor in a contract. Proposal submittals will be accepted at the address listed below or electronically via www.civcastusa.com.

The City of Friendswood
City Secretary's Office
910 South Friendswood Drive
Friendswood, TX 77546
Monday - Thursday: 8:00 AM to 5:30 PM
Friday: 8:00 AM to 5:00 PM

Proposals sent via courier must be sealed in a separate envelope inside of the mailer. External envelope must be marked: CSP #2026-02.

To enable the City to efficiently evaluate the responses, it is IMPORTANT that respondents follow the required format in preparing their responses.

Each copy of the response shall be bound using a semi-permanent binding method, to ensure that pages are not lost. Pages shall be no larger than letter-size (8.5" by 11") or, if folded to that dimension, twice letter size (11" by 17"). Each section (defined below) shall be separated by a tabbed divider. Text shall be no smaller than 10 point. Margins shall be no smaller than 1 inch. Elaborate covers, binding, dividers, etc., are not required.

PART VI: SUBMITTAL PROCESS

A. No Gratuities – Respondents shall not offer any gratuities, favors, or anything of monetary value to any official or employee of Friendswood for the purposes of influencing this selection. Any attempt by the respondent to influence the selection process by any means, other than disclosure of qualifications and credentials through the proper channels, shall be grounds for exclusion from the selection process.

B. All Information True – Respondents represents and warrants to the City that all information provided in the response shall be true, correct and complete. Respondents who provide false, misleading, or incomplete information, whether intentional or not, in any of the documents presented to the City for consideration in the selection process shall be excluded.

C. Inquiries – Do not contact the City during the selection process to make inquiries about the progress of this selection process. Respondents will be contacted when it is appropriate to do so.

D. Cost of Responses – The City will not be responsible for the costs incurred by anyone in the submittal of responses.

E. No Obligation – The City reserves the sole right to (1) evaluate the responses submitted; (2) waive any irregularities therein; (3) reject any or all respondents submitting responses, should it be deemed in Friendswood's best interest; or (4) cancel the entire process.

F. Insurance – The respondent shall have the appropriate liability insurance written by an insurer to transact insurance in the State of Texas.

END OF DOCUMENT

SECTION 00101
INSTRUCTIONS TO OFFERORS

1. Defined Terms

1.1. The term "Owner" hereinafter is defined as the City of Friendswood and is used interchangeably with the term "the City." Both terms are synonymous and refer to the City.

1.2. The term "Offeror" means one who submits a Proposal directly to Owner, as distinct from a sub-offeror, who submits a proposal to an Offeror. The term "Successful Offeror" means, on the basis of Owner's evaluation as hereinafter provided, the Offeror submitting a proposal that represents, in the Owner's opinion, the best value to the City. The term "Proposal Documents" includes the Invitation to Propose, Instructions to Offerors, the Proposal, and the proposed Contract Documents (including all Addenda issued prior to receipts of proposals).

1.3. The term "Engineer" hereinafter is defined as the professional designer or consultant and is used interchangeably with the term "Consultant". Both terms are synonymous and refer to the City.

1.4. The term "E-bid System" refers to the CivCast USA. This is a web-based system that provides all Proposal Documents electronically to potential Offerors and forms the pathway for interested Offerors to submit proposals in response to the advertisement and invitation. The term "e-bid" and/ or "electronic bid" means the Offerors' electronic proposal submitted to the Owner by way of the E-bid System. The terms "electronic bid" or "e-bid" are used inter-changeably to describe the above proposal process to submit an authorized proposal to the City in response to an Invitation to Propose.

1.5. The term "Project Management software" means the City's web-based contract administration and construction records management system used by involved parties to administer the project. This system serves as the web-accessed centralized information distribution hub for communications and document management, pay application processing and record repository for all project documentation. Operational instructions for this system will be issued to the successful Offeror at the pre-Construction Meeting.

1.6. All other definitions set out in the Contract Documents are applicable to terms used in the Proposal Documents.

1.7. Unless otherwise expressly provided herein, all references to "day(s)" shall mean consecutive calendar day(s).

1.8. The term "Alternate(s)" or "Add Alternate(s)" as used here interchangeably is defined as an additive work item that may be selected or rejected by the Owner based solely on the Owner's acceptance or rejection of the price proposed for this item. Alternate prices shall include all labor, material, equipment and overhead costs to perform the work as specified, complete in place. When selected by the Owner, the costs for an Alternate shall be added to the Base Proposal and made a part of the Contract price

2. Copies of Proposal Documents

2.1. Complete sets of electronic Proposal Documents are available for download. A Plan Holder will be notified immediately, by email, of any Addendums added to the project.

2.2. The Offeror accepts sole responsibility for ensuring that he obtains a full set of these documents by executing a full and complete download of the project documents. Downloading Proposal Documents automatically ensures receipt of any and all subsequent communications from the City and its Consultant.

2.3. Complete sets of Proposal Documents must be used in preparing Proposals; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Proposal Documents including, but not limited to all Addenda issued prior to opening the proposals.

2.4. Owner and Engineer, in making copies of Proposal Documents available on the above terms, do so only for the purpose of obtaining Proposals on the Work, and do not confer a license or grant for any other use.

2.5. Proposal Documents include, but are not limited to, construction documents, selection criteria and the weighted value for each criterion, estimated budget, project scope, estimated project completion date, and other documents required herein, e.g.,Section 00145 Cost Proposal Form.

3. Examination of Contract Documents and Site

3.1. It is the responsibility of each Offeror before submitting a Proposal, to (a) examine the Proposal Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work,(c) consider federal, state and local laws and regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Offeror's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors, omissions or discrepancies in the Contract Documents, (f) to recognize and plan for use of the City's "Project Management" software to administer the construction process and perform the work of the project.

3.2. Any reports of explorations and tests of conditions at the site which have been utilized by the Engineer in preparation of the Contract Documents will be made available to Offerors for review, but such reports are not part of the Contract Documents. Offeror may not and should not rely upon the accuracy of the data contained in such reports, interpretations or opinions contained therein, or the completeness thereof, for the purposes of proposing or construction.

3.3. Information and data reflected in the Contract Documents with respect to underground utilities, equipment or other underground facilities at or contiguous to the site is based upon information and data furnished to Owner and Engineer by owners of such underground facilities or others, and Owner does not assume responsibility for the accuracy or completeness thereof.

3.4. Before submitting a Proposal, each Offeror will, at Offeror's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Offeror deems necessary to determine its Proposal prices for performing and furnishing the Work in accordance with the Contract Time, Contract Price and other terms and conditions of the Contract Documents.

3.5. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands, access thereto or contractual arrangements for use by the Contractor required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

3.6. The submission of a Proposal will constitute an incontrovertible representation by Offeror that Offeror has complied with every requirement of this Article 3, that without exception the Proposal is premised upon performing and furnishing all of the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in, required by or reasonably inferred from the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

4. Interpretations and Addenda

4.1. All questions about the meaning or intent of the Contract Documents are to be directed to City of Friendswood Engineering Department, or posted to CivCast. Interpretations or clarifications considered necessary by the City in response to such questions will be issued by Addenda delivered or transmitted by electronic means to all registered Offerors via CivCast and posted on CivCast and the City's website. Questions received less than five (5) days prior to the date for opening of Proposals may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

4.2. Addenda may also be issued to modify the Proposal Documents as deemed advisable by Owner or Consultant. Addenda will automatically be made available to all registered Offerors via CivCast and will be posted on CivCast and the City's website.

5. Contract Time

5.1. The number of days in which the Work is to be Substantially Completed, as set forth in the Proposal form and the Standard Form of Agreement, subject to such extension of time as may be due under the terms and conditions of the Contract Documents ("Contract Time"). All references to "time" or "days" shall be interpreted as consecutive calendar days.

6. Liquidated Damages and Early Completion Bonus

6.1. Provisions for liquidated damages and early completion bonus, if any, are set forth in the Standard Form of Agreement.

7. Substitute or "Or-Equal" Items

7.1. The Proposal must be on the basis of the selected materials and equipment described in the Plans or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Plans or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by the Contractor if acceptable to Consultant. Application for such acceptance will not be considered by Consultant until after the Agreement becomes effective. All "or-equal" references shall be interpreted to mean "or approved equal". The procedure for submission of any such application by Contractor and consideration by Consultant is set

forth in the Contract Documents.

8. Proposal Form

8.1. The Proposal form (Section 00145 – Cost Proposal Form) is included with the Proposal Documents when downloaded. This Document must be printed and signed, as required below, and then uploaded as an Attachment to the Proposal.

All E-bids and physical proposals must be submitted via CivCast or submitted in person. All blanks on the Proposal form must be completed or filled in. The Offeror shall propose for all Alternates, if any. Incomplete Proposals may be cause for rejection.

8.2. Proposals by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied be evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature. **Once executed, the document is to be uploaded as an attachment to the Proposal.**

8.3. Proposals by partnerships must be executed in the partnership name and signed by a general partner, whose title must appear under the signature, and if a corporate general partner, executed as required above for corporations and the official address of the partnership must be shown below the signature. All names must be typed or printed below the signature. **Once executed, the document is to be uploaded as an attachment to the Proposal.**

8.4. The Offeror shall acknowledge receipt of all Addenda (the number of which must be filled in on the Proposal form).

8.5. The address, telephone number, and email address for communications regarding the Proposal must be shown on the Cost Proposal form.

8.6. Proposal Security and Bonds: Security Bond in the form of Cashier's Check, Certified Check, or Proposal Bond payable to the City of Friendswood in the amount of 5% of the total cost proposal must accompany each proposal. Offerors submitting proposals electronically through the CivCast system shall scan and upload a copy of the sealed Proposal Bond as an attachment to their proposals. However, the **original Proposal Bond must be received in the City Secretary's Office before the proposal opening, else the Proposal will not be considered**.

9. Submission of Proposals

9.1. The place, date and/or time designated for opening Proposals may be changed in accordance with applicable laws, codes and ordinances. Any such changes to the Proposal Schedule shall be made by Addenda.

9.2. Electronic Proposals shall be submitted via CivCast. **Proposals submitted after the proposal date and time will be rejected.**

9.3. Physical proposals shall be submitted in-person at City Hall (910 S. Friendswood Drive, Friendswood, TX 77546) addressed to the City Secretary.

10. Modification and Withdrawal of Proposals

10.1. Prior to submission, E-bid Proposals may be modified or withdrawn without prejudice.

10.2. An Offeror may not modify or withdraw its Proposal by facsimile or verbal means. A withdrawn Proposal may be resubmitted prior to the designated time for opening Proposals.

10.3. If, within twenty-four (24) hours after Proposals are opened, any Offeror files a duly signed, written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material mistake in the preparation of its Proposal, that Offeror may request to withdraw its Proposal. Thereafter, if allowed to withdraw, that Offeror will be disqualified from further proposing on the Project to be provided under the Contract Documents.

11. Opening of Proposals

11.1. Electronic and physical proposals will be opened and read aloud publicly to identify the names of the offerors and their respective cost proposals, only. Proposals, in their entirety, shall be open for public inspection after the contract is awarded, with the exception of any trade secrets or confidential information contained therein, provided Offeror has expressly identified any specific information contained therein as being trade secrets or confidential information.

12. Proposals to Remain Subject to Acceptance

12.1. All Proposals will remain subject to acceptance for ninety (90) days after the day of the Proposal opening, but Owner may, in its sole discretion, release any Proposal prior to that date.

13. Award of Contract

13.1. Owner reserves the right to reject any and all Proposals, to waive any and all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Successful Offeror. Owner may reject a proposal as non-responsive if:

1. Offeror improperly or illegibly completes or fails to complete all information required by the Proposal Documents;
2. Offeror fails to sign the Proposal or improperly signs the Proposal;
3. Offeror qualifies its Proposal;
4. Offeror tardily or otherwise improperly submits its Proposal;
5. Offeror fails to submit the Contractor's Qualification Statement and Technical Proposal as required under Section 3 of these Instructions to Offerors; or
6. The Proposal is otherwise non-responsive.

13.2. Best Value. The Contract is to be awarded based on provision of "Best Value" to the Owner. Within 45 days after the date the proposals are opened, the City will evaluate and rank each proposal using the following selection criteria:

1)	Cost Proposal	50%
2)	Experience with similar projects within past 5 years	10%
3)	Proposed Project Approach (Consider construction phasing and work sequence, schedule, proposed bypass pumping, and material, equipment, and delivery)	10%
4)	Experience and qualifications of key project personnel	10%
5)	Demonstrate ability to meet schedule on similar projects	10%
6)	Subcontractor qualifications and work history with general contractor	5%
7)	Quality Assurance and Safety Record	2%
8)	Current Workload	3%
	Total	100%

The City will select the Offeror that submits the proposal that offers the best value for the City based on:

(1) the above-referenced selection criteria and the weighted value for those criteria in the request for proposal; and

(2) its ranking evaluation.

A contract to be awarded to the Offeror providing the Best Value may be let on either a lump sum basis or a unit cost basis dependent on the Proposal format.

13.3 Offeror is required to submit for approval a full schedule of values for the project as component of contract negotiations.

13.4 Within 45 days of the date of opening the proposals, the Owner will evaluate and rank each proposal with respect to the selection criteria contained in this Competitive Sealed Proposal document. After opening and ranking, an award may be made on the basis of the proposals initially submitted, without discussion, clarification or modification, or, the Owner may discuss with the selected responder, offers for cost reduction and other elements of the responder's proposal. If the Owner determines that it is unable to reach a contract satisfactory to the Owner with the selected offeror, then the Owner will formally terminate discussions with the selected offeror and proceed to the next offeror in order of selection ranking until a contract is reached or the Owner has rejected all proposals.

13.5 Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Proposal.

13.6 Offeror Attendance. The successful Offeror or its representative may be required to attend the City Council meeting at which the contract will be considered for award. Owner will establish a schedule for the award with Offeror.

14 Contract Security

14.1 When the Successful Offeror delivers the executed Standard Form of Agreement to Owner, it must include the required Performance, Payment, and Maintenance Bonds (if required) by the Contract Documents. Bonds shall be on the forms provided herein.

15 Workers' Classification

15.1 Texas Labor Code § 214.008 authorizes a penalty of $200 per misclassified individual to be imposed on a person who contracts for certain services with a

governmental entity and fails to properly classify their workers and subcontractors.

16 Signing of Agreement

16.1 When Owner gives a Notice of Intent to Award to the Successful Offeror, it will be accompanied by the required number of unsigned counterparts of the Standard Form of Agreement, and the required Performance and Payment Bond forms. Within ten (10) days thereafter Contractor shall sign and deliver the required number of counterparts of the Standard Form of Agreement to Owner with the required Bonds. Owner shall deliver one fully signed counterpart to Contractor. There shall be no contract or agreement between Owner and the Successful Offeror until proper execution and attestation of the Standard Form of Agreement by authorized representatives of the Owner.

17 Pre-Proposal Conference

17.1 A pre-proposal meeting will be held as indicated in the Invitation to Propose.

18 Retainage

18.1 Provisions concerning retainage are set forth in the Contract Documents.

19 Award

19.1 The contract, if awarded, may be awarded to the eligible Offeror submitting the proposal that yields the best value to the Owner, complying with these Instructions to Offerors and other proposal requirements in the Documents. By submitting a Proposal, each Offeror agrees and consents that the Owner, in determining the Successful Offeror and its eligibility for the award, may consider the Offeror's experience conduct and performance under other contracts, reputation in the industry, safety record and other factors as stated below, which could affect the Offeror's qualifications to perform the work.

19.2 Pursuant to Statute 2269.151 of the Government Code, the City will evaluate the proposals to determine which proposal provides the best value for the Owner. In making said determination, the Owner will consider Criteria as further defined or explained in these Instructions to Offerors, including the Contractor's Qualification Statement and Safety Questionnaire, and Technical Proposal.

19.3 The average of the team member's individual rating values will be multiplied by the relative weighting points for each of the criteria below, and the total used to rank the Offerors. The Offeror with the highest ranking will be the Offeror considered the Offeror that provides the best value to the Owner and will be recommended to the City for contract award.

19.4 **Cost Proposal and Price – 50 Percent** - The Offeror with the lowest price will be rated accordingly. All other offerors will be awarded a rating value based on a weighted percentage based on the difference from the low offeror.

19.5 **Experience with similar projects within past 5 years – 10 Percent** – Offeror should provide at least three (3) references for the company and include in the references company name, contact person(s), address and telephone number for projects of similar contract price and scope within the past 5 years. Owner reserves the right to contact references for verification.

19.6 **Proposed project approach – 10 Percent** – Contractor should consider construction phasing, execution plan, equipment placement and use of construction limits, material storage and staging, clean-up plan for inadvertent returns during trenchless construction.

19.7 **Experience and qualifications of key personnel– 10 Percent** – Contractor must demonstrate the work experience and qualifications for the Project Manager and Superintendent. The evaluation is based on the number of years with the contractor, and the number of similar projects in which the employee performed task assigned to a Project Manager and Superintendent. The Offeror's reputation among other governmental entities, owners, suppliers, and sub-contractors will be considered for awarding of rating value points.

19.8 **Demonstrated ability to meet schedule on similar projects – 10 Percent** – Contractor must demonstrate past ability to meet contract schedule on similar projects included in this proposal. Contractor must provide a summary level schedule for past projects. Compare the Offeror firm's initial construction schedules with the final construction schedules. Based the schedules on calendar days, start with the Owner's Notice to Proceed and end with final completion of the work. Explain why if there is a disparity between the initial and final construction schedules.

19.9 **Experience, qualifications and work history of proposed major sub-contractors with General Contractor – 5 Percent** – A major sub-contractor is a sub-contractor that performs 5 percent or more of the Project. The contractor is required to provide references for similar projects where the subcontractor and Offeror have worked together in the last five years.

19.10 **Quality Assurance program and Safety Record – 2 Percent** - The Offeror and the subcontractors must provide owner with their Quality Assurance Program and Experience Modification Rate (EMR).

19.11 **Current Workload– 3 Percent** - Ability to commit to delivery of the project on schedule commitment to meeting the specific deadlines for the various components of the project will be awarded a rating value based on a weighted percentage based on the schedule offered. Summarize the Offeror firm's current workload and state the Offeror's availability to start construction of the project. Confirm equipment availability for the proposed work.

19.12 Maximum Possible Ranking Percentage = 100 Percent

19.13 In evaluating proposals, Owner will consider the qualifications of the Offerors, whether or not the proposals comply with the prescribed requirements, and such alternates, and other data (e.g., safety record, subcontractor qualifications, experience on similar projects, etc.), as requested in the Proposal.

END OF SECTION

PRE-BID MEETING OUTLINE

Project Name: Blackhawk Boulevard Reconstruction Phase II – Repackage 'C'
Date: [INSERT MEETING DATE]
Time: [INSERT MEETING TIME]

Item		Discussed
1.	Set out Sign-in sheet.	☐
2.	Introductions.	☐
3.	Give a brief description of the project.	☐
4.	Ask Engineer if they would like to say a few words.	☐
5.	Open floor for questions.	☐
6.	Document questions and person that asked. If need be say that the question will be answered by addendum.	☐
7.	If asked, have Engineer give cost estimate.	☐
8.	Announce cutoff date and time for questions.	☐
9.	Announce date and time that bids are due.	☐
10.	Reiterate that the sealed Bids MUST be received at the City Secretary's Office, and no other location, so they can be time/date stamped.	☐
11.	Plans and Specifications are available online.	☐
12.	Confirm Sign-in sheet is complete and state that it will be shared via email.	☐
13.	We will be at the project site for field observations and questions. (Relay directions to project site)	☐
14.	This concludes the pre-bid meeting. Thank you for coming and good luck.	☐

END OF DOCUMENT

ADDENDUM

ADDENDUM NO. [INSERT ADDENDUM #]

Date of Addendum: [INSERT DATE]

PROJECT NAME: [INSERT PROJECT NAME]

PROJECT NO: [INSERT PROJECT #]

BID DATE: [INSERT DATE OF BID]

FROM: [INSERT CONTACT]
[INSERT FIRM]
[INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]

TO: Prospective Bidders

This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings may conflict, this Addendum governs.

CHANGE IN BID DATE

****

ADDENDUM CONTENT

****

CHANGES TO CONTRACT TIME

****

ADDENDUM CONTENT

****

CHANGES TO DRAWINGS

****

ADDENDUM CONTENT

****

CLARIFICATIONS

****

ADDENDUM CONTENT

****

END OF DOCUMENT

ACKNOWLEDGEMENT OF ADDENDA

Date: [INSERT DATE]

To: Prospective Respondents

From: [INSERT CONTACT]
[INSERT POSITION]
City of Friendswood

Re: [INSERT RFQ, RFP OR ITB AND #]

This signed document shall be included in the final Bid submittal. This is to serve as an official acknowledgment any addenda that were issued have been received and the contents understood.

Please list addenda by number and date.

_____

_____

_____

_____

_____

_____

Name: _____
(signature)

Name: _____
(printed name)

Name: _____
(company name)

END OF DOCUMENT

INSURANCE REQUIREMENTS

PART I: GENERAL

1.1 Throughout the term of the Executed Agreement, the Contractor, at their own expense, shall purchase, maintain, and keep in force and effect insurance against claims for injuries to, or death of, persons, or damages to property which may arise out of or result from the Contractor's operation and/or performance of the Work under stated agreement, whether such operations and/or performance be by the Contractor, their agents, representatives, volunteers, employees, or subcontractors or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

1.2 The Contractor's insurance cover shall be primary insurance with respect to the City, its officers, agents, and employees, including the City. Any insurance maintained by the City, its officials, agents, and employees shall be considered in excess of the Contractor's insurance and shall not contribute to it. Further, the Contractor shall include the City of Friendswood and all subcontractors as an additional insured under its commercial general liability policies or furnish separate certificates and endorsements for each subcontractor. All coverage for subcontractors shall be subject to all of the requirements stated herein.

1.3 The following is a list of standard insurance policies along with their respective minimum coverage amounts required per the Contract Documents:

A. Workers' Compensation: Statutory.
B. Employer's Liability: $500,000.
C. Comprehensive General Liability:
    a. Bodily Injury:
        1. $500,000 per Occurrence.
        2. $1,000,000 per Aggregate Occurrence.
    b. Property Damage:
        1. $500,000 per Occurrence.
        2. $1,000,000 per Aggregate Occurrence.
D. Comprehensive Automobile Liability:
    a. Bodily Injury:
        1. $500,000 per Each Person.
        2. $1,000,000 per Accident; or
        3. $1,000,000 Combined Single Limit (CSL).
    b. Property Damage:
        1. $500,000 per Accident.

1.4 Upon execution of Standard Agreement, the Contractor shall file with the City valid Certificates of Insurance and endorsements acceptable to the

City. Such Certificates shall contain a provision that coverage afforded under the policies will not be canceled, suspended, voided, or reduced until at least thirty days (30 D) prior written notice has been given to the City.

1.5 The Contractor shall also file with the City valid Certificates of Insurance covering all Subcontractors.

1.6 The following general requirements shall apply to all policies:

A. AM Best Rating of A- or better.
B. Only insurance carriers licensed and admitted to do business in the State of Texas shall be accepted.
C. The City of Friendswood, its officials, and employees are to be added as an Additional Insured to liability policies.
D. Certificates of Insurance showing evidence of insurance coverage shall be provided to the City's representative within ten (10) Working Days after this Agreement is executed.
E. All other requirements set in Document 000115[INSERT B, C OR P] - Instructions to [INSERT BIDDERS, OFFERORS OR PROPOSERS].

PART II: NOT USED

PART III: NOT USED

END OF DOCUMENT

CHILD SUPPORT AFFIDAVIT

"Under Texas Family Code, Section 231.006 a sole proprietorship, corporation or other entity in which a sole proprietor, partner, majority shareholder of a corporation or an owner of ten percent (10%) or more of an other business entity is thirty (30) days or more delinquent in paying child support under a court order or written repayment agreement is not eligible to bid on or receive a state contract."

To comply with Section 231.006, the affidavit below shall be signed by the person who is authorized to sign and submit a bid, and thereby bind the Bidder, and must be returned with the Bid. A failure to do so will result in the disqualification of the Bid.

"I, [INSERT SIGNEE'S NAME], the [INSERT SIGNEE'S TITLE], am authorized to sign this Bid on behalf of [INSERT CONTRACTOR NAME], a [INSERT SOLE PROPRIETORSIP/PARTNERSIP/CORPORATION/OR OTHER ENTITY].

I certify that no [INSERT SOLE PROPRIETOR/PARTNER/MAJORITY SHAREHOLDER OR TEN PERCENT (10%) OR MORE OWNER OR OTHER ENTITY] is thirty (30) days or more delinquent in child support payment required by court order or written repayment agreement."

_____ _____
[INSERT SIGNEE'S NAME] Date

SWORN AND SUBSCRIBED by me on this _____ day of_____,
A. D. _____.

Notary Public in and for _____ County, Texas.

_____
Notary Public Signature

_____
Print or Type Notary Public Name

NOTARY SEAL My Commission Expires: _____

END OF DOCUMENT

BIDDER'S BOND

STATE OF TEXAS §
§ Bond Number:[INSERT BOND #]
COUNTY OF GALVESTON §

THAT [INSERT BIDDERS NAME] ("Principal"), as Principal, and **[INSERT BONDING COMPANY NAME]** ("Surety"), as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Friendswood, a home rule municipal corporation of Harris and Galveston Counties ("Obligee"), in the sum of: **[INSERT WRITTEN AMOUNT OF 5% OF TOTAL BID, INCLUDING ANY ALLOWANCES AND ALTERNATIVES]** Dollars ($**[INSERT BOND AMOUNT IN NUMBERS]**) for the payment whereof said Bidder and Surety do bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the PRINCIPAL has submitted on or about this day a bid to perform the following:

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage 'C'
BID NUMBER: [CSP #2026-02]
PROJECT NUMBER: 10390880
PROJECT LOCATION: [Blackhawk Blvd]

in accordance with the Contract Documents, including all drawings, specifications, and terms and conditions related thereto to which reference is hereby made.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if said Principal shall faithfully enter into such written contract and provide all required submittals, including bonds and insurance, then this obligation shall become null and void; otherwise, it shall remain in full force and effect.

IT IS EXPRESSLY UNDERSTOOD AND AGREED that if Principal should withdraw its Bid anytime after such Bid is opened and before official rejection of such Bid or, if successful in securing the award thereof, said Principal should fail to enter into the Contract and furnish required submittals, including satisfactory Performance, Payment and Maintenance Bonds, along with certificate(s) of insurance evidencing required coverages and limits, the Obligee, in either of such events, shall be entitled and is hereby given the right to collect the full amount of this Bid Bond as liquidated damages, which is hereby acknowledged as the amount of damages which will be suffered by Obligee on account of the failure of Principal to perform such obligations, the actual amount of such damages being difficult to ascertain.

PROVIDED, the Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Obligee may accept such Bid, and said Surety does hereby waive notice of any such extension

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie in Harris County, Texas.

IN WITNESS THEREOF, the Bidder and Surety have signed and sealed this instrument on the respective dates written below their signatures and have attached current Power of Attorney.

_____	_____
Principal/Contractor	Surety
By:_____	By: _____ (Attorney-in-Fact Signature)
Printed Name:_____	Printed Name:_____
Address:_____	Address:_____
_____	_____
ATTEST:	ATTEST:
_____	_____
Secretary (if corporation)/Witness	Secretary (if corporation)/Witness
[Corporate Seal if corporation]	[Surety Seal]
	Registered Agent of Surety for Delivery of notice and service of process:
	Name: _____
	Address:_____
	Phone Number:_____

NOTE: Attach Certified Copy of Power of Attorney

END OF DOCUMENT

COST PROPOSAL

RFP

To: The Honorable Mayor and City Council of the City of Friendswood
City Hall
910 South Friendswood Drive
Friendswood, Texas 77546

Project: Blackhawk Boulevard Reconstruction Phase II – Repackage C
Proposal No.: CSP 2026-02

Proposer: _____
(Print or type full name of proprietorship, partnership, corporation, or joint venture.)

PART I: OFFER

1.1 Total Cost Proposed: Having examined the Project location and all matters referred to in the Proposal Documents for the Project, we, the undersigned, offer to enter into the Owner's form of Contract without material modification to perform the Work for the Total Cost Proposed shown on the signature page of this Document.

1.2 Security Deposit: Included with this Cost Proposal is a Security Deposit in the amount of five percent (5%) of the Total Cost Proposed.

1.3 Period for Acceptance of Proposal: This offer is open to acceptance and is irrevocable for ninety (90) days from the opening date of this proposal. That period may be extended by mutual written agreement of the City and the Offeror.

1.4 Addenda: All Addenda have been received. Modifications to the Construction Documents have been considered and all related costs are included in the Total Cost Proposed.

1.5 This document constitutes a government record, as defined by § 37.01 of the Texas Penal Code. Submission of a false government record is punishable as provided in § 37.10 of the Texas Penal Code.

PART II: CONTRACT TIME

2.1 If offer is accepted, the Contractor shall achieve the Date of Substantial Completion within FIVE HUNDRED FORTY (540) calendar days after the date

of commencement of the Work as stipulated in the Notice To Proceed, subject to adjustments of Contract Time as provided in the Contract.

2.2 It is also understood and agreed that the Work shall be completed in full within FIVE HUNDRED SEVENTY (570) calendar days after the date of commencement of the Work as stipulated in the Notice To Proceed, subject to adjustments of Contract Time as provided in the Contract.

PART III: CONTRACT PRICE

3.1 Total Cost Proposed has been Calculated by the Offeror, using the following component prices and process (Print or Type numerical amounts).

3.2 The Total Cost Proposed for the Project shall be a factor for Contract of the successful low Offeror.

PART IV: ACKNOWLEDGEMENT

4.1 The undersigned, as the Offeror, declares that the only person or parties interested in this proposal as principals are those named herein, that this proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the Request for Proposals, Instructions to Offerors, this Cost Proposal Form, the Agreement, the General Conditions, the Supplementary Conditions, The Technical Specifications, the Special Provisions, and the Drawings therein referred to and has carefully examined the locations, conditions, and classes of materials of the proposed work; and agrees that he shall provide all necessary labor, machinery, tools, apparatus and other items incidental to construction and will do all the work and furnish all the materials called for in the Contract and the Technical Specifications in the manner prescribed herein and according to the requirements of the City's Engineer as therein set forth.

4.2 It is understood that the following quantities of work to be done at unit prices are approximate only and are intended principally to serve as a guide in evaluating proposals. It is further understood that all items of work for which there are no specific pay items are included in the proposal items shown on this Cost Proposal Form and are considered incidental to the Work.

4.3 It is further understood that the quantities of work to be done at the unit prices and materials to be furnished may be considered necessary, in the opinion of the City's Engineer, to complete the work fully as planned and contemplated, and that all quantities of work, whether increased or decreased are to be performed at the unit prices set forth below except as provided for in the specifications.

4.4 It is further agreed that the lump sum prices may be increased to cover additional work ordered by the City's Engineer or the City, but not shown on the Drawings or required by the Technical Specifications, in accordance with the provisions of the General Conditions. Similarly, they may be decreased to cover the deletion of work so ordered.

4.5 If Offeror whose proposal is accepted by the City fails to execute the Agreement and/or fails to execute a Performance Bond and a Payment Bond within ten (10) days of Notice to Award, the proposal security shall become the property of the City, and shall be considered as payment for damages due to delay, and other inconveniences suffered by the City on account of such failure of the Offeror. Further, should the City bring suit in court to enforce any terms of this proposal, it is agreed that the Offeror or his surety shall pay to the City the cost and reasonable attorney's fees.

4.6 In the event of the award of a contract to the undersigned, the undersigned shall furnish a Performance Bond for the full amount of the Contract, to secure proper compliance with the terms and provisions of the Contract, to insure and guarantee the Work until final completion and acceptance, and shall furnish a Payment Bond in the same amount to guarantee payment of all lawful claims for labor performed and materials furnished in fulfillment of the Contract.

4.7 The work proposed to be done shall be accepted when fully complete and finished in accordance with the Drawings and Technical Specifications to the satisfaction of the City. The undersigned certified that the prices contained in this Cost Proposal Form have been carefully checked and submitted as correct and final.

4.8 Unit and lump sum prices shall be shown in words and figures for each item listed in this proposal, and in the event of discrepancy, the words shall control. Should prices on any item be omitted, the right to apply the lowest prices submitted by any other Offerors for the omitted items in payment for work done under this proposal.

4.9 Offeror understands that the City reserves the right to reject any and all proposals and to waive any informalities in the competitive sealed proposal process. In addition, the City reserves the right to award the Contract to the Offeror that provides the best value to the City based upon the criterion specified in the Instructions to Offerors.

4.10 Proposals shall be good for ninety (90) days from the date of the proposal opening.

PART V: UNIT PRICE COST PROPOSAL FORMS

5.1 The following forms shall be included in this Cost Proposal Form.

A. PAVING ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL AMOUNT
1	Mobilization (3% maximum), complete in place, the sum of:	L.S.	1		
2	Traffic Control and Regulation throughout the project duration, including Flagmen, Signs, Barrels, Barricades, Temporary Striping and Raised Markers, Message Boards, Arrow Boards, Maintaining All Weather Access to Traffic, Temporary Transitions from Proposed Pavement to Existing Pavement, Relocating Existing Mailboxes and Traffic Signs, and Temporary Mailboxes, complete in place, the sum of:	L.S.	1		
3	Preparatory work for sampling and analysis in Chlorinated solvent (SCA) and Potentially Petroleum Contaminated Area (PPCAs) impacted area, complete in place, the sum of:	L.S.	1		
4	Temporary Signals at FM 2351 and FM 528 intersections, complete in place, the sum of:	EA.	2		
5	Implementation of Storm Water Pollution Prevention Plan including Maintenance, Permitting, Inspections, and Reporting for all Pollution Prevention Measures as shown on the plans, including concrete washout areas, complete in place, the sum of:	L.S.	1		
6	Remove and dispose of existing reinforced concrete pavement and base material, regardless of thickness encountered, including curb, sawcutting and paving headers, complete in place, the sum of:	S.Y.	24,500		
7	7" thick reinforced concrete pavement, including reinforcement, joints, excavation, embankment grading, and curing, complete in place, the sum of:	S.Y.	24,500		
8	8" lime stabilized subgrade, including grading, mixing, compacting and curing, complete in place, the sum of:	S.Y.	28,000		
9	Lime for lime stabilized subgrade (8% minimum by dry weight), complete in place, the sum of:	TON	825		
10	6" Concrete Driveway, including sawcutting, curb return, stabilized subgrade, reinforcement and joints, complete in place, the sum of:	S.Y.	2,000		
11	Additional cost for Decorative Driveway treatment, all styles, complete in place, the sum of:	S.Y.	50		
12	Remove and dispose of existing concrete driveway, regardless of thickness encountered, including sawcutting, complete in place, the sum of:	S.Y.	2,000		
13	2" Type D HMAC surface overlay, with tack coat placed at a minimum rate of 0.1 gal/SY, complete in place, the sum of:	S.Y.	80		
14	6" Type B HMAC black base course, placed in 3-inch lifts, with prime coat, complete in place, the sum of:	S.Y.	80		
15	8" Thick Cement Stabilized Subgrade, complete in place, the sum of:	S.Y.	80		
16	Concrete paving header, complete in place, the sum of:	L.F.	850		
17	4-1/2" thick concrete sidewalk, including sawcutting, subgrade, bank sand bedding, reinforcement and joints, complete in place, the sum of:	S.F.	31,250		
18	Wheelchair Ramp, including sawcutting, reinforcement and joints, and truncated domes, complete in place, the sum of:	S.F.	3,000		
19	Remove and dispose of existing concrete sidewalk and wheelchair ramps, regardless of thickness encountered, including sawcutting, complete in place, the sum of:	S.F.	25,250		
20	Concrete Curb for roadway (Standard 6" Curb), including sawcutting, reinforcement, and joints, complete in place, the sum of	L.F.	15,000		
21	0" to 12" Curb on sidewalks and wheelchair ramps, including sawcutting, reinforcement, and joints, complete in place, the sum of:	L.F.	2,500		
22	Retaining Wall (greater than 12"), including sawcutting, reinforcement, joints, and weepholes, complete in place, the sum of:	L.F.	200		
23	Concrete rip rap for esplanade nose, complete in place, the sum of:	S.Y.	85		
24	Vehicle loop detectors, including sawcut containing loop wire, (per TxDOT detail) for complete operation, complete in place, the sum of:	EA.	5		
25	Temporary driveways, complete in place, the sum of:	EA.	40		
SUBTOTAL PAVING ITEMS (A)					**$**

B. DRAINAGE ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL AMOUNT
26	Remove and dispose of existing storm sewer and culverts, all depths, all sizes, all material types, including excavation and backfill and site restoration, complete in place, the sum of:	L.F.	850		
27	Remove Storm Sewer Brick Plugs, Less Than or Equal to 24" Diameter, complete in place, the sum of:	EA.	4		
28	Remove Storm Sewer Brick Plugs for Reinforced Concrete Box (all sizes), complete in place, the sum of:	EA.	1		
29	Replace yard drain piping through curb, including PVC pipe and fittings, all depths, complete in place, the sum of:	EA.	5		
30	Remove and dispose of existing storm sewer manhole or junction box, including excavation and backfill, salvaging ring and cover and site restoration, complete in place, the sum of:	EA.	8		
31	Remove and dispose of existing inlets, including excavation and backfill, salvaging frame and grate and site restoration, complete in place, the sum of:	EA.	13		
32	Adjust Existing Storm Sewer Manhole Rim and Cover to Grade, including excavation, backfill, and site restoration, complete in place, the sum of:	EA.	2		
33	5'x3' Precast Reinforced Concrete Box Culvert, all depths, cement stabilized sand bedding and backfill, complete in place, the sum of:	L.F.	785		
34	42" Diameter Reinforced Concrete Pipe, ASTM C76, Class III storm sewer, rubber gasket joints, all depths, cement stabilized sand bedding and backfill, complete in place, the sum of:	L.F.	35		
35	36" Diameter Reinforced Concrete Pipe, ASTM C76, Class III storm sewer, rubber gasket joints, all depths, cement stabilized sand bedding and backfill, complete in place, the sum of:	L.F.	35		
36	30" Diameter Reinforced Concrete Pipe, ASTM C76, Class III storm sewer, rubber gasket joints, all depths, cement stabilized sand bedding and backfill, complete in place, the sum of:	L.F.	570		
37	24" Diameter Reinforced Concrete Pipe, ASTM C76, Class III storm sewer, rubber gasket joints, all depths, cement stabilized sand bedding and backfill, complete in place, the sum of:	L.F.	2,100		
38	Precast 7' x 7' Storm Sewer Box Junction Box, all depths, including ring and cover or frame and grate, cement stabilized sand bedding and backfill, complete in place, the sum of:	EA.	5		
39	Precast 6' x 6' Storm Sewer Box Junction Box, all depths, including ring and cover or frame and grate, cement stabilized sand bedding and backfill, complete in place, the sum of:	EA.	1		
40	Precast 5' x 5' Storm Sewer Box Junction Box, all depths, including ring and cover or frame and grate, cement stabilized sand bedding and backfill, complete in place, the sum of:	EA.	5		
41	Precast 4' x 4' Storm Sewer Box Junction Box, all depths, including ring and cover or frame and grate, cement stabilized sand bedding and backfill, complete in place, the sum of:	EA.	19		
42	Storm Manway Installed on Precast Storm Sewer Box Culverts, complete in place, the sum of:	EA.	2		
43	Type 'B-B' Storm Sewer Inlet, all depths, including frame and grate, cement stabilized sand bedding and backfill, complete in place, the sum of:	EA.	32		
44	Trench safety for all storm sewers greater than 5' deep, including installation, operation and removal, complete in place, the sum of:	L.F.	3,525		
45	Inlet Protection Barrier Type II and Type III (at Existing & Proposed Stage II Inlets), including maintenance and removal, complete in place, the sum of:	EA.	48		
SUBTOTAL DRAINAGE ITEMS (B)					**$**

C. STRIPING AND SIGNAGE ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL AMOUNT
46	Thermoplastic pavement markings, 4" white, including surface preparation and priming, complete in place, the sum of:	L.F.	2,700		
47	Thermoplastic pavement markings, 4" yellow, including surface preparation and priming, complete in place, the sum of:	L.F.	1,080		
48	Thermoplastic pavement markings, 8" white, including surface preparation and priming, complete in place, the sum of:	L.F.	800		
49	Thermoplastic pavement markings, 12" white, including surface preparation and priming, complete in place, the sum of:	L.F.	1,850		
50	Thermoplastic pavement markings, 24" white, including surface preparation and priming, complete in place, the sum of:	L.F.	400		
51	Thermoplastic pavement marking, yellow paint along esplanade curb, including surface preparation and priming, complete in place, the sum of:	L.F.	3,400		
52	Thermoplastic pavement marking, black paint on esplanade nose area, including surface preparation and priming, complete in pace the sum of:	S.Y.	115		
53	Thermoplastic pavement markings, ONLY, including surface preparation and priming, complete in place, the sum of:	EA.	10		
54	Thermoplastic pavement markings, arrow, including surface preparation and priming, complete in place, the sum of:	EA.	10		
55	Raised reflective pavement markers, Type II-C-R, complete in place, the sum of:	EA.	235		
56	Raised reflective pavement markers, Type II-B-B, complete in place, the sum of:	EA.	6		
57	Furnish and install traffic sign, STOP R1-1, including street sign, WITH NO OUTLET DESIGNATION, complete in place, the sum of:	EA.	3		
58	Furnish and install traffic sign, STOP R1-1, including street sign, WITH ALL WAY DESIGNATION, complete in place, the sum of:	EA.	6		
59	Furnish and install traffic sign, STOP R1-1, including street sign, WITHOUT NO OUTLET DESIGNATION , complete in place, the sum of:	EA.	2		
60	Furnish and install traffic sign, STOP R1-1, without street sign, complete in place, the sum of:	EA.	1		
61	Furnish and install traffic sign, SPEED LIMIT R2-1, complete in place, the sum of:	EA.	2		
62	Project identification sign, including installation, maintenance and removal, complete in place, the sum of:	EA.	2		
63	New traffic sign, post, and foundation, complete in place, the sum of:	EA.	14		
64	Remove and replace City of Friendswood sign at Bentwood intersection, complete in place, the sum of:	EA.	1		
SUBTOTAL STRIPING AND SIGNAGE ITEMS (C)					**$**

D. TREE PROTECTION ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL AMOUNT
65	Remove tree 0 to 11.99", complete in place, the sum of:	EA.	6		
66	Remove tree 12" to 29.99", complete in place, the sum of:	EA.	3		
67	Clearance prune tree, complete in place, the sum of:	EA.	115		
68	Install Tree Protection fence, complete in place, the sum of:	L.F.	7,500		
69	Install Root Pruning Trench, complete in place, the sum of:	L.F.	2,700		
70	Install Zero Curb Cutback, complete in place, the sum of:	L.F.	500		
71	Install Checkerplate Sidewalk construction, complete in place, the sum of:	S.F.	160		
72	Hand dig tap and lead/Water line fitting/Fire Hydrant, complete in place, the sum of:	EA.	5		
SUBTOTAL TREE PROTECTION ITEMS (D)					**$**

E. SUPPLEMENTAL ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE		TOTAL AMOUNT	
73	Well pointing for storm sewer, all sizes, all depths, including all necessary appurtenances, complete in place, the sum of:	L.F.	1,000	$ 25.00	(1)	**$ 25,000.00**	(1)
74	Wet condition bedding for storm sewer installation, all sizes, all depths, consisting of 6" crushed stone foundation, complete in place, the sum of:	L.F.	1,000	$ 10.00	(1)	**$ 10,000.00**	(1)
75	Wet condition bedding for storm sewer junction box construction, all sizes, all depths, complete in place, the sum of:	EA.	3	$ 500.00	(1)	**$ 1,500.00**	(1)
76	Solid sheet shoring system for storm sewer and water line, all sizes, all depths, complete in place, the sum of:	L.F.	200	$ 40.00	(1)	**$ 8,000.00**	(1)
77	Installation and removal of piezometers, complete in place, the sum of:	EA.	5	$ 200.00	(1)	**$ 1,000.00**	(1)
78	Install extra cement stabilized sand backfill, complete in place, the sum of:	C.Y.	150	$ 30.00	(1)	**$ 4,500.00**	(1)
79	Install extra bank sand backfill, complete in place, the sum of:	C.Y.	75	$ 25.00	(1)	**$ 1,875.00**	(1)
80	Extra Type D asphalt pavement, complete in place, the sum of:	TON	75	$ 100.00	(1)	**$ 7,500.00**	(1)
81	Extra crushed concrete base material, complete in place, the sum of:	TON	75	$ 30.00	(1)	**$ 2,250.00**	(1)
82	6" overexcavation of trench bottom, complete in place, the sum of:	L.F.	750	$ 5.00	(1)	**$ 3,750.00**	(1)
83	Extra 1.5 sack of cement per cubic yard added to the 6" concrete driveways (total of 7.0 sack/cubic yard), complete in place, the sum of:	S.Y.	2,250	$ 5.00	(1)	**$ 11,250.00**	(1)
84	Extra 1.5 sack of cement per cubic yard added to the 7" concrete pavement and driveways (total of 7.0 sack/cubic yard), complete in place, the sum of:	S.Y.	2,000	$ 7.00	(1)	**$ 14,000.00**	(1)
85	Brace, support, and protect utility structures as per Utility Company's requirements, complete in place, the sum of:	EA.	25	$ 1,000.00	(1)	**$ 25,000.00**	(1)
86	Remove and Replace Decorative Landscaping, including Flowers, Plants, Bushes, Rocks and Associated Materials within Landscaping Area, complete in place, the sum of:	S.F.	500	$ 20.00	(1)	**$ 10,000.00**	(1)
87	Remove and Replace Irrigation System per Property due to conflict during construction to obtain an operational system, including Sprinkler Heads and Valves and Plugging Existing System for Use During Construction, complete in place, the sum of:	EA.	15	$ 1,000.00	(1)	**$ 15,000.00**	(1)
88	Abandon Existing Storm Sewer Manhole per detail in plans, complete in place, the sum of:	EA.	5	$ 500.00	(1)	**$ 2,500.00**	(1)
89	Clean and Televise Existing Storm Sewer Pipe Ranging from 24-inch Diameter to Equal to or Less Than 30-inch Diameter, including capturing and proper disposal of pipe debris, complete in place, the sum of:	L.F.	1,200	$ 10.00	(1)	**$ 12,000.00**	(1)
90	Proposed Point Repair on existing 24" RCP storm sewer (maximum limit of 8-foot), including removal and disposal of existing pipe section and replacing with new 24" RCP storm sewer, bedding and backfill per detail and two concrete collars, complete in place, the sum of:	EA.	1	$ 1,500.00	(1)	**$ 1,500.00**	(1)
91	Proposed Point Repair on existing 30" RCP storm sewer (maximum limit of 8-foot), including removal and disposal of existing pipe section and replacing with new 30" RCP storm sewer, bedding and backfill per detail and two concrete collars, complete in place, the sum of:	EA.	1	$ 2,000.00	(1)	**$ 2,000.00**	(1)

92	Additional footage of proposed 24" RCP storm sewer to Proposed Point Repair, complete in place, the sum of:	L.F.	16	$ 90.00	(1)	**$ 1,440.00**	(1)
93	Additional footage of proposed 30" RCP storm sewer to Proposed Point Repair, complete in place, the sum of:	L.F.	16	$ 125.00	(1)	**$ 2,000.00**	(1)
94	Concrete collar for 24" RCP, complete in place, the sum of:	EA.	4	$ 600.00	(1)	**$ 2,400.00**	(1)
95	Development of a Health & Safety, Soil Management, and Groundwater Control Plan for Chlorinated solvent (SCA) and Potentially Petroleum Contaminated Area(PPCAs), complete in place, the sum of:	LS	1	$ 10,000.00	(1)	**$ 10,000.00**	(1)
96	Offsite transportation and disposal of Non-hazardous (Category I), Chlorinated solvent (SCA) impacted soil, complete in place, the sum of:	CY	200	$ 100.00	(1)	**$ 20,000.00**	(1)
97	Offsite transportation and disposal of Hazardous (Category II), Chlorinated solvent (SCA) impacted soil, complete in place, the sum of:	CY	200	$ 150.00	(1)	**$ 30,000.00**	(1)
98	Offsite transportation and disposal of Non-hazardous (Category I), Petroleum Contaminated Area(PPCAs) impacted soil, complete in place, the sum of:	CY	200	$ 50.00	(1)	**$ 10,000.00**	(1)
99	Offsite transportation and disposal of Hazardous(Category II), Petroleum Contaminated Area(PPCAs) impacted soil, complete in place, the sum of:	CY	200	$ 75.00	(1)	**$ 15,000.00**	(1)
100	Offsite transportation and disposal of Non-hazardous(Category I), Chlorinated solvent (SCA) impacted groundwater, complete in place, the sum of:	Gal	1,000	$ 10.00	(1)	**$ 10,000.00**	(1)
101	Offsite transportation and disposal of Hazardous (Category II) Chlorinated solvent (SCA) impacted groundwater, complete in place, the sum of:	Gal	1,000	$ 15.00	(1)	**$ 15,000.00**	(1)
102	Offsite transportation and disposal of groundwater from Petroleum Contaminated Area (PPCAs), complete in place, the sum of:	Gal	1,000	$ 5.00	(1)	**$ 5,000.00**	(1)
103	24-inch x 8-inch Tapping Sleeve W/8-inch Tapping Valve and Box: including 20 linear feet of 8-inch AWWA C900 DR25 PVC pipe, 8-inch plug w/blow-off valve assembly, complete in place, the sum of:	EA.	1	$ 15,000.00	(1)	**$ 15,000.00**	(1)
SUBTOTAL SUPPLEMENTAL ITEMS (E)						**$**	

F. CASH ALLOWANCE ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE		TOTAL AMOUNT	
104	Cash allowance for street light relocation, complete in place, the sum of:	C.A.	1	$ 60,000.00	(2)	$ 60,000.00	(2)
SUBTOTAL CASH ALLOWANCE ITEMS (F)						**$ 60,000.00**	(2)

G. UTILITIES ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL AMOUNT
105	12-inch PVC (AWWA C-900, DR 18) Class 150, Water Line by Trenchless Construction, all depths, including Service Connection Pits, fittings and restraints, complete in place, the sum of:	L.F.	1,650		
106	8-inch PVC (AWWA C-900, DR 18) Class 150, Water Line by Trenchless Construction, all depths, including Service Connection Pits, fittings and restraints, complete in place, the sum of:	L.F.	1,200		
107	6-inch PVC (AWWA C-900, DR 18) Class 150, Water Line by Trenchless Construction, all depths, including Service Connection Pits, fittings and restraints, complete in place, the sum of:	L.F.	275		
108	2-inch PVC (AWWA C-900, DR 18) Class 150, Water Line by Trenchless Construction, all depths, including Service Connection Pits, fittings and restraints, complete in place, the sum of:	L.F.	175		
109	12-inch Gate Valve & Box, AWWA C509, mechanical joint, resilient wedge, NRS open counter clockwise with valve boxes, complete in place, the sum of:	EA.	7		
110	8-inch Gate Valve & Box, AWWA C509, mechanical joint, resilient wedge, NRS open counter clockwise with valve boxes, complete in place, the sum of:	EA.	5		
111	6-inch Gate Valve & Box, AWWA C509, mechanical joint, resilient wedge, NRS open counter clockwise with valve boxes, complete in place, the sum of:	EA.	5		
112	12-inch Wet Connection, including coupling and appurtenances as necessary, complete in place, the sum of:	EA.	4		
113	8-inch Wet Connection, including coupling and appurtenances as necessary, complete in place, the sum of:	EA.	3		
114	6-inch Wet Connection, including coupling and appurtenances as necessary, complete in place, the sum of:	EA.	3		
115	2-inch Wet Connection, including coupling and appurtenances as necessary, complete in place, the sum of:	EA.	4		
116	6-inch Plug with 2-inch Threaded Tap, complete in place, the sum of:	EA.	2		
117	2-inch Tap on 6-inch PVC Water Line, complete in place, the sum of:	EA.	2		
118	Cut and plug existing 12-inch water line to be abandoned, complete in place, the sum of:	EA.	7		
119	Cut and plug existing 8-inch water line to be abandoned, complete in place, the sum of:	EA.	2		
120	Cut and plug existing 6-inch water line to be abandoned, complete in place, the sum of:	EA.	3		
121	Cut and plug existing 2-inch water line to be abandoned, complete in place, the sum of:	EA.	4		
122	8" X 8" Tapping Sleeve and Valve (TS&V), complete in place, the sum of:	EA.	1		
123	Short Side Water Line Service Reconnections (1 inch), complete in place, the sum of:	EA.	3		
124	Long Side Water Line Service Reconnections (1 inch), complete in place, the sum of:	EA.	24		
125	Fire hydrant assembly, AWWA C502, mechanical joint inlet, including 6" gate valve and box, complete in place, the sum of:	EA.	4		
126	Fire hydrant lead, complete in place, the sum of:	L.F.	30		
127	Remove and Salvage Existing Fire Hydrant, complete in place, the sum of:	EA.	2		
128	Abandon Existing Water Valve, complete in place, the sum of:	EA.	8		
129	Relocate existing meter box, complete in place, the sum of:	EA.	5		
130	Trench safety for all water line greater than 5' deep, including installation, operation and removal, complete in place, the sum of:	L.F.	1,000		
131	Adjust Existing Sanitary Manhole Rim and Cover to New Grade, including rack over if required, excavation, backfill, and site restoration, complete in place, the sum of:	EA.	2		
132	Well pointing for water line, all sizes, all depths, including all necessary appurtenances, complete in place, the sum of:	L.F.	1,000		
133	Wet condition bedding for water line installation, all sizes, all depths, consisting of 6" crushed stone foundation, complete in place, the sum of:	L.F.	1,000		
SUBTOTAL UTILITIES (G)					**$**

H. 24" TRANSMISSION MAIN ITEMS

ITEM	ITEM DESCRIPTION	UNIT	QTY.	UNIT PRICE	TOTAL AMOUNT
134	24-inch HDPE (DR 13.5, DIPS) Water Transmission Main by Open Cut Construction, all depths, including fittings, restraints, excavation, bedding and backfill, hydrostatic testing,and disinfection, complete in place, the sum of:	L.F.	1,315		
135	24-inch HDPE (DR 13.5, DIPS) Water Transmission Main by Trenchless Construction, all depths,including 42" steel encasement, shaft pit, fittings and restraints, complete in place, the sum of:	L.F.	433		
136	24" Gate Valve, AWWA C515, reduced-wall,resilient seated gate valves with 250 psi pressure rating, furnished with spur or bevel gearing, including installation, valave box, and concrte pads, complete in place, the sum of:	E.A.	2		
137	2-Inch Air Release Valve and Vault including fittings, vent piping, and appurtenances necessary for complete installation, complete in place, the sum of:	E.A.	2		
138	Connection to Existing 24-inch Waterline, including PVC DR 25 pipe segments, transition couplings, and restraints, complete in place, the sum of:	E.A.	2		
139	Removal and replacement of existing 10" Sanitary Sewer w/10-inch PVC AWWA C900 DR-25 by Open cut Construction, all depths, excavation, bedding and backfill, connection to existing system, materials labor, removal and disposal of existing saniatry sewer line, post-installation televsion inspection and testing, and cement stabilized sand, complete in place, the sum of:	L.F.	20		
140	Trench Safety for all water line greater than 5' deep, including installation, operation and removal, complete in place, the sum of:	L.F.	1,315		
141	Clear and Grub, complete in place, the sum of:	L.S.	1		
142	Dewatering along 24" transmission main limits, complete in place, the sum of:	L.S.	1		
143	Transmission Main Testing and Disfection, complete in place, the sum of:	L.S.	1		
SUBTOTAL 24" TRANSMISSION MAIN ITEMS (H)					**$**

TOTAL ITEM NOS. 1 - 104	**$**

TOTAL UTILITIES ITEM NOS. 105 - 143	**$**

TOTAL BASE BID ITEM NOS. 1 - 143	**$**

Notes:

(1) Minimum Bid Price determined prior to Bid. Can be increased by the Bidder by crossing out the Minimum and noting revised price on the line above.

(2) Fixed Unit Price determined prior to Bid. Cannot be adjusted by the Bidder.

5.2 Insert a lump sum figure for each of the alternates listed in TABLE 5.2 – ALTERNATES listed below:

Alternate Number	Alternate Description	Alternate Lump Sum
01210-1		$
01210-2		$
01210-3		$
01210-4		$
01210-5		$
TOTAL ALTERNATE PRICE		$

5.3 ADDENDA ACKNOWLEDGEMENT

ADDENDA NUMBER	ADDENDA DATE	DATE RECEIVED	OFFERORS INITIALED
1			
2			
3			
4			
5			

5.4 ALLOWANCES

1. Allowance Type

5.5 PRICES

A. TOTAL BASE COST PROPOSED _____

B. TOTAL ALTERNATES _____

C. TOTAL ALLOWANCES_____

D. TOTAL COST PROPOSED _____

PART VI: SIGNATURES

6.1 By signing this Document, I agree that I have received and reviewed all Addenda and considered all costs associated with the Addenda in calculating the Total Cost Proposed.

Company: _____
(Print Company Name)

Signed: _____
(Authorized Signature)

By: _____
(Print Name)

Title: _____
(Print Title)

ATTEST:

_____
(Seal, if Offeror is a Corporation)

_____
(Mailing Address)

_____
(City, State and Zip Code)

_____
(Delivery Address)

_____
(City, State and Zip Code)

_____
(Telephone Number)

_____
(email Address)

PART VII: AFFIDAVIT

All pages in Offers' cost proposal containing statements, letters, etc. shall be signed by a duly authorized officer of the company, whose signature is binding on the proposal.

The undersigned offers and agrees to one (1) of the following:

☐ I hereby certify that I do not have outstanding debt with the City of Friendswood. Further, I agree to pay succeeding debts as they become due during this agreement.

☐ I hereby certify that I do have outstanding debts with the City of Friendswood and agree to pay said debts prior to execution of this agreement.

☐ I hereby certify that I do have outstanding debts with the City of Friendswood and agree to enter into an agreement for the payment of said debts. I further agree to pay succeeding debts as they become due.

Name of Offeror: _____

Title: _____

Address: _____

City/State/Zip: _____

Telephone: _____

Email: _____

Signature: _____

SWORN AND SUBSCRIBED by me on this _____ day of _____,
A. D. 20_____.

Notary Public in and for _____ County, Texas.

_____
Notary Public Signature

_____
Print or Type Notary Public Name

NOTARY SEAL My Commission Expires: _____

END OF DOCUMENT

00145-14

BID TABULATION SHEET

Bid Tabulation For:							
CONTRACTOR NAME:				Company 1		Company 1	
Item Number	Item Description	Unit	Unit Amount	Unit Price	Extended Amount	Unit Price	Extended Amount
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
SUBTOTAL BASE BID				**$0.00**		**$0.00**	
01210-1							
01210-2							
01210-3							
01210-4							
01210-5							
01210-6							
01210-7							
SUBTOTAL ALLOWANCES				**$0.00**		**$0.00**	

A.	**BASE BID**	**$0.00**	**$0.00**
B.	**ALTERNATES**	**$0.00**	**$0.00**
C.	**TOTAL STIPULATED PRICE**	**$0.00**	**$0.00**

END OF DOCUMENT

THE STATE OF TEXAS §
§
COUNTY OF HARRIS §

STANDARD AGREEMENT FOR CONTRACTING SERVICES

THIS AGREEMENT, entered into as of this [INSERT DATE] day of [INSERT MONTH], [INSERT YEAR], by and between the City of Friendswood, Texas (hereinafter called the "CITY") acting herein by its Mayor, duly authorized by approval of the City Council of the City of Friendswood and [INSERT CONTRACTOR NAME], [INSERT ADDRESS], [INSERT CITY, STATE AND ZIP] (hereinafter called the "CONTRACTOR") acting herein by [INSERT PRINCIPAL NAME], [INSERT PRINCIPAL TITLE] hereunto duly authorized:

WITNESSETH THAT:

WHEREAS, the CITY and the CONTRACTOR in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE I: WORK

1.1 The Contractor shall complete all the Work as specified in the Contract Documents. The Work is generally described as follows:

Blackhawk Boulevard Reconstruction Phase II – Repackage C

1.2 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Blackhawk Boulevard Reconstruction Phase II – Repackage C

ARTICLE II: DESIGN PROFESSIONAL

2.1 The Project has been designed by HDR Engineering, Inc., 4828 Loop Central Drive, Ste. 700, Houston, TX 77081, who is hereinafter called the Design Professional and who is to act as the City's Representative, assume all duties and responsibilities and shall have the rights and authority assigned to the Design Professional in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE III: CONTRACT TIME

3.1 The Work shall be Substantially Complete within five hundred and forty (540) calendar days after the date when the Contract Time commences to run as provided by

the General Conditions.

3.2 The Work shall have Final Completion and be ready for Final Payment in accordance with the General Conditions within thirty calendar days after the date when the Contract Time commences to run as provided by the General Conditions.

ARTICLE IV: LIQUIDATED DAMAGES

4.1 The City and the Contractor recognize that time is of the essence of this Agreement and that the City shall suffer financial loss if the Work is not completed within the time specified in Article 3.1 above, plus any extensions thereof allowed in accordance with the General Conditions. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by the City if the Work is not completed on time. Accordingly, instead of requiring any such proof, the City and the Contractor agree that as liquidated damages for delay (not as a penalty) the Contractor shall pay the City FIVE HUNDRED Dollars ($500.00) for each day that expires after the time specified in Article 3.1, in this Agreement, for Substantial Completion until the Work is Substantially Complete.

4.2 After Substantial Completion, if the Contractor shall neglect, refuse or fail to complete the remaining Work within the time specified in Article 3.2 for Final Completion and readiness for Final Payment or any proper extension thereof granted by the City, the Contractor shall pay City Seven Hundred Fifty Dollars ($750) for each day that expires after the time specified in Article 3.2, in this Agreement, for Final Completion until the Work is Finally Complete and ready for Final Payment.

4.3 Contractor agrees any assessed liquidated damages may be offset against retainage held by the City.

ARTICLE V: CONTRACT PRICE

5.1 The City shall pay the Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Document 00145 – Unit Price Bid Form.

5.2 TOTAL AMOUNT OF BID is [INSERT WRITTEN DOLLARS] Dollars and [INSERT WRITTEN CENTS] Cents ($[INSERT # AMOUNT]).

5.3 As provided in the General Conditions estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by the City as provided in the General Conditions. Unit prices have been computed as provided in the General Conditions. Unit prices

specified as per lump sum have been computed in accordance with of the General Conditions.

ARTICLE VI: PAYMENT PROCEDURES

6.1 The Contractor shall submit Contractor Payment Application. Payment Applications shall be processed by the City as provided in the General Conditions.

6.2 Progress Payments; The City shall make progress payments on account of the Contract Price on the basis of the Contractor's Payment Application on or about the twentieth (20th) day of each month during construction as provided in Paragraph 6.3 below. All such payments shall be measured by the schedule of value established in Section 01295 – Schedule of Values (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

6.3 Prior to Substantial Completion progress payments shall be made equal to the percentage of the Work completed, as established above, and materials and/or equipment not incorporated in the work completed but delivered, suitably stored, and accompanied by suitable documentation satisfactory to the City as provided in the General Conditions. Progress payments shall be made less retainage as indicated in Paragraph 6.4 and 6.5 below, but in each case, less the aggregate of payments previously made less such amounts as the City shall determine or withhold, in accordance with of the General Conditions.

6.4 Retainage prior to Substantial Completion; If the total Contract Price at the time of Contract Execution is Five Hundred Thousand Dollars ($500,000) or more, the agreed retainage until Substantial Completions shall be five percent (5%), otherwise the agreed retainage shall be ten percent (10%).

6.5 Retainage after Substantial Completion: On projects where a long period of time is expected to occur between the Substantial Completion and Final Acceptance, retainage shall be reduced by one-half (1/2). The reduced retainage shall never be less that the expected value of any work requiring correction or unfinished work. A portion of the retainage shall always be held until issuance of a Certification of Final Completion.

ARTICLE VII: INTEREST

7.1 All monies except retainage, not paid when due as provided in the General Conditions shall bear interest at the maximum rate allowed by the law.

ARTICLE VII: CONTRACTOR'S REPRESENTATIONS

In order to induce the City to enter into this Agreement the Contractor makes the following representations:

8.1 The Contractor has examined and carefully studied the Contract Documents (including the Addenda listed in Article IX) and other related data identified in the Documents including "technical data" and performed a constructability review.

8.2 The Contractor has visited the site and become familiar with and is satisfied as to the general local and site conditions, including utilities that may affect cost, progress, performance and furnishing of the Work.

8.3 The Contractor is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work.

8.4 The Contractor has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings if physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in the General Conditions. Contractor accepts the determination set forth in the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which the Contractor is entitled to rely as provided in the General Conditions. The Contractor acknowledges that such reports and drawings are not Contract Documents and may not be complete for the Contractor's purposes. The Contractor acknowledges that the City and the Design Professional shall not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. The Contractor has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by the Contractor and safety precautions and programs incident hereto. The Contractor does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with other terms and conditions of the Contract Documents.

8.5 The Contractor is aware of the general nature of work to be performed by the City and others at the site that relates to the Work as indicated in the Contract Documents.

8.6 The Contractor has correlated the information known to the Contractor, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all examinations, investigations, explorations, tests, studies and data with the Contract Documents.

8.7 The Contractor has given the City written notice of all conflicts, errors, ambiguities or discrepancies that the Contractor has discovered in the Contract Documents and the written resolution thereof by the City is acceptable to the Contractor, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE IX: THE CONTRACT DOCUMENTS

The Contract Documents, which comprise the entire agreement between the FDEDC and the Contractor concerning the Work, consist of those referenced in this article. The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. In case of conflict between any of the Contract Documents, priority of interpretation shall be in the following order:

9.1 Any modification, including Change Orders, duly delivered after Execution of the Agreement

9.2 Addenda as issued, with Acknowledgement of Addenda if applicable

9.3 Standard Agreement for Contracting Services (this agreement)

9.4 General Conditions.

9.5 Supplemental Conditions

9.6 Technical Specifications Divisions 1 through 16

9.7 Request for Proposals (Cover Sheet and numbered sheets)

9.8 Post-Bid Procedures

9.9 Insurance Requirements

9.10 Performance Bond, included herein

9.11 Payment Bond, included herein.

9.12 Texas Workers' Compensation

9.13 Wage Scale

9.14 Affidavit of Insurance, and Certificates of Insurance

9.15 Alcohol and Drug Free Workplace Policy

9.16 Construction Storm Preparation Policy

9.17 Hazardous Communications Program Requirement Agreement.

9.18 Homeland Security Policy

9.19 Child Support Affidavit

9.20 Unit Price Bid Form

9.21 Texas Ethics Commission Form 1295

9.22 Government Code Verifications Form

There are no Contract Documents other than those listed above in this Article IX. The Contract Documents shall only be altered, amended, or repealed by a modification (as defined in the General Conditions).

ARTICLE X: INDEMNIFICATION

CONTRACTOR SHALL PROTECT, DEFEND, INDEMNIFY, AND HOLD THE CITY, ITS OFFICERS, ELECTED OFFICIALS, AGENTS, AND EMPLOYEES, HARMLESS FROM ANY CLAIMS, FINES, DEMANDS, LOSS, DAMAGE, SUIT, AND LIABILITY OF EVERY KIND, INCLUDING ALL EXPENSES OF LITIGATION, COURT COSTS, AND ATTORNEY'S FEES, FOR INJURY TO OR DEATH OF ANY PERSON, OR FOR DAMAGE TO ANY PROPERTY, CAUSED BY THE NEGLIGENT, INTENTIONAL OR WILLFUL ACTS OR OMISSIONS OF THE CONTRACTOR, ITS OFFICERS, EMPLOYEES, AGENTS, CONTRACT LABORERS, OR SUBCONTRACTORS IN THE PERFORMANCE OF THIS AGREEMENT.

CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF ALL APPLICABLE LAWS, RULES, AND REGULATIONS IN CONNECTION WITH THE SERVICES OF CONTRACTOR AND SHALL EXONERATE,

INDEMNIFY, DEFEND, AND HOLD HARMLESS THE CITY, ITS OFFICERS, AGENTS AND ALL EMPLOYEES FROM ANY AND ALL LIABILITY, LOSS OR DAMAGE ARISING OUT OF NONCOMPLIANCE WITH SUCH LAWS, RULES AND REGULATIONS, WITHOUT LIMITATION. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR PAYMENTS OF FEDERAL, STATE AND LOCAL TAXES OR CONTRIBUTIONS IMPOSED OR REQUIRED UNDER THE SOCIAL SECURITY, WORKER'S COMPENSATION, AND INCOME TAX LAWS WITH RESPECT TO CONTRACTOR'S EMPLOYEES. FURTHER, CONTRACTOR SHALL EXONERATE, INDEMNIFY, DEFEND, AND HOLD HARMLESS THE CITY, ITS OFFICERS, AGENTS AND ALL EMPLOYEES FROM ANY AND ALL LIABILITY, LOSS, DAMAGES, EXPENSES OR CLAIMS ARISING OUT OF ANY ACT OR OMISSION, INTENTIONAL TORT, OR FAILURE TO PAY A SUBCONTRACTOR OR SUPPLIER OF CONTRACTOR, ITS OFFICERS, AGENTS AND EMPLOYEES IN CONNECTION WITH ANY OF THE WORK PERFORMED OR TO BE PERFORMED UNDER THIS CONTRACT BY CONTRACTOR OR AS A RESULT OF CONTRACTOR'S FAILURE TO USE AND EMPLOY REASONABLE SKILL AND CARE BEFITTING THE PROFESSION IN ACCORDANCE WITH THE TERMS OF THIS AGREEMENT. FURTHER, CONTRACTOR SHALL EXONERATE, INDEMNIFY, DEFEND, AND HOLD HARMLESS THE CITY, ITS OFFICERS, AGENTS, AND ALL EMPLOYEES FROM ANY AND ALL LIABILITY, LOSS, DAMAGES, EXPENSES OR CLAIMS FOR INFRINGEMENT OF ANY INTELLECTUAL PROPERTY ARISING OUT OF THE USE OF ANY PLANS, DESIGN, DRAWINGS, OR SPECIFICATIONS FURNISHED BY CONTRACTOR IN THE PERFORMANCE OF THIS AGREEMENT.

THE FOREGOING INDEMNIFICATION PROVISION SHALL APPLY TO CONTRACTOR REGARDLESS OF WHETHER OR NOT SAID LIABILITY, LOSS, DAMAGES, EXPENSES, OR CLAIMS IS CAUSED IN PART BY A PARTY INDEMNIFIED HEREUNDER.

THE CONTRACTOR SHALL REQUIRE ALL OF ITS APPROVED SUBCONTRACTORS TO INCLUDE IN THEIR SUBCONTRACTS, A RELEASE AND INDEMNITY IN FAVOR OF THE CITY IN SUBSTANTIALLY THE SAME FORM AS ABOVE.

ARTICLE XI: MISCELLANEOUS

11.1 Terms used in this Agreement which are defined in the General Conditions will have the meanings indicated in the General Conditions.

11.2 Termination. In addition to the termination rights elsewhere in Contract Documents, the City may terminate this Agreement as follows:

a. For Convenience.
The performance of the work may be terminated at any time in whole or in part, by the City for its convenience. Any such termination shall be effected by delivery to the Contractor of a written notice (notice of termination) specifying the extent to which performance of the work is terminated and the date upon which termination becomes effective. If, for whatever reason, this contract is terminated for cause, which is later determined not to exist, the parties agree that the contract will be deemed to be terminated for convenience. In the event of termination for convenience, the Contractor shall only be paid its reimbursable costs incurred prior to the effective date of the termination notice and shall not be entitled to receive any further payment hereunder and shall be further subject to any claim the City may have against the Contractor under other provisions of this Contract or as a matter of law, including the refund of any overpayment of reimbursable costs and/or other payment.

b. For Cause.
Without prejudice to any other legal or equitable right or remedy that the City would otherwise possess hereunder or as a matter of law, the City, upon giving the Contractor ten (10) days' prior written notice, shall be entitled to terminate this Contract in its entirety at any time for the following:
(1) If the Contractor becomes insolvent, commits any act of bankruptcy, makes a general assignment for the benefit of creditors, or becomes the subject of any proceeding commenced under any statute or law for the relief of debtors;
(2) If a receiver, trustee or liquidator of any of the property or income of the Contractor shall be appointed;
(3) If the Contractor shall fail to prosecute the work or any part thereof with diligence necessary to ensure its progress and completion as prescribed by the time schedules;
(4) If within ten (10) calendar days after written notice thereof from the City or the City's Representative, the Contractor shall fail to remedy any defective work or work that does not conform to the requirements of this Contract, specifications, and other Contract Documents, or any other default under any of the terms, provisions, conditions, or covenants contained in this Contract or any other current agreement

between the Contractor and another City for similar construction work on other property; or

(5) If the Contractor shall fail for any reason other than the failure by the City to make payment called upon when due.

In the event of such termination for cause, the Contractor shall only be paid its reimbursable costs incurred prior to the effective date of the termination and shall not be entitled to receive any further payment hereunder and shall be further subject to any claim that the City's Representative or the City may have against the Contractor under the provisions of this Contract or as a matter of law, including the refund of any overpayments of reimbursable costs or other payments.

c. Procedure after Notice of Termination.
After receipt of a notice of termination, whether with or without cause, the Contractor shall, in good faith and to the best of its ability, do all things necessary in light of such notice to assure the efficient and proper close-out of the terminated work (including, but not limited to, the protection of the City's property). Among other things the Contractor shall, except as otherwise directed or approved by the City, do the following:

(1) Stop the work on the date and to the extent specified in the notice of termination;
(2) Place no further orders or subcontracts for services, equipment, or material, except as may be necessary for completion of such portion of the work as is not terminated;
(3) Immediately terminate all orders and subcontracts to the extent that they relate to the performance of the work terminated by the notice of termination;
(4) Assign to the City, in the manner and to the extent directed by it, all of the right, title and interest of the Contractor under the orders or subcontracts so terminated in which case, the City shall have the right to settle or pay any or all claims arising out of the termination of such orders and subcontracts;
(5) With the approval of the City, settle all outstanding liabilities and all claims arising out of such termination, orders and subcontracts;
(6) Deliver to the City, when directed by the City, all documents and all property, which if the work had been completed, the Contractor would have been required to account for or deliver to the City, and transfer title to such property to the City to the extent not already transferred; and/or
(7) Take actions necessary or as otherwise directed by the City's Representative or the City for the protection and preservation of the work.

In the event of such termination, there shall be an equitable reduction of the Contract Price to reflect the reduction in the work. Costs incurred after the

effective date of the notice of termination shall not be treated as reimbursable costs unless they relate to carrying out the unterminated portion or taking close-out measures, approved by the City.

11.3 No assignment by a party hereto of any rights under or interests in the Contract Documents shall be binding on another party hereto without written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and monies that are due but may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment shall release or discharge the assignor from any duty or responsibility under the Contract Documents.

11.3 The City and the Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

11.4 Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon the City and the Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close to expressing the intention of the stricken provision.

11.5 Other Provisions – None.

ARTICLE XII: ADDRESSES FOR GIVING NOTICES

12.1 The City:

City of Friendswood
910 S. Friendswood Drive
Friendswood, Texas 77546

12.2 The Contractor:

[INSERT CONTRACTOR NAME]
[INSERT CONTRACTOR ADDRESS]
[INSERT CONTRACTOR CITY,STATE,ZIP]

ARTICLE XIII: VENUE

13.1 Any action brought by either party based on any claim arising under or as a result of this contract shall be brought in a court of competent jurisdiction in

Harris County, Texas.

EXECUTED IN on behalf of the Contractor by [INSERT CONTRACTOR REPRESENTATIVE] its [INSERT THEIR TITLE] shown below, and on behalf of the City by [INSERT MAYOR NAME], its Mayor, thereto duly authorized this [INSERT DAY] day of [INSERT MONTH], [INSERT YEAR].

ACCEPTED:	**PROPOSED AND AGREED TO:**
CITY:	CONTRACTOR:
CITY OF FRIENDSWOOD, TEXAS	[INSERT CONTRACTOR FIRM]
_____	BY:_____
MAYOR	[INSERT TITLE]
DATE:_____	DATE:_____
ATTEST:	**ATTEST:**
_____	_____
CITY SECRETARY	(OFFICER OR SECRETARY)

APPROVED AS TO FORM:

_____
CITY ATTORNEY

END OF SECTION

INTENT TO AWARD

Date: [INSERT DATE]

[INSERT CONTRACTOR NAME]
ATTN: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR ADDRESS]
[INSERT CITY, STATE, ZIP]

RE: Project Name: Blackhawk Boulevard Reconstruction Phase II-C
Project No.: [INSERT PROJECT #]
CSP No.: 2026-02

Dear [INSERT CONTRACTOR CONTACT]:

Your [INSERT RFQ, RFP or BID] dated [INSERT DATE] for the above Contract has been considered and you are the apparent "Best Value" to the City. The [INSERT YOUR DEPARTMENT] of the City of Friendswood recommended that the City Council Award the [INSERT PROJECT NAME], [INSERT RFQ, RFP or BID] Number [INSERT RFQ, RFP or BID #], to [INSERT CONTRACTOR NAME] on [INSERT COUNCIL DATE]. The City Council approval and your satisfactory compliance with contractual requirements, the City hereby intends to award the construction contract to you for:

[INSTALL FULL AND COMPLETE PROJECT NAME]

The Contract Price is [INSERT WRITTEN DOLLAR AMOUNT] dollars and [INSERT WRITTEN CENTS] cents ($[INSERT CONTRACT PRICE IN NUMBERS]) to be completed in the Contract Time of [INSERT WRITTEN CONTRACT TIME] ([INSERT TIME IN NUMBERS]) [INSERT Working OR Calendar] Days.

After the City Council has considered and approved this action, and after the City has signed the Documents, the City shall provide the Executed Contract as a PDF file.

Direct questions regarding the contract award process to [INSERT YOUR NAME] at [INSERT YOUR PHONE #].

Respectfully,

_____
[INSERT YOUR NAME]
[INSERT YOUR TITLE]
City of Friendswood

END OF DOCUMENT

NOTICE TO PROCEED

Date: [INSERT DATE]

[INSERT CONTRACTOR NAME]
ATTN: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR ADDRESS]
[INSERT CITY, STATE, ZIP]

RE: Project Name: Blackhawk Boulevard Reconstruction Phase II – Repackage C
Project No.: [INSERT PROJECT #]
[INSERT RFQ, RFP or BID #]No.: [INSERT RFQ, RFP or BID #]

Dear [INSERT CONTRACTOR CONTACT]:

In accordance with the terms and conditions set out in the contract for the above referenced project and as directed by the City of Friendswood, you are herewith issued **Notice To Proceed** as of START DATE. According to our contract, the work of this project shall be substantially complete within [INSERT WRITTEN CONTRACT DAYS] ([INSERT # DAYS]) [INSERT Working OR Calendar] Days from the date of Notice To Proceed. Contract Time shall run as specified in the General Conditions. The work of this contract shall be complete on or before [INSERT COMPLETION DATE]. Final payment shall be made in accordance with the General Conditions.

Please contact the City of Friendswood [INSERT YOUR DEPARTMENT] forty-eight (48) hours prior to the start of construction. Additionally, you are responsible for informing property owners or residents of work schedules affecting access to and from their properties or any work that may impede or delay routine traffic routes. You are required to inform property owners or residents no less than twenty-four (24) hours prior to beginning any work within private property. Access to work within private property may require agreement with owners or other special provisions that you are responsible for obtaining.

Respectfully,

_____
[INSERT YOUR NAME]
[INSERT YOUR TITLE]
City of Friendswood

END OF DOCUMENT

TEXAS WORKERS' COMPENSATION

In accordance with
28 TAC 110.110
DIVISION OF TEXAS WORKERS' COMPENSATION
TEXAS DEPARTMENT OF INSURANCE

A. DEFINITIONS

Certificate of coverage ("certificate") – A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84) showing statutory workers' compensation insurance coverage for the persons' or entity's employees providing services on a project, for the duration of the project.

Duration of the project – includes the time from the beginning of the work on the project until the Contractor's/person's work on the project has been completed and accepted by the governmental entity.

Persons providing services on the project ("subcontractor" in §406.096) – includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

B. The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the Contractor providing services on the project, for the duration of the project.

C. The Contractor must provide a certificate of coverage to the City prior to being awarded the Contract.

D. If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the City showing that the coverage has been extended.

E. The Contractor shall obtain from each person providing services on the project, and provide to the City:
   1. A certificate of coverage, prior to that person beginning work on the project, so the City will have on file certificates of coverage showing coverage for all persons providing services on the project; and
   2. No later than seven days (7 D) after the receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

F. The Contractor shall retain all required certificates of coverage on file for the duration of the project and for one year (1 Yr) thereafter.

G. The Contractor shall notify the City in writing by certified mail or personal delivery, within ten days (10 D) after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

H. The Contractor shall post on each project site a notice, in the text, form, and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify current coverage and report failure to provide coverage.

I. The Contractor shall contractually require each person with whom it contracts to provide services on a project, to:
   1. Provide coverage, based on proper reporting classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code Section 401.011(44) for all employees providing services on the project, for the duration of the project;
   2. provide to the Contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;
   3. provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
   4. Obtain from each other person with whom it contracts, and provide to the Contractor:
      (A) a certificate of coverage, prior to the other person beginning work on the project, and;
      (B) a new certificate of coverage showing extension of the coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
   5. retain all required certificates of coverage on file for the duration of the project and for one year (1 Yr) thereafter;

6. notify the City in writing by certified mail or personal delivery, within ten days (10 D) after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and
7. contractually require each other person with whom it contracts, to perform as required by paragraphs (1) – (7), with certificates of coverage to be provided to the person for whom they are providing services.

J. By signing this Contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the City that all employees of the Contractor who will provide services on this project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classifications codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

K. The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the City to declare the contract void if the Contractor does not remedy this breach within ten days (10 D) after receipt of notice of breach from the City.

END OF SECTION

WAGE SCALE

PART I: GENERAL

1.1 As required by Chapter 2258, Subchapter A, Government Code, Building and Procurement Commission, Vernon's Texas Civil Statutes, the City has ascertained local prevailing wage rates for the type of any Civil or Utility work to be performed under the Contract.

1.2 The Amended Article further provides that the Contractor shall forfeit, as a penalty, to the City, Sixty dollars ($60.00) per day for each laborer, workman, or mechanic who is not paid the stipulated wage for the type of work being performed by him as set up in the wage scale. The City is authorized to withhold from the Contractor the amount of this penalty in any payment that might be claimed by the Contractor or subcontractor. The Act makes the Contractor responsible for the acts of the subcontractors in this respect.

1.3 The Article likewise requires that the Contractor and subcontractors keep an accurate record of the names and occupations of all persons employed by him and to show the actual per diem wages paid to each worker and these records are open to the inspection of the City.

1.4 This prevailing wage rate does not prohibit the payment of more than the rates stated.

1.5 The hourly cost of salary for non-exempt workers for labor in excess of forty (40) hours per worker per week shall be calculated at one and one-half (1.5) times the worker's base pay.

1.6 The wage scale for engineering construction is to be applied to all site work greater than five (5) feet from an exterior wall of new building under construction or from an exterior wall of an existing building.

PART II: WAGE CLASSIFICATION

2.1 Refer to the sam.gov - This website provides the Davis-Bacon Act (DBA) wage determinations (WDs) for each official contract action. The website is available to the general public as well. Guidance in selecting WDs from this website is provided in the https://sam.gov/content/home Learning Center.

END OF DOCUMENT

AFFIDAVIT OF INSURANCE

BEFORE ME, the undersigned authority, on this day personally appeared [INSERT AFFIANT], who being by me duly sworn on their oath stated that [INSERT HE OR SHE] is [INSERT TITLE] of [INSERT CONTRACTOR NAME], a representative of the Contractor named and referred to within the Contract Documents; that they are fully competent and authorized to give this affidavit and that the attached original insurance certificate(s) truly and accurately reflects the insurance coverage that is now available and will be available during the term of the Contract.

_____ _____
(Affiant's Signature) (Date)

SWORN AND SUBSCRIBED by me on this ____ day of _____,
A.D. 20_____.

Notary Public in and for _____ County, _____.

_____
Notary Public Signature

_____
NOTARY SEAL Print or Type Notary Public Name

My Commission Expires: _____

END OF DOCUMENT

ALCOHOL AND DRUG FREE WORKPLACE

I. POLICY STATEMENT

In order to effectuate an alcohol and drug free workplace, the following general policy statements are hereby adopted:

A. Employees shall not be permitted to report to work while under the influence of alcohol or drugs, or to possess or transfer drugs or alcohol to any person while on duty. Provided however, this policy statement shall not be construed to apply to members of the City Police Department or Emergency Medical Technicians when their duties require the lawful possession of seized of alcohol or drugs, or the transport thereof.

B. Employees who are reasonably suspected of being under the influence of alcohol or drugs shall be prohibited from engaging in further work, and shall be subject to immediate testing in accordance with the procedures herein established.

C. In recognition of serious duties and responsibilities entrusted to employees of the City and that use of alcohol or drugs hinder one's ability to perform and fulfill such duties and responsibilities, these policies are adopted to establish guidelines for the detection and deterrence of alcohol and drug abuse.

D. When applying the policies contained herein, Management should always focus on the ability of the employee to prosecute his work. Tests and procedures outlined herein are only intended as tools to assist Management, not as a replacement of Management's responsibilities over employees in the performance of their duties.

II. PURPOSE OF POLICIES

The purpose of the alcohol and drug free workplace policies contained herein is as follows:

A. To promote and maintain a safe, healthy, and productive work environment for all city employees.

B. To ensure the safe and efficient delivery of services to the citizens of the city.

C. To eliminate the abusive use of alcohol, illegal drugs, prescription drugs, or any other substance which could impair an employee's ability to perform safely and effectively the functions of any given job; and

D. To establish compliance by the city with any and all state and federal rules and regulations relating to the establishment and maintenance of an alcohol and drug free workplace.

III. DEFINITIONS

For the purpose of these policies the following words, terms, and phrases shall have the meanings ascribed thereto:

A. **"Alcohol"** means any beverage that contains ethyl alcohol (ethanol), including but not limited to, beer, wine and distilled spirits.

B. **"Biological Testing"** or **"chemical testing"** or **"drug testing"** means the scientific analysis of urine, blood, breath, saliva, hair, tissue, and other specimens of the human body for the purpose of detecting alcohol or drugs.

C. **"Chain of custody"** means procedures to account for the integrity of each urine specimen by tracking its handling and storage from point of specimen to collection to final disposition of the specimen. These procedures shall require that an approved chain of custody form be used from time to collection to receipt by the laboratory and that upon receipt of the laboratory an appropriate chain of custody form(s) account for the sample or sample aliquot within the laboratory. Chain of custody forms shall, at minimum, include an entry documenting date and purpose each time a specimen or aliquot is handled or transferred and identifying every individual in the chain of custody.

D. **"Collection site"** means a place where individuals present themselves for the purpose of providing body fluids or tissue samples to be analyzed for specified controlled substances. A collection site will have all necessary personnel, materials, equipment, facilities and supervision to provide for collection, security, temporary storage, and transportation or shipment of the samples to a laboratory.

E. **"Collection site person"** means a person who instructs and assists individuals as a collection site and who receives and makes initial examination of the specimens provided by those individuals. A collection site person shall have successfully completed training to carry out this function.

F. **"Contract vendor"** means an independent testing or administrative agency engaged for the purpose of implementing one or more procedures in the collection or testing of employees for alcohol or drug use.

G. **"City Premises"** or **"City Facilities"** means all property of the City including, but not limited to, buildings and surrounding areas on City-

owned or leased vehicles and equipment wherever located. It also includes premises where the city performs contract services.

H. **"Confirmatory test"** means a second analytical procedure to identify the presence in urine specimen of a specific drug or metabolite which is independent of initial test and which uses a different technique and chemical principle from that of the initial test in order to ensure reliability and accuracy. Gas chromatography/mass spectrometry (GC/MS) is the only authorized confirmatory test method.

I. **"Contraband"** means any article, the possession of which on City premises or while on City business,, causes as individual to be in violation of a City work rule. Contraband includes illegal drugs and alcohol beverages and drug paraphernalia.

J. **"Controlled Substances"** means all substances listed in Schedule I through V of the Controlled Substances Abuse Act as those schedules may be revised from time to time.

K. **"Drug"** means any substance that is a controlled substance.

L. **"Employee"** means an employee, contractor, subcontractor, agent, officer, or representative of the City.

M. **"Illegal Drug"** means any drug which is not legally obtainable; any drug which is legally obtainable but has not been legally obtained; any prescribed drug not being used for the prescribed purpose; and over-the-counter drug being used at a dosage level different than recommended by the manufacturer or being used for a purpose other than intended by the manufacturer or being used for a purpose not in accordance with bona fide medical therapy. Examples of illegal drugs are Cannabis substance such as marijuana and hashish, cocaine, heroin, phencyclidine (PCP), and so –called designer drugs and look-alike drugs.

N. **"Initial test"** or **"screening test"** or **"preliminary test"** means in the context of drug detection an immunoassay screen to eliminate negative uria specimens from further consideration. In the context of alcohol detection, these terms mean an analysis of breath or saliva specimens for the purpose of eliminating negative specimens from further consideration.

O. **"Legal drug"** means any prescribed drug or over-the-counter drug, which has been legally obtained and is being used for the purpose of which prescribed or manufactured.

P. **"Medical practitioner"** means a licensed physician.

Q. **"Under the Influence"** means any detectable trace or amount.

CONTRACTOR'S CERTIFICATION FOR COMPLIANCE TO THE CITY OF FRIENDSWOOD ALCOHOL AND DRUG FREE WORKPLACE POLICIES

This is to certify that the officers and operating management of [INSERT CONTRACTOR NAME] have read and acknowledge understanding of and agreement with the provisions of the City of Friendswood, Texas Alcohol and Drug Free Workplace policies, and the implementing procedures related thereto.

This certification confirms our obligation to comply with the above-named policies and we further acknowledge and agree that our failure to comply with the provisions thereof shall constitute a material breach of that certain Contract dated [INSERT MONTH] [INSERT DATE], [INSERT YEAR] by and between the aforedescribed and the City of Friendswood, Texas.

_____ _____

[INSERT CONTACT NAME] Date
[INSERT CONTACT TITLE]

END OF DOCUMENT

CONSTRUCTION STORM PREPARATION POLICY

PART I: GENERAL

1.1 The City of Friendswood has instituted a storm preparation policy to help protect citizens and property from damage due to loose construction materials driven by storm winds. Storms covered by this policy may be tropical disturbances, hurricanes, and systems of disturbed weather associated with weather front movements.

1.2 Storms from the Gulf of Mexico and systems of disturbed weather associated with fronts are preceded by a warning system from the National Weather Service that allows some time to prepare.

PART II: DEFINITIONS

2.1 WATCH

A. A National Weather Service notice indicating that a particular hazard is possible, i.e., that conditions are more favorable than usual for its occurrence. A watch is a recommendation for planning, preparation, and increased awareness (i.e., to be alert for changing weather, listen for further information, and think about what to do if the danger materializes).

2.2 WARNING

A. A notice issued by the National Weather Service local offices indicating that a particular weather hazard is either imminent or has been reported. A warning indicates the need to take action to protect life and property. The type of hazard is reflected in the type of warning (e.g., tornado warning, hurricane warning, etc.)

2.3 GALE AND STORM WARNINGS

A. Gale warning may be issued when winds of 39-54 miles an hour (34-47 knots) are expected. Storm Warnings may be issued when winds of 55-73 miles an hour (48-63 knots) are expected. If a hurricane is expected to strike a costal area, gale or storm warnings will not usually precede hurricane warnings.

2.4 HURRICANE ADVISORY

A. A notice issued by the National Hurricane Center, numbered consecutively for each storm, describing the present and forecasted position and intensity. Advisories are issued at six (6) hour intervals at midnight, 6 a.m., noon, and 6 p.m., Eastern Daylight Time. Bulletins provide additional information. Each message gives the name, eye position, and intensity and forecast movement of the storm.

2.5 HURRICANE WATCH

A. An announcement added to a hurricane advisory that hurricane conditions pose a possible threat to a specified coastal area within thirty-six (36) hours. A watch is used to inform the public and marine interests of the storms location and intensity, and movement.

2.6 HURRICANE WARNING

A. A warning added to a hurricane advisory that sustained winds of 74 mph (64 knots) or higher associated with a hurricane are expected in a specified coastal area within twenty-four (24) hours or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force. A warning is issued to inform the public and marine interest of the storms location, intensity, and movement. The NHC chooses a distance of approximately 300 miles.

2.7 SEVERE THUNDERSTORM WATCH

A. A notice that severe thunderstorms are possible in your area.

2.8 SEVERE THUNDERSTORM WARNING

A. A notice that severe thunderstorms are occurring.

PART III: EXECUTION

3.1 PHASE 1 – ALERT/WATCH PHASE

A. This phase shall go into affect with a call and Fax from the City of Friendswood to the Contractor. The Contractor's superintendent on site shall also be informed and the Project Manager shall go over the steps that shall to be taken. This shall be initiated when The National Weather Service issues a watch or warning indicating a Gulf storm system or a severe weather front exists and poses a "potential" threat to the Friendswood area.

B. The following actions shall be taken during an Alert/Watch Phase:

1. The Contractor shall immediately undertake cleanup operations at the job site.
2. Make preparations to remove all debris and trash from the site.
3. Stack and secure other materials that are subject to wind movement.
4. Make preparations to back-fill all excavations and secure all equipment.
5. Secure all facilities such as trailers, port-a-cans, tool sheds, etc.
6. Doors and windows are to be closed and locked.

3.2 Phase 2 – Threat / Warning Phase

A. When Friendswood is within the predicted impact area as in the path of a severe weather front, or in the path of a hurricane, additional

preparation must be made. Phase Two (2) shall go into affect with a second (2nd) call from the City of Friendswood to the contractor.

B. The following action shall be taken during a Threat/Warning Phase:
   1. The Contractor shall immediately suspend ALL building operations.
   2. All materials shall be tied down to resist the reported National Weather Service probable winds. Always assume the worst-case wind.
   3. Any materials that are not tied down shall be stored in heavy containers or carried off the job site.
   4. If structures are partly finished, storm bracing shall be added to withstand the probable storm winds.
   5. All windows are shall protected from flying debris and wind damage.
   6. All equipment shall be stored or removed from the job site to a safe place.
   7. Trailers, port-a-cans, and any other facilities shall be tied down.
   8. All excavations shall be covered.
   9. All incomplete work shall be stabilized.
   10. Take necessary precautions against rising water – some sites may be in flood prone areas.

3.3 TRAFFIC CONTROL DEVICES

A. All Traffic Control devices for the project shall be in place and in good condition. Traffic Control Devices are **NOT** to be secured or extra weight added to hold them in place. Traffic Control Devices are to remain as originally placed and within the guidelines of the TMUTCD.

B. All Traffic Control signage shall be cleaned for visibility, and if not up to current TMUTCD standards shall be replaced.

3.4 NOTIFICATION CONTACTS

A. Each Contractor shall provide and maintain a contact name and two Alternates with day and night telephone numbers to The City of Friendswood for these emergency notifications.

This is to certify that the officers and operating management of [INSERT CONTRACTOR NAME] have read and acknowledge understanding of and agreement with the provisions of the City of Friendswood, Storm Policy, and the implementing procedures related thereto. The emergency contacts listed below have been given copies of this policy and instructed in the procedures contained herein.

This certification confirms our obligation to comply with the above-named policies and we further acknowledge and agree that our failure to comply with the provisions thereof shall constitute a material breach of that certain Contract dated [INSERT MONTH] [INSERT DATE], [INSERT YEAR] by and between the aforedescribed and the City of Friendswood, Texas.

_____ _____
Signature Print Name

_____
Company Name

COMPANY CONTACTS:

_____ _____
Contact #1 Name Contact #2 Name

_____ _____
Daytime Phone Number Daytime Phone Number

_____ _____
Nighttime Phone Number Nighttime Phone Number

_____
Contact #3 Name

_____
Daytime Phone Number

_____
Nighttime Phone Number

CITY OF FRIENDSWOOD CONTACTS:

Contact #1 Name
[INSERT DIRECTOR NAME]
Director of [INSERT DEPARTMENT]
(281) [INSERT YOUR NUMBER]
Daytime Phone Number

Contact #2 Name
[INSERT SUPERVISOR NAME]
[INSERT TITLE]
(281) [INSERT YOUR NUMBER]
Daytime Phone Number

Contact #3 Name
[INSERT YOUR NAME]
[INSERT YOUR TITLE]
(281) [INSERT YOUR NUMBER]
Daytime Phone Number

Any nighttime contact will be made via Police Department Dispatch at (281) 996-3300.

END OF DOCUMENT

HAZARDOUS COMMUNICATIONS PROGRAM REQUIREMENT AGREEMENT

For Contractors Performing Work Under Contract

PART I: GENERAL

Whereas, the City of Friendswood desires to comply with the Texas Hazard Communications Act of the Health and Safety Code, provide and maintain a safe and healthy work environment for its employees, citizens and contractors and to provide for the free access to and communication of information pertaining to the use and storage of materials in the workplace; and

Whereas, the City of Friendswood wants to ensure that its contractors do the same.

Accordingly, the City of Friendswood's Hazard Communications Program maintains a list of all materials stored or used within its sites and facilities. Additionally, the City maintains and updates its inventories of MSDS on a routine basis so as to provide its employees, citizens and contractors with the most accurate and up-to-date information pertaining to materials that an employee or contractor might come into contact with during the course of normal operations.

The City acknowledges its obligations under these States and federal laws to make any and all such information available to the contractor, his employees, vendors and sub-contractors for sites or facilities within which its contractors, their employees, vendors and sub-contractors are engaged in work.

It is hereby understood and agreed that [INSERT CONTRACTOR NAME], performing the work of the contract for [INSERT PROJECT NAME], shall provide and maintain, within the limits of all applicable laws, a satisfactory job-site Hazard Communications program including, but not limited to, an Employer Right to Know information center, which shall have a Hazard Communication Information Binder for all chemicals, materials and substances that are required for, used, stored, or incorporated into the work of the contract and a Workplace chemical list.

The Contractor shall retain all legal responsibility for providing and maintaining this center and providing accurate and an up-to-date list of all such materials chemicals and substances and the appropriate Material Safety Data Sheets (MSDS) throughout the duration of the contract or as long as the Contractor's forces, materials, substances or chemicals remain or continue to be stored on site.

The Contractor further agrees to notify the City's representative in advance if any of the work requires the use of or storage of any "hazardous chemical."

The terms and conditions of this agreement shall remain a part of the Contract and in force whether attached to the Contract or not.

PART II: DEFINITIONS

2.1 “Contractor”
- A. Any entity legally contracted with the City of Friendswood for the purpose of providing services or goods of any nature in exchange for monetary consideration.

2.2 “Duration of Contract”
- A. The agreed contract time as defined and amended by the terms of the agreement.

2.3 "Employee vendor and sub-contractor"
- A. Means a person or group who may be or may have been exposed to hazardous chemicals in the person's workplace under normal operating conditions or foreseeable emergencies, and includes a person working for this state, a person working for a political subdivision of this state, or a member of a volunteer emergency service organization

2.4 "Hazardous chemical" or "chemical"
- A. Means an element, compound, or mixture of elements or compounds that is a physical hazard or health hazard as defined by the OSHA standard in 29 CFR Section 1910.1200(c), or a hazardous substance as defined by the OSHA standard in 29 CFR Section 1910.1200(d)(3), or by OSHA's written interpretations. A hazard determination may be made by employers who choose not to rely on the evaluations made by their suppliers if there are relevant qualitative or quantitative differences. Hazard determination shall involve professional judgment.

2.5 "Material Safety Data Sheet" ("MSDS")
- A. Means a document containing chemical hazard and safe handling information that is prepared in accordance with the requirements of the OSHA standard for that document.

2.6 "Workplace chemical list"
- A. Means a list of hazardous chemicals developed under Section 502.005(a) of the Texas Health and Safety Code.

This certification confirms our obligation to comply with the above-named policies and we further acknowledge and agree that our failure to comply with the provisions thereof shall constitute a material breach of that certain Contract dated [INSERT DATE] by and between the aforedescribed and the City of Friendswood, Texas.

_____ _____

[INSERT CONTACT NAME] Date
[INSERT CONTACT TITLE]

END OF DOCUMENT

HOMELAND SECURITY POLICY

On October 8, 2001 the President of the United States established the Department of Homeland Security. The Department of Homeland Security implemented the National Strategy for Homeland Security on October 8, 2002. Providing Homeland Security for potable water systems is a federally mandated requirement for Owner/Operators of public water systems as evidenced in Homeland Security Presidential Directive HSPD-7 on December 17, 2003. The City of Friendswood has accepted this responsibility to protect the potable water system that serves its customers.

The responsibility to maintain a secure site falls upon the Contractors working at or on water system improvements. Unfortunately this responsibility has not always been accepted and maintained by the City's Contractors.

The City is very serious about it's responsibilities to protect the potable water system. Contractors that do not maintain secure sites, per instructions from the City, shall be subject to financial and civil legal action provided by the Contract and the Judicial System. Contractors that repeatedly fail to maintain a secure site may be locked out of the site until they comply with all the requirements of securing the site.

The City has the right to have security provisions implemented and to deduct said cost from the Contract as a last resort.

For the purpose of this document the meaning of secure is as follows: Reducing the vulnerability of critical infrastructure or key resources in order to deter, mitigate or neutralize terrorist attacks.

At a minimum the contractor shall enclose such areas with a fence and padlock so that access to such areas is not easily accomplished.

This certification confirms our obligation to comply with the above-named policies and we further acknowledge and agree that our failure to comply with the provisions thereof shall constitute a material breach of that certain Contract dated [INSERT MONTH] [INSERT DATE], [INSERT YEAR] by and between the aforedescribed and the City of Friendswood, Texas.

_____ _____

[CONTRACTOR CONTACT NAME] Date
[INSERT CONTACT TITLE]

END OF DOCUMENT

CERTIFICATE OF INTERESTED PARTIES (Form 1295)

In 2015, the Texas Legislature adopted House Bill 1295. The Texas Government Code §2252.908, and the rules issued by the Texas Ethics Commission found in Title 1, Sections 46.1, 46.3 and 46.5 of the Texas Administrative Code, require a business entity to submit a completed Form 1295 to the City before the City may enter into a contract with that business entity. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. **The law applies only to a contract of a governmental entity or state agency that either (1) requires an action or vote by the governing body of the entity or agency before the contract may be signed or (2) has a value of at least $1 million. The disclosure requirement applies to a contract entered into on or after January 1, 2016.**

Form 1295 must be completed online. The form is available from the Texas Ethics Commission by accessing the following web address:

https://www.ethics.state.tx.us/filinginfo/1295/

Print the completed Form 1295 showing the Certification Number and Date Filed in the Certification of Filing box at the upper right corner. The person filing the 1295 needs to complete an "unsworn declaration".

The following definitions found in the statute and Texas Ethics Commission rules may be helpful in completing Form 1295.

"Business entity" includes an entity through which business is conducted with a governmental entity or state agency, regardless of whether the entity is a for-profit or nonprofit entity. The term does not include a governmental entity or state agency.

"Controlling interest" means: (1) an ownership interest or participating interest in a business entity by virtue of units, percentage, shares, stock, or otherwise that exceeds 10 percent; (2) membership on the board of directors or other governing body of a business entity of which the board or other governing body is composed of not more than 10 members; or (3) serves as an officer of a business entity that has four or fewer officers, or service as one of the four officers most highly compensated by a business entity that has more than four officers.

"Interested party" means: (1) a person who has a controlling interest in a business entity with whom a governmental entity or state agency contracts; or (2) a person who actively participates in facilitating a contract or negotiating the terms of a contract with a governmental entity or state agency, including a broker, intermediary, adviser, or attorney for the business entity. Subsection (c) of this section does not apply to an officer of a publicly held business entity or its wholly owned subsidiaries.

"Intermediary", for purposes of this rule, means a person who actively participates in the facilitation of the contract or negotiating the contract, including a broker, adviser, attorney, or representative of or agent for the business entity who:

(1) receives compensation from the business entity for the person's participation;

(2) communicates directly with the governmental entity or state agency on behalf of the business entity regarding the contract; and

(3) is not an employee of the business entity.

The law has been amended beginning January 1, 2018. A completed Form 1295 is not required for:

- A sponsored research contract of an institution of higher education;
- An interagency contract of a state agency or an institution of higher education
- A contract related to health and human services if:
    - The value of the contract cannot be determined at the time the contract is executed; and
    - Any qualified vendor is eligible for the contract;
- A contract with a publicly traded business entity, including a wholly owned subsidiary of the business entity
- A contract with an electric utility, as that term is defined by Section 31.002, Utilities Code; or
- A contract with a gas utility, as that term is defined by Section 121.001, Utilities Code.

City of Friendswood

TEXAS GOVERNMENT CODE VERIFICATIONS

(for Companies with 10 or more full-time employees entering into a contract with a value of $100,000 or more)

Pursuant to the Texas Government Code, I, _____, the undersigned representative of _____ (Company Name), do hereby verify the following for and on behalf of the above-referenced company (the "Company"):

a. the Company does not boycott Israel and will not boycott Israel during the term of the contract to be entered into with the City of Friendswood;

b. the Company does not boycott energy companies and will not boycott energy companies during the term of the contract to be entered into with the City of Friendswood; and

c. the Company does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and will not discriminate during the term of the contract against a firearm entity or firearm trade association.

In making this verification, I understand that the following definitions apply:

1. "Boycott Israel" means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes.
2. "Boycott energy company" means, without an ordinary business purpose, refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with a company because the company:
   a. engages in the exploration, production, utilization, transportation, sale, or manufacturing of fossil fuel-based energy and does not commit or pledge to meet environmental standards beyond applicable federal and state law; or
   b. does business with a company described by Paragraph (a).
3. "Discriminate against a firearm entity or firearm trade association" means, with respect to the entity or association, to:
   a. refuse to engage in the trade of any goods or services with the entity or association based solely on its status as a firearm entity or firearm trade association;
   b. refrain from continuing an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association; or
   c. terminate an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association;

   but does not include:
   a. the established policies of a merchant, retail seller, or platform that restrict or prohibit the listing or selling of ammunition, firearms, or firearm accessories; and
   b. a company's refusal to engage in the trade of any goods or services, decision to refrain from continuing an existing business relationship, or decision to terminate an existing business relationship:
      (1) to comply with federal, state, or local law, policy, or regulations or a directive by a regulatory agency; or
      (2) for any traditional business reason that is specific to the customer or potential customer and not based solely on an entity's or association's status as a firearm entity or firearm trade association.

EXECUTED this the _____ day of _____, 20_____.

_____
Company Name

_____
Signature

_____
Printed Name/Title

STATE OF TEXAS §
COUNTY OF HARRIS §

Before me, _____, the undersigned notary public, on this day personally appeared _____, the _____ (Title) of _____ (Company Name), known to me to be the person whose name is subscribed to the foregoing instrument, who after by me being duly sworn, did swear and affirm that the above is true and correct.

Given under my hand and seal of office this _____ day of _____, 20_____.

_____
Notary Public in and for the State of Texas

PERFORMANCE BOND

Bond Number: [INSERT BOND #]

THAT WE, [INSERT CONTRACTOR NAME], as Principal, hereinafter called Contractor, and the other subscriber hereto, [INSERT SURETY NAME], as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Friendswood, a municipal corporation, in the sum of [INSERT WRITTEN DOLLAR AMOUNT] dollars and [INSERT WRITTEN CENTS AMOUNT] cents ($[INSERT AMOUNT IN #'S]), for the payment of which sum well and truly to be made to the City of Friendswood and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a contract in writing with the City of Friendswood for *Blackhawk Boulevard Reconstruction Phase II – Repackage 'C'*, all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein;

NOW, THEREFORE, if the said Contractor shall faithfully and strictly perform the Contract in all its terms, provisions, and stipulations in accordance with its true meaning and effect, and in accordance with the Contract Documents referred to therein and shall comply strictly with each and every provision of the Contract and this Bond, then this obligation shall become null and void and shall have no further force and effect; otherwise the same is to remain in full force and effect. Should the Contractor fail to faithfully and strictly perform the Contract in all its terms, including but not limited to the indemnifications thereunder, the Surety shall be liable for all damages, losses, expenses, and liabilities that the City may suffer in consequence thereof, as more fully set forth herein.

IT IS FURTHER PROVIDED herein that pursuant to this undertaking, the Principal hereof and the Surety shall both be bound until date of final completion as shall be expressed and set out in the terms and conditions of the Contract, and suit on said bond may be brought up until the first anniversary of the date of said final completion, or abandonment or termination of the public work contract as is provided for in Chapter 2253.078(a), Texas Government Code, as may be amended.

It is further understood and agreed that the Surety does hereby relieve the City or its representatives from the exercise of any diligence whatever securing compliance on the part of the Contractor with the terms of the Contract, and Surety agrees that it shall be bound to take notice of and shall be held to have knowledge of all acts or omissions of the Contractor in all matters pertaining to the Contract. The Surety understands and agrees that the provision in the Contract that the City shall retain certain amounts due the Contractor until the expiration of thirty (30) days from the acceptance of the Work, which is intended for the City's benefit, and the City shall have the right to pay or withhold such

retained amounts or any other amount owing under the Contract without changing or affecting the liability of the Surety hereon in any degree.

It is further expressly agreed by the Surety that the City or its representatives are at liberty at any time, without notice to the Surety, to make any changes in the Contract Documents and in the Work to be done there under, as provided in the Contract and in the terms and conditions thereof, or to make any extension of time, any change in, addition to, or deduction from the Work to be done thereunder, and that such changes, if made, shall not in any way vitiate the obligation in this bond and undertaking or release the Surety therefrom.

It is further expressly agreed and understood that the Contractor and Surety will full indemnify, defend, and save harmless the City from any liability, loss, cost, expense, or damage arising out of the Contractor's performance of the Contract.

If the City gives the Surety notice of the Contractors default, Surety shall, within forty-five (45) days take one (1) of the following actions:

1. Arrange for the Contractor, with consent of the City, to perform and complete the Contract; or

2. Take over and assume the completion of the Contract itself, through its agents or through independent contractors, and become entitled to the payment of the balance of the Contract Price.

If the Surety fails to take either of the actions set out above, it shall be deemed to have waived its right to perform and complete the Contract and receive payment of the balance of the Contract Price and the City shall be entitled to enforce and remedies available at law, including but not limited to completing the Contract itself and recovering any cost in excess of the Original Contract Price from the Surety.

This Bond and all obligations created hereunder shall be performable in Galveston County, Texas. This Bond is given in compliance with the provisions of Chapter 2253, Texas Government Code, as amended, which is incorporated herein by this reference.

Notices required or permitted hereunder shall be given in writing and shall be deemed delivered when actually received or, if earlier, on the third (3rd) day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other Party at the address prescribed in the Contract Documents or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

IN WITNESS THEREOF, the Bidder and Surety have signed and sealed this instrument on the respective dates written below their signatures and have attached current Power of Attorney.

ATTEST SEAL:

[INSERT CONTRACTOR NAME]
Name of Contractor

_____
Signature
Name: [INSERT NAME]
Title: [INSERT TITLE]

ATTEST SEAL:

[INSERT SURETY NAME]
Full Name of Surety
[INSERT SURETY ADDRESS]
Address of Surety for Notice
[INSERT CITY, STATE, ZIP]
City, State and Zip Code of Surety for Notice
[INSERT SURETY TEL #]
Telephone Number of Surety

_____
Signature
Name: [INSERT NAME]
Title: Attorney-in-Fact
Date: _____

END OF DOCUMENT

PAYMENT BOND

Bond Number: [INSERT BOND #]

THAT WE, [INSERT CONTRACTOR NAME], as Principal, hereinafter called Contractor, and the other subscriber hereto, [INSERT SURETY NAME], as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Friendswood, a municipal corporation, in the sum of [INSERT WRITTEN DOLLAR AMOUNT] dollars and [INSERT WRITTEN CENTS AMOUNT] cents ($[INSERT AMOUNT IN #'S]), for the payment of which sum well and truly to be made to the City of Friendswood and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a contract in writing with the City of Friendswood for *Blackhawk Boulevard Reconstruction Phase II – Repackage 'C'*, all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein;

NOW, THEREFORE, if the said Contractor shall pay all claimants supplying labor and materials to him or a Subcontractor in the prosecution of the Work provided for in the Contract, then, this obligation shall be void and shall no further force and affect; otherwise the same is to remain in full force and effect;

This Bond and all obligations created hereunder shall be performable in Galveston County, Texas. This Bond is given in compliance with the provisions of Chapter 2253, Texas Government Code, as amended, which is incorporated herein by this reference.

Notices required or permitted hereunder shall be given in writing and shall be deemed delivered when actually received or, if earlier, on the third (3rd) day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other Party at the address prescribed in the Contract Documents or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

IN WITNESS THEREOF, the Bidder and Surety have signed and sealed this instrument on the respective dates written below their signatures and have attached current Power of Attorney.

ATTEST SEAL:

[INSERT CONTRACTOR NAME]
Name of Contractor

_____
Signature
Name: [INSERT NAME]
Title: [INSERT TITLE]

ATTEST SEAL:

[INSERT SURETY NAME]
Full Name of Surety
[INSERT SURETY ADDRESS]
Address of Surety for Notice
[INSERT CITY, STATE, ZIP]
City, State and Zip Code of Surety for Notice
[INSERT SURETY TEL #]
Telephone Number of Surety

_____
Signature
Name: [INSERT NAME]
Title: Attorney-in-Fact
Date: _____

END OF DOCUMENT

GENERAL CONDITIONS

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1. THE AGREEMENT AND THE CONTRACT DOCUMENTS

   The Drawings, Technical Specifications and Addenda, enumerated in the Agreement, shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal notes contained herein and in said Documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit, or cast light on the interpretation of the provisions to which they refer.

2. DEFINITIONS

   The following terms, as used in this Contract, are respectively defined as the following:

   A. "ADDENDA": Written or graphic instrument issued prior to Bid opening, which clarifies, modifies, corrects, or changes the Bid Documents.
   B. "ALTERNATE": The total amount bid for additions to the Work. Each Alternate includes cost of effects on adjacent or related components, and Bidder's overhead and profit.
   C. "APPARENT LOW BIDDER": The bidder at the time of the bid opening who has the lowest documented bid before tabulation of the Bid Form.
   D. "BID": A complete and properly signed offer or proposal on the Unit Price Form or Total Stipulated Price Form, setting forth price for the Work that shall be performed.
   E. "BID DATE": The date and time set for receipt of Bids
   F. "BID DOCUMENTS": The Project Manual, the Drawings, and Addenda.
   G. "BIDDER": The person or firm who submits a Bid to the City.
   H. "CHANGE ORDER": A document which is signed by the Contractor and the City which authorizes an addition, deletion, or revision to the Work or an adjustment of the Contract Price or the Contract Time.
   I. "CITY": The City of Friendswood, Texas.
   J. "CODE": The City of Friendswood Code of Ordinances (CFCO).
   K. "CONSTRUCTABILITY REVIEW": A review and analysis by a Construction Professional of the Contract Documents and Drawings to report any errors, omissions, or inconsistencies that would prevent the project from being constructed according to the Contract Documents and Drawings.
   L. "CONTRACT DOCUMENTS": Those documents so designated as the City's Standard Agreement.
   M. "CONTRACT PRICE": The monies payable by the City to the Contractor for Final Completion of the Work in accordance with the City's Standard Agreement.
   N. "CONTRACT TIME": The number of Working Days to achieve Substantial and/or Final Completion as stated in the City's Standard Agreement.
   O. "CONTRACTOR": A person, firm, or corporation with whom the Contract is made with the City.
   P. "DESIGN PROFESSIONAL": The individual or entity, either Engineer or Architect, with whom the City contracted for design and construction of the Work and named as such in the City's Standard Agreement.
   Q. "DRAWINGS": The part of the Contract Documents prepared and/or

approved and sealed by the Engineer which graphically shows the scope, extent, and character of the Work to be performed.

R. "FINAL COMPLETION": The time at which all punch list items, start up procedures and other Closeout functions have been completed by the Contractor and verified by the Project Manager and recommends Final Acceptance of the Work to the City Council, and to release the Final Payment to the Contractor.

S. "LOW BIDDER": The Bidder that submits a Bid with lowest Total Bid Price and has been verified by Bid Tabulation.

T. "PROJECT MANAGER": The person designated by the City to represent the City during bidding, post-bid, and construction periods.

U. "PROJECT MANUAL": A volume assembled for the Work that includes the bidding requirements, sample forms, the Conditions of the Contract, and the Technical Specifications.

V. "SECURITY DEPOSIT": A certified check, cashier's check, or bid bond in the amount of five percent (5%) of the Total Bid Price.

W. "SUBCONTRACTOR": A person, firm or corporation supplying labor and materials or only labor for the Work, and under a separate Contract Agreement with the Contractor.

X. "SUBSTANTIAL COMPLETION": The time as specified in the City's Standard Agreement., at which time the Work has progressed to a point whereas the Work is sufficiently complete so that the Work, at the City's discretion, can be utilized and/or occupied.

Y. "SUCCESSFUL BIDDER": The lowest responsible bidder to whom the City awards the Contract.

Z. "SUPPLEMENTAL CONDITIONS": The part of the Contract Documents which amends or supplements the General Conditions.

AA. "TECHNICAL SPECIFICATIONS": The City of Friendswood Technical Specifications (CFTS) and all other Specifications added to the Project Manual by the Design Professional for necessary completion of the Work.

AB. "TOTAL BID PRICE": The total amount bid for performing the Work as identified by Bidder and including any and all alternates and allowances.

AC. "WORK": The entire construction required to be provided under the Contract Documents which includes, but is not limited to, performing or providing labor, services, documentation and the furnishing, installation and incorporation of materials and equipment as required by the Contract Documents.

AD. 'WORKING DAY": Any calendar day from Monday through Friday, excluding City Holidays, in which four (4) or more consecutive hours of work on the Critical Path can be performed between the hours of seven (7) A.M. and eight (8) P.M. inclusive.

3. TERMINATION OF CONTRACT FOR CAUSE

If, through any cause, the Contractor shall fail to fulfill in a timely and proper manner the Contractor's obligations under this Contract, or if the Contract shall violate any of the covenants, agreements or stipulations of this Contract, the City shall thereupon have the right to terminate this Contract by giving written notice to

the Contractor and specifying the effective date thereof, at least five (5) days before the effective date of such termination. In such event, all finished or unfinished Documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Contractor under this Contract shall, at the option of the City, become its property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder. Notwithstanding the above, the Contractor shall not be relieved of liability to the City for damages sustained by the virtue of any breach of the Contract by the Contractor, and the City shall withhold any payments due to the Contractor for the purpose of set-off until such time as the exact amount of damages due the City from the Contractor is determined.

City also has the right to breach the Contract by anticipated repudiation if the rate of progress of the Work is so behind that the Contractor cannot finish on time.

4. PERSONNEL
   A. The Contractor represents that he has, or will secure at his own expense, all personnel required in performing the Work under the Contract. Such personnel shall not be employees of or have any contractual relationship with the City.
   B. All work required hereunder shall be performed by the Contractor or under his supervision and all personnel engaged in the Work shall be fully qualified and shall be authorized or permitted under state and local law to perform such services.
   C. None of the Work covered by this Contract shall be subcontracted without prior written approval of the City. Any work or services subcontracted hereunder shall be specified by written Contract or agreement and shall be subject to each provision of this Contract.

5. REPORTS AND INFORMATION
   The Contractor, at such times and in such forms as the City shall require, shall furnish the City such periodic reports as it may request pertaining to the Work or services undertaken pursuant to this Contract, the costs and obligations incurred or to be incurred in connection therewith, and any other matters covered by this Contract.

6. RECORDS AND AUDITS
   The Contractor shall maintain accounts and records, including personnel, property and financial records, adequate to identify and account for all costs pertaining to the Contract and such other records as may be deemed necessary by the City to assure proper accounting for all project funds, both federal and non-federal.

   These records shall be made available for audit purposes to the City or any authorized representative, and shall be retained for three (3) years after the expiration of this Contract unless permission to destroy them is granted by the City.

7. FINDINGS CONFIDENTIAL
All of the reports, information, data, etc., prepared or assembled by the Contractor under this Contract are confidential and the Contractor agrees that they shall not be made available to any individual or organization without the prior written approval of the City.

8. COPYRIGHT
No report, maps, or other Documents produced in whole in part under this Contract shall be subject of an application for copyright by or on behalf of the Contractor.

9. COMPLIANCE WITH LAWS
The Contractor shall comply with all applicable laws, ordinances, rules, orders, regulations, and codes of federal, state, and local governments relating to performance of the Work herein, the protection of adjacent property and the maintenance of passageways, guard fences or other protective facilities. The Contractor shall also comply with the Construction Storm Preparation Policy.

Failure of the Contractor to comply with all federal, state, and local applicable laws, ordinances, rules, order, regulations and codes, whether though lack of knowledge or negligence, does not relieve the Contractor to bring the Work into compliance at no additional cost to the City.

10. INTEREST OF MEMBERS OF THE CITY
No member of the governing body of the City, and no other officer, employee or agent of the City, who exercises any functions or responsibilities in connection with the planning and carrying out of the program, shall have any personal financial interest, direct or indirect, in this Contract; and, the Contractor shall take appropriate steps to assure compliance.

11. INTEREST OF OTHER LOCAL PUBLIC OFFICIALS
No member of the governing body of the locality and no other public official of such locality, who exercises any functions or responsibilities in connection with the planning and carrying out of the program, shall have any personal financial interest, direct or indirect, in this Contract; and, the Contractor shall take appropriate steps to assure compliance.

12. INTEREST OF CONTRACTOR AND EMPLOYEES
The Contractor covenants that he presently has no interest and shall not acquire any interest, direct or indirect, in the study area or any parcels therein or any other interest which would conflict in any manner or degree with the performance of his services hereunder. The Contractor further covenants that in the performance of this Contract, no person having any such interest shall be employed.

13. INCORPORATION OF PROVISIONS REQUIRED BY LAW
Each provision and clause required by law to be inserted into the Contract shall be deemed to be enhanced herein and the Contract shall be read and enforced as

though each were included herein. If, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, the Contract shall be amended to make such insertion on application by either party.

14. CERTIFICATES AND PERMITS

Except for required permits issued by the City, which shall be issued at no cost to the Contractor, the Contractor shall secure, at their own expense, from other public authorities all necessary certificates, licenses, approvals and permits required in connection with the Work of this Contract or any part thereof, and shall give all notices required by law, ordinance or regulation. It is the duty of the Contractor to know and find out what permits are needed. The Contractor shall pay all fees and charges incident to the due and lawful prosecution of the Work of this Contract, and any extra work performed by the Contractor.

15. GUARANTEE OF WORK

A. Neither the Notice of Final Completion, the Final Payment nor any other provision in the Contract Documents nor partial or entire occupancy of the premises by the City shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any warranties or responsibility for faulty materials or workmanship. The Contractor guarantees and warrants that all materials and equipment which are to become part of the Work shall be new unless otherwise specified and that all work shall be of good quality and free from faults and defects and in accordance with the Contract Documents and of any inspections, tests or approvals required by the Contract Documents, law, ordinance, rules, regulations or orders of any public authority having jurisdiction. The City shall give notice of observed defects within reasonable promptness.

B. Neither observations by the City's Design Professional nor inspections, tests or approvals by persons other than the Contractor shall relieve the Contractor from their obligations to perform the Work in accordance with the requirements of the Contract.

C. The provisions of this paragraph shall be cumulative of and not in limitation of the responsibility of the Contractor for defects in the Work or materials or damages resulting therefrom as otherwise provided by the law of the State of Texas or this Contract, including, without limitation, the implied warranty of fitness of the Work and the implied obligation to perform the Work in a good and workmanlike manner.

16. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

The Contractor shall be furnished additional instructions and detail drawings as necessary to carry out the Work included in the Contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and shall be so prepared that they can be reasonably interpreted as part thereof. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions. The Contractor and the City's Design Professional shall jointly (a) a schedule, fixing the dates at which special drawings

will be required, such drawings, if any, to be furnished by the City's Design Professional in accordance with said schedule, and (b) a schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment, and the completion of the various parts of the Work; each schedule to be subject to change from time to time in accordance with the progress of the Work.

17. SHOP OR SETTING DRAWINGS

The Contractor shall submit promptly to the City's Design Professional two (2) copies of each shop or setting drawing prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the City's Design Professional and the return thereof, the Contractor shall make such corrections to the drawings as have been indicated and shall furnish the City's Design Professional with two (2) corrected copies. Regardless of corrections made in or approval given to such drawings by the City's Design Professional, the Contractor shall nevertheless be responsible for the accuracy of such drawings and for their conformity to the Drawings and Technical Specifications, unless the Contractor notifies the City's Design Professional in writing of any deviations at the time such drawings are furnished.

18. MATERIALS, SERVICES, AND FACILITIES

A. It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendents, temporary construction of every nature and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.

B. Any work necessary to be performed after regular working hours on Saturdays, Sundays or legal City Holidays shall be performed without any additional expense to the City. Such work shall only be performed after written notice is given to and approval given by the City. Notice shall be a minimum of forty-eight (48) hours previous to the commencement of such work and only within the specifications specified in Work Restrictions.

19. CONTRACTOR'S TITLE TO MATERIALS

No materials or supplies for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale Contract or other agreement by which an interest is retained by the seller. The Contractor warrants that they have good title to all materials and supplies used by the Contractor in the Work, free from all liens, claims, or encumbrances.

20. INSPECTION AND TESTING OF MATERIALS

A. All materials and equipment used or any infrastructure produced in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the City. The City shall pay for all first (1st) laboratory inspection services directly and not as a part of the Contract. Should any

materials, equipment or infrastructure fail the first (1st) test, the Contractor shall pay for all subsequent testing to show that items meet the specifications of the Contract.

B. Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with the Technical Specifications and suitability for uses intended.

21. "OR EQUAL" CLAUSE

Whenever a material, article or piece of equipment is identified on the Drawings or in the Technical Specifications by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., it is intended merely to establish a standard; and, any material, article or equipment of other manufacturers and vendors which shall perform adequately the duties imposed by the general design shall be considered equally acceptable provided the material, article or equipment so proposed is, in the opinion of the City's Design Professional, of equal substance and function. It shall not be purchased or installed by the Contractor without the City's Design Professional's and the City's written approval.

The "or equal" clause shall only pertain to materials, articles or equipment specified or identified as such. Material, articles, or equipment not listed as such shall not be substituted.

22. PATENTS

A. The Contractor shall indemnify, defend, and hold and save the City and its officers, agents, servants and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of the Contract, including its use by the City, unless otherwise specifically stipulated in the Contract Documents.

B. License or Royalty Fees: License and/or royalty fees for the use of a process which is authorized by the City for a project shall be reasonable and paid to the holder of the patent or their authorized licensee, direct by the City and not by or through the Contractor.

C. If the Contractor uses any design, device, or materials covered by letters of patent or copyright, he shall provide for each use by suitable agreement with the City of such patented or copyrighted design, device, or material. It is mutually agreed and understood that, without exception, the Contract prices shall include all royalties or costs arising from the use of such design, device, or materials in any way involved in the Work. The Contractor and/or his Sureties shall indemnify, defend and save harmless the City from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this Contract, and shall indemnify the City for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the Work or after completion of the Work.

23. SURVEYS

Unless otherwise expressly provided for in the Technical Specifications, the City shall furnish the Contractor all surveys necessary for the execution of the Work. At the beginning of the project the City shall have a surveyor set vertical and horizontal control points. All other surveying for construction and progression of the Work shall be the Contractors responsibility and incidental to the Contract.

24. CONTRACTORS OBLIGATIONS

The Contractor shall, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except otherwise expressly specified, necessary or proper to perform and complete all the Work required by this Contract, within the time herein specified, in accordance with the provisions of this Contract and any said Technical Specifications and in accordance with the Drawings covered by this Contract and any and all supplemental drawings and specifications, and in accordance with the directions of the City's Design Professional as given from time to time during the progress of the Work. The Contractor shall furnish, erect, maintain, and remove such construction plant and such temporary works as may be required.

The Contractor shall observe, comply with and be subject to all terms, conditions, requirements and limitations of the Contract and Technical Specifications, and shall do, carry on and complete the entire work to the satisfaction of the City and the City's Design Professional.

25. INSURANCE

The Contractor shall not commence and work under this Contract until all insurance required herein has been obtained and such insurance has been approved by the City, nor shall the Contractor allow any Subcontractor to commence work on this Subcontract until the insurance required of the Subcontractor has been so obtained and approved.

All insurance shall be written by an insurer licensed to conduct business in the State of Texas.

26. SPECIAL CONDITIONS PERTAINING TO HAZARDS, SAFETY STANDARDS, AND ACCIDENT PREVENTION

A. Lead Based Paint Hazards:

(Applicable to Contracts for construction or rehabilitation of residential structures.)

The construction or rehabilitation of residential structures is subject to the HUD Lead-Based Paint regulations, 24 CFR Part 35. The Contractor and Subcontractors shall comply with the provisions for the elimination of lead-base paint hazards under subpart B of said regulations. The City shall be responsible for the inspections and certifications required under Section 35.14(f) thereof.

B. Use of Explosives:

When use of explosives is necessary for the prosecution of the Work, the Contractor shall observe all local, state, and federal laws in purchasing and handling explosives. The Contractor shall take all necessary precautions to protect completed work, neighboring property and all underground structures and utilities.

The Contractor shall notify all owners of public utility property of the intention to use explosives at least forty-eight (48) hours before blasting is done, close to such property. Any supervision or direction of use of explosives by the City does not in any way reduce the responsibility of the Contractor or his Surety for damages that may be caused by such use.

The Contractor shall subcontract to a company or firm that is licensed by state and federal entities for the purchase, transport, and use of such explosives. Subcontractor shall have a minimum of ten (10) years experience and shall be subject to the approval and verification of the City.

C. Danger Signals and Safety Devices (Modify as Required):
The Contractor shall make all necessary precautions to guard against damages to property and injury to persons. The Contractor shall put up and maintain in condition sufficient of red or warning lights at night, suitable barricades and other devices and signage necessary to protect the public. In case the Contractor fails or neglects to take such precautions or maintain same, the City shall have such lights, barricades, devices and/or signage installed and charge the cost of this work to the Contractor. Such action by the City does not relieve the Contractor of any liability incurred under these Technical Specifications or Contract. All such Signals or devices shall comply with the latest edition of The Texas Manual on Uniform Traffic Control Devices (TMUTCD).

27. SUSPENSION OF WORK
Should the City be prevented or enjoined from proceeding with work or from authorizing its prosecution either before or after its prosecution, by reason of any litigation, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay, but time completion of the Work shall be extended to such reasonable time as the City shall determine will compensate for time lost by such delay with such determination to be set forth in writing.

28. SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION
In order to protect the lives and health of the Contractor’s employees under the Contract, the Contractor shall comply with all pertinent provisions of the Contract Work Hours and Safety Standards Act, as amended, commonly known as Construction Safety Act as pertains to health and safety standards; and shall maintain an accurate record of all cases of death, occupational disease and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on the Work under this Contract.

The Contractor alone shall be responsible for the safety, efficiency, and adequacy of the project, appliance, and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

29. USE AND OCCUPANCY PRIOR TO ACCEPTANCE BY THE CITY

The Contractor agrees to the use and occupancy of a portion or unit of the project before formal acceptance by the City, provided the City:

A. Secures written consent of the Contractor except in the event, in the opinion of the City or the City's Design Professional, the Contractor is chargeable with unwarranted delay in completing the Contract requirements;
B. Secures consent of Surety;
C. Secures endorsement from insurance carrier(s) permitting occupancy of the building or use of the project during the remaining period of construction; or,
D. When the project consists of more that one (1) building and one (1) of the buildings is occupied, secures permanent fire and extended coverage insurance, including a permit from the insurance construction.

Use and occupancy shall not be allowed without the approval of the City's Design Professional, the Director of Community Development, and the City Manager. All conditions and terms for occupancy prior to acceptance shall be written and agreed to by the Contractor and the City.

30. USE OF PREMISES AND REMOVAL OF DEBRIS

The Contractor expressly undertakes at the Contractors expense:

A. To take every precaution against injuries to persons or damage to property;
B. To store apparatus, materials, supplies and equipment in such orderly fashion at the site of the Work as will not unduly interfere with the progress of the Work or any other Contractor or Subcontractors work;
C. To place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work;
D. To clean up frequently all refuse, rubbish, scrap materials and debris caused by construction operations, to the end that at all times the site of the Work shall present a neat, orderly and workmanlike appearance;
E. Before Final Payment to the Contractor, removal of all surplus material not to be kept and stored, false work temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from the Contractor's operations, and to put the site in a neat, orderly condition.
F. To effect all cutting, fitting or patching of the Contractors work required to make the same to conform to the Drawings and Technical Specifications and, except with the consent of the City and the City's Design Professional, not to cut or otherwise alter the Work of any other Contractor.

31. QUANTITIES OF ESTIMATE

Wherever the estimated quantities of the Work to be done and materials to be furnished under this Contract are shown in any of the documents including the proposal, they are given for use in comparing bids and the right shall be reserved, except herein otherwise specifically limited , to increase or diminish them as deemed reasonably necessary or desirable by the City to complete the Work

contemplated by the Contract, and such increase or diminution shall in no way vitiate this Contract, nor shall any such increase or diminution give cause for claims or liability for damages.

All quantities shall be based on exact or near exact usage of items actually installed and incorporated into the Work.

32. LAND AND RIGHTS-OF-WAY
Prior to the start of construction, the City shall obtain all lands and rights-of-way necessary for the carrying out and completion of the Work to be performed under this Contract.

33. NOTICE AND SERVICE THEREOF
Any notice to any Contractor from the City relative to any part of this Contract shall be in writing and considered delivered and service thereof completed when said notice is posted, certified or registered mail, to the said Contractor at the last given address or delivered in person to the said Contractor or duly authorized representative on the Work.

34. SEPARATE CONTRACT
The Contractor shall coordinate operations with those of other Contractors. Cooperation shall be required in the arrangement for the storage of materials and in detailed execution of the Work. The Contractor, including the Subcontractors, shall keep informed of the progress and detail work of other Contractors and shall notify the City's Design Professional immediately of lack of progress or defective workmanship on the part of other Contractors.

Failure of a Contractor to keep informed of the Work progressing on the site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by the Contractor of the status of the Work as being satisfactory for proper coordination with the Contractors own work.

35. SUBCONTRACTING
A. The Contractor may utilize the services of specialty Subcontractors on those parts of the Work which, under normal contracting practices, are performed by specialty Subcontractors.
C. The Contractor shall be as fully responsible to the City for the acts or omissions of Subcontractors performing work under the Contractors supervision, and of persons directly of indirectly employed by said Subcontractor, as the Contractor is for acts and omission for persons directly employed by the Contractor.
D. The Contractor shall cause appropriate provisions to be inserted in all Subcontracts relative to the Work to bind Subcontractors to the Contractor by terms of the General Conditions and Contract Documents insofar as applicable to the Work of Subcontractors and to give the Contractor the same power as regards terminating any Subcontractor that the City may exercise over the Contractor under any provision of the Contract Documents.

E. Nothing contained in this Contract shall create any contractual relation between any Subcontractor and the City.

36. THE CITY'S DESIGN PROFESSIONAL AUTHORITY
The City's Design Professional shall convey all orders and directions contemplated under this Contract and Technical Specifications, relative to the execution of the Work. The City's Design Professional shall determine the amount, quality, acceptability, and fitness of the several kinds of work and materials which shall be paid for under this Contract and shall decide all questions which may arise in relation to said work and the construction thereof. The City's Design Professional's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any questions shall arise between the parties hereto relative to said Contract or Technical Specifications, the determination or decision of the City's Design Professional shall be condition precedent to right of the Contractor to receive any monies or payment for work under this Contract affected in any manner or to any extent by such question.

37. MEANING AND INTENT
The City's Design Professional shall decide the meaning and intent of any portion of the Technical Specifications and of any Drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work which may arise between the Contractor, under this Contract and other Contractors, performing work for the City, shall be adjusted and determined by the City's Design Professional.

38. CONTRACT SECURITY
If the Contract amount exceeds Twenty-Five Thousand Dollars ($25,000), a Payment Bond shall be furnished, and if the Contract amount exceeds One Hundred Thousand Dollars ($100,000) a Performance Bond also shall be furnished, on prescribed forms in the amount of one hundred percent (100%) of the Contract amount as prescribed by the state, territorial or local law, as security for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with this Contract and as security for faithful performance of this Contract.

39. ADDITIONAL OR SUBSTITUTE BOND
If at any time the City, for justifiable cause, shall be or become dissatisfied with any Surety or Sureties for the Performance and/or Payment Bonds, the Contractor shall, within five (5) working days after notice from the City to do so, substitute an acceptable bond (or bonds) in such form and sum and signed by such Surety or Sureties as may be satisfactory to the City. The premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new Surety or Sureties shall have furnished such an acceptable bond to the City.

For Final Acceptance, the Contractor shall supply a One-year Maintenance Bond dated the date of Council Acceptance, and effective for One-year, in the total amount of the Contract.

40. ASSIGNMENTS

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the City. In case the Contractor assigns all or part of the monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations of services rendered or materials supplied for the performance of the Work called for this Contract.

41. MUTUAL RESPONSIBILITY OF CONTRACTORS

If, through acts of neglect on the part of the Contractor, and other Contractor or any Subcontractor shall suffer loss or damage on the Work, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractor shall so settle. If such other Contractor or Subcontractor assert any claim against the City on account of damage alleged to have been sustained, the City shall notify the Contractor, who shall indemnify and hold harmless the City against any such claim.

42. ACCEPTANCE OF FINAL PAYMENT CONSTITUTES RELEASE

The acceptance by the Contractor of the Final Payment shall be and shall operate as a release to the City of all claims and all liability to the Contractor for all things done or furnished in connection with this work. No payment, however, final or otherwise, shall operate to release the Contractor or the Contractors Sureties from any obligations under this Contract or the Performance, Payment or Maintenance Bonds.

43. PAYMENTS BY THE CONTRACTOR

The Contractor shall pay the following:

A. For all transportation and utility services no later than the twentieth (20th) day of the calendar month following that tin which the services are rendered;
B. For all materials, tools, and other expendable equipment to extent of ninety percent (90%) cost thereof, no later than the twentieth (20th) day of the calendar month following that in which such materials, tools and equipment are delivered at the site of the project, and the balance of the cost thereof, no later than the thirtieth (30th) day following the completion of that part of the Work in or on which such materials, tools and equipment are incorporated or used; and
C. To each of the Subcontractors under contract to the Contractor, no later than the fifth (5th) day following each payment to the Contractor, the respective amounts allowed the Contractor on account of work performed by said Subcontractors to the extent of each Subcontractors interest therein.

44. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES
Immediately after execution and delivery of the Contract, and before the first progress payment is made, the Contractor shall deliver to the City an estimated construction progress schedule in form satisfactory to the City, showing proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of each monthly payment that shall become due the Contractor in accordance with the project schedule. The Contractor shall also furnish on forms to be supplied by the City:
A. A detailed estimate giving complete breakdown of the Contract Price and;
B. Periodic itemized estimates of work done for the purpose of making progress payments thereon. The costs employed in making up any of these schedules shall be used only for determining the basis of progress payments and shall not be considered as fixing basis for additions to or deductions from the Contract Price.

45. PAYMENTS TO THE CONTRACTOR
A. Not later than the twentieth (20th) day of each calendar month, the City shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract, but to insure proper performance of the Contract, the City shall retain ten percent (10%) [five percent (5%) if the total Contract Price exceeds Five Hundred Thousand Dollars ($500,000)] of the amount of each estimate until Final Completion and acceptance of all work covered by this Contract; provided that the Contractor shall submit the estimate no later than the fifth (5th) day of the calendar month. Provided further, that on completion and acceptance of each separate building, public work or other division of the Contract on which the price is stated separately in the Contract, payment may be made in full, including retained percentages thereon, less authorized deductions.
B. In preparing estimates, the material delivered on the site and preparatory work done may be taken into consideration.
    1) Materials shall only be taken into consideration with validation by invoice, or other document showing the materials are paid, and if allowed only in the amount invoiced.
C. All material and work covered by progress payments made shall thereupon become the sole property of the City, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work or as a waiver of the right of the City to require the fulfillment of all of the terms of the Contract.
D. The City's Right to Withhold Certain Amounts and Make Application Thereof: The Contractor agrees that they will indemnify, defend and save the City harmless from all claims growing out of lawful demands of Subcontractors, labors, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, power tools and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. The

Contractor shall, at the City's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails to do so, the City shall, after having served written notice on the said Contractor, the City shall either:

1) Withhold from said Contractors unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall provisions of this sentence be construed to impose any obligations upon the City to either the Contractor or the Contractors Surety; or
2) Pay unpaid bills direct on which the City has given written notice. In paying any unpaid bills of the Contractor, the City shall be deemed the agent of the Contractor, and any payment so made by the City shall be considered as a payment made under the Contract by the City and the Contractor and the City shall not be liable to the Contractor for any such payments made in good faith. This provision shall not be construed to give rise to any third party beneficiary rights in claimants.
3) If in the opinion of the City the Contractor cannot in due diligence make payment to Subcontractors, suppliers or other debt incurred as a result of the Work or the non-payment is a recurring problem, the City shall immediately notify the Contractors Surety and make claim on the Payment Bond.

E. Monies in dispute, either due to non-payment as specified above, if more monies withheld from the Contractor than can be justified, and payment to the Contractor has passed beyond one (1) progress payment, the Contractor shall be due interest on the unjustified part of the amount withheld. If the Contractor fails to pay Subcontractors, suppliers or other debt past one (1) progress payment, subcontractors, supplies, or other debt shall be entitled to interest payments on monies owed from the Contractor.

Payments due and unpaid under Contract Documents shall bear interest from the date payment is due at such rate as the legal rate prevailing at the time at the place where project is located.

46. CORRECTION OF WORK

All work, all materials, whether incorporated in the Work or not, all processes of manufacture and all methods of construction shall be at all times and places subject to inspection of the City's Design Professional who shall be the final judge of the quality and suitability of the Work, materials, processes for manufacture and methods of construction for the purposes for which they are used. Should they fail to meet the City's Design Professional's approval, they shall be forthwith reconstructed, made good, replaced, and/or corrected, as the case may be, by the Contractor at the Contractors expense. If, in the opinion of the City's Design Professional, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the Work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the

Contractor hereunder shall be reduced by such amount as in the judgment of the City and the City's Design Professional is determined to be equitable.

If the Contractor cannot or will not remedy the Work that the Contractor has been notified is defective, the City shall give written notice for the Contractor to bring such defective work into compliance with the Contract Documents in a reasonable number of days. If the Contractor fails to take corrective action, then the City shall have the defective work corrected and deduct the cost from the Contract.

47. SUBSURFACE CONDITIONS

Should the Contractor encounter subsurface and/or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Technical Specifications, the Contractor shall immediately give notice to the Project Manager and the City's Design Professional of such conditions before they are disturbed. The City's Design Professional shall thereupon promptly investigate the conditions and, if the City's Design Professional finds that they materially differ from those shown on the Drawings or indicated in the Technical Specifications, the City's Design Professional shall at once make such changes in the Drawings and/or Technical Specifications as shall be necessary. Any increase or decrease of the cost resulting from such changes shall be adjusted in the manner provided in Paragraph 49 of the General Conditions.

48. CLAIMS FOR EXTRA COST

No claim for extra work or cost shall be allowed unless the same was done pursuant to a written order of the City's Design Professional and approved by the City, as aforesaid, and the claim presented with the first (1st) estimate after the changed or extra work is done. When work is performed under the terms of Paragraph 49.C of the General Conditions, the Contractor shall furnish satisfactory bills, payrolls, and vouchers covering all items of cost and when requested by the City, shall give the City access to accounts relating hereto.

49. CHANGES IN WORK

No changes in the Work covered by the approved Contract Documents shall be made without having prior written approval of the City. Any work undertaken by the Contractor that changes work covered by the approved Contract Documents shall be at the Contractors own risk and no claim shall be made against the City if said work is not approved for change.

A. Unit Bid Prices previously approved by the Contract Documents.
B. An agreed Lump Sum.
C. Time and material, in which the actual cost shall be:
    1) Labor, including foreman;
    2) Materials entering permanently into the Work;
    3) Ownership or rental cost of construction plant and equipment during the time of use on the extra work;
    4) Power and consumable supplies for operation of power equipment;
    5) Insurance;
    6) Social Security and old age unemployment contributions.

To the cost under subparagraph C of Paragraph 49 there shall be added a fixed fee to set at ten percent (10%) of the extra work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit, and any other general expenses.

50. EXTRAS

Without invalidating the Contract, the City may, to the extent allowed by law, order extra work or make changes by altering, adding to or deducting from the Work, the Contract sum being adjusted accordingly, and consent of the Surety being first (1st) obtained where necessary or desirable. All the Work of the kind bid upon shall be paid for at the price stipulated in the proposal and no claims for any extra work or materials shall be allowed unless the work ordered in writing by the City or the City's Design Professional and approved by the City, acting officially for the City, and the price stated in such order.

51. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

A. It is hereby understood and mutually agreed, by and between the Contractor and the City, that the date of beginning and the time of completion as specified in the Contract of work to be done hereunder are ESSENTIAL CONDITIONS of this Contract; and it is further mutually understood and agreed that the Work embraced in this Contract shall be commenced on a date specified in the Notice To Proceed.

B. The Contractor agrees that said Work shall be prosecuted regularly, diligently and without interruption at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the City, that the time for completion of the Work described herein is a reasonable time for the completion of same, taking into consideration the average climatic range and industrial conditions prevailing in this locality. City reserves the right to terminate this agreement, and breach by repudiation, without penalty, if the rate of progress is so behind schedule that full completion thereof cannot reasonably be accomplished within the time specified.

C. If the said Contractor shall neglect, fail or refuse to complete the Work within the time herein specified, or any proper extension thereof granted by the City, the Contractor does hereby agree, as a part consideration for awarding of this Contract, to pay to the City the amount specified in the Contract, not as a penalty, but as liquidated damages for such breach of Contract as hereinafter set forth, for each and every consecutive working day that the Contractor shall be in default after the time stipulated in the Contract for completing the Work.

D. The said amount stated in the City's Standard Agreement is fixed and agreed upon by and between the Contractor and City because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the City would in such event sustain, and said amount is agreed to be the amount of damages which the City would sustain and said amount shall be retained from time to time by the City from current periodical estimates.

E. It is further agreed that time is of the essence of each and every portion of

this Contract and of the Technical Specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any work, the new time limit fixed by such an extension shall be of the essence of this Contract. Provided, that the Contractor shall not be charged with any liquidated damages or any excess cost when the City determines that any part of the liquidated damages was not the fault of the Contractor and the City determines that the request for extension by the Contractor is justified and due to:

1) Any preference, priority, or allocation duly issued by the government;
2) The following unforeseeable causes namely acts of the public enemy, unjustified acts of the City, acts of another Contractor in performance of a Contract with the City, fires, floods, earthquakes, hurricanes, tornadoes, epidemics and any other acts of nature, quarantine restrictions, strikes, freight embargos; and rainy days claimed by the Contractor; however rainy days shall be considered only if the Contractor notifies the City on the day the Contractor claims he cannot work because of rainy weather that day. Rainy day must be as is specified in Paragraph 51.E.3 below. Failure to report the rainy day and to claim said rainy day on a Time Request shall eliminate any claim for time extension because of rain or inclement weather on that day.
3) Rainy day shall be described as when a minimum of sixty percent (60%) of the Contractors workforce cannot work for four (4) or more consecutive hours on critical path activities and providing that the Contractor has complied with the conditions under Paragraph 51.E.2.
4) Any delays of Subcontractors or suppliers occasioned by any of the causes specified in subparagraphs one (1) and two (2) of this Paragraph.

F. Provided, further, that the Contractor shall, within ten (10) days from beginning of such delay, unless the City shall grant a further period of time prior to the date of final completion of the Contract, notify the City, in writing, of the causes of delay, who shall ascertain the facts and extent of delay and notify the Contractor within reasonable time of the City's decision in the matter.

G. Provided, that this provision for liquidated damages shall be cumulative of and not in limitation of any other remedy available to the City, including, but without limitation, the right to terminate as provided in Paragraph 3 of the General Conditions and recover additional damages for any excess cost in otherwise completing the Work.

H. The City shall, if it deems necessary, start charging liquidated damages equal to the amount of time over the date of Final Completion listed in the Notice To Proceed. This date shall be adjusted using current changes in Contract Time and allowable Weather Days. The amount of liquidated damages shall be deducted from the next Pay Estimate submitted by the Contractor.

52. WEATHER CONDITIONS

In the event of temporary suspension of work, or during inclement weather, or whenever the City's Design Professional shall direct, the Contractor shall cause the Subcontractors to protect carefully all work and materials against damage or injury from the weather. If, in the opinion of the City's Design Professional, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of the Subcontractors so to protect the Work, such materials and work shall be removed and replaced at the expense of the Contractor.

53. PROTECTION OF THE WORK AND PROPERTY – EMERGENCY

A. The Contractor shall at all times safely guard the City's property from injury or loss in connection with this Contract. The Contractor shall at all times safely guard and protect the Work and that of adjacent property, from damage. The Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the Contract, by the City or the City's duly authorized representatives.

B. In case of an emergency which threatens loss or injury of property and/or safety of life, the Contractor shall be allowed to act, without previous instructions from the City or the City's Design Professional, in a diligent manner. The Contractor shall notify the City or the City's Design Professional immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall promptly be submitted to the City or the City's Design Professional.

C. Where the Contractor has not taken action but has notified the City or the City's Design Professional of an emergency threatening injury to persons or damage to the Work or any adjoining property, the Contractor shall act as instructed by the City or the City's Design Professional.

D. The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided for in the General Conditions.

54. INSPECTION

The authorized representatives and agents of the City shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials and other relevant data. The Contractor shall not impede and allow unrestricted access to the Project Mangers, Building Official, and Testing Laboratory personnel.

55. SUPERINTENDENCE BY CONTRACTOR

At the site of the Work, the Contractor shall employ a construction superintendent or foreman who shall have full authority to act for the Contractor. It is understood that the representative shall be acceptable to the City's Design Professional and shall remain in such capacity for the particular job involved unless superintendent ceases to be on the Contractors payroll.

56. FEDERAL LABOR STANDARDS PROVISIONS
All laborers and mechanics employed upon the Work covered by this Contract shall be paid unconditionally and not less than once each week and without subsequent deduction or rebate on any account (except such payroll deductions as are mandatory by law and such other payroll deductions as are permitted by the applicable regulations issued by the Secretary of Labor, United States Department of Labor, pursuant to the Anti-Kickback Act hereinafter identified) the full amount due at time of payment computed at wage rates not less than those contained in the wage determination decision of said Secretary of Labor, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor and such laborers and mechanics. All laborers and mechanics employed upon such work shall be paid in cash, except that payment may be by check if the employer provides or secures satisfactory facilities approved by the City for the cashing of same without cost or expense to the employee. For the purpose of this clause, contributions made or costs reasonably anticipated under Section 1(b)(2) of the Davis Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section 5.5(a)(1)(iv) of Title 29, Code of Federal Regulations. Also, for the purpose of this clause, regular contributions made or costs incurred more than a weekly period under plans, funds, or programs, but covering the particular work week, are deemed to be constructively made or incurred during such weekly period.

57. UNDERPAYMENTS OF WAGES OR SALARIES
In case of underpayment of wages by the Contractor or by any subcontractors to laborers or mechanics employed by the Contractor or Subcontractor upon the Work covered by the Contract, the City, in addition to such other rights as may be afforded it under this Contract, shall withhold from the Contractor, out of any payments due the Contractor, so much thereof as the City, may consider necessary to pay such laborers or mechanics the full amount of wages required of this Contract. The amount so withheld may be disbursed by the City for and on account of the Contractor or the Subcontractor (as may be appropriate), to the respective laborers and mechanics to whom same is due or on their behalf to plans, funds, or programs for any type of fringe benefit prescribed in the applicable wage determination.

58. EMPLOYMENT OF CERTAIN PERSONS PROHIBITED
No person under the age of sixteen (16) years and no person who, at the time, is serving sentence in a penal, correctional institution or undocumented workers shall be employed on the Work covered by this Contract.

59. EMPLOYMENT OF LABORERS OR MECHANICS NOT LISTED IN AFORESAID WAGE DETERMINATION DECISION
Unlisted classifications needed for work not included within the scope of the classifications listed in the wage determination of this Contract maybe added after award only as provided in the labor standards contract clauses (29CFR, 5.5(a)(1)(ii).

60. FRINGE BENEFITS NOT EXPRESSED AS HOURLY WAGE RATES
The City shall require, whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly wage rate and the Contractor is obligated to pay cash equivalent of such benefit, an hourly cash equivalent thereof established. In the event the interested parties cannot agree upon a cash equivalent of the fringe benefits, the question, accompanied by a recommendation of the City, shall be referred to the Secretary of Housing and Urban Development, to the Secretary of Labor for determination.

61. POSTING WAGE DETERMINATION DECISIONS AND AUTHORIZED WAGE DEDUCTIONS
The applicable wage poster and the applicable wage determination decisions, with respect to the various classification of laborers and mechanic employed upon the Work covered by this Contract, and a statement showing all deductions, if any, in accordance with the provisions of this Contract, to be made from wages actually earned by persons so employed or to be employed in such classifications, shall be posted at the appropriate conspicuous points at the site of the Work.

62. COMPLAINTS, PROCEEDINGS, OR TESTIMONY BY EMPLOYEES
No laborer or mechanic to whom wages, salary or other labor standards provisions of this Contract are applicable shall be discharged or in any manner discriminated against by the Contractor or any Subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to their employer.

63. CLAIMS AND DISPUTES PERTAINING TO WAGE RATES
Claims and disputes pertaining to wage rates or to classifications of laborers and mechanics employed upon the Work covered by this Contract shall be promptly reported by the Contractor in writing to the City for referral by the latter through the Secretary of Housing and Urban Development to the Secretary of Labor, United States Department of Labor, whose decision shall be final with respect thereto.

64. PAYROLLS AND BASIC PAYROLL RECORDS OF THE CONTRACTOR AND THE SUBCONTRACTOR
    A. The Contractor and each Subcontractor shall prepare their payrolls on forms satisfactory to and in accordance with instructions to be furnished by the City. The Contractor shall submit weekly to the City one (1) certified copy of all payrolls of the Contractor and of the subcontractors, it is being understood that the Contractor shall be responsible for the submission of copies of payrolls of all subcontractors. Each payroll shall contain the “Weekly Statement of Compliance” set forth in Section 3.3 of Title 29, Code of Federal Regulations. The payrolls and basic payroll records of the Contractor and each Subcontractor covering all laborers and mechanics employed upon the Work covered by this Contract shall be maintained during the course of the Work and for a period of three (3) years thereafter. Such payroll records

shall contain name and address of each employee, the employee's correct classification, rate of pay (including rates of contributions or costs anticipated of types described in Section 1(b)(2) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid.

B. In addition, whenever the Secretary of Labor has found, under Section 5.5(a)(1)(iv) of Title 29, Code of Federal Regulations, that wages of any laborer or mechanic include the amount any costs reasonably anticipated in providing benefits under a plan, or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor or Subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible and that the plan or program has been communicated in writing to the laborers or mechanics affected, and will maintain records which show the costs anticipated or the actual cost incurred in providing such benefits. The Contractor and each Subcontractor shall make their employment records, with respect to persons employed by them upon the Work covered by this Contract, available for inspection by authorized representatives of the Secretary of Housing and Urban Development, the City and the United States Department of Labor. Such representatives shall be permitted to interview employees of the Contractor or of any subcontractors during working hours on the job.

C. At a minimum the Contractor and subcontractors shall certify their payroll and remit such certification with the progress payment request.

65. SPECIFIC COVERAGE OF CERTAIN TYPES OF WORK BY EMPLOYEES

The transporting of materials and supplies to or from the site of the project or program to which the Contract pertains by the employees of the Contractor or any Subcontractor and manufacturing or furnishing of materials, articles, supplies or equipment on the site of the project of program to which this Contract pertains by persons employed by the Contractor or by any Subcontractor, shall, for the purpose of this Contract, and without limiting the generality of the foregoing provisions of this Contract, shall be deemed to be work which these Federal Labor Standards Provisions are applicable.

66. INELIGIBLE SUBCONTRACTORS

The Contractor shall not subcontract any part of the Work covered by this Contract or permit subcontracted work to be further subcontracted without the City's prior written approval of the Subcontractor. The City shall not approve any Subcontractor for work covered by this Contract who is at the time ineligible under the provisions of any applicable regulations issued by the Secretary of Labor, United States Department of Labor, or the Secretary of Housing and Urban Development to receive an award of such subcontract.

Any Subcontractor shall also not be eligible if they previously or currently, in default of a contract on any other project, have failed to complete any project or was removed from a project for defective work.

67. PROVISIONS TO BE INCLUDED IN CERTAIN SUBCONTRACTS
The Contractor shall include or cause to be included in each subcontract covering any of the Work covered by this Contract, provisions which are consistent with these Federal Labor Standards Provisions and also a clause requiring the Subcontractors to include such provisions in any lower tier subcontracts which they may enter into, together with a clause requiring such insertion in any further subcontracts that may be in turn be made.

68. BREACH OF FEDERAL LABOR STANDARDS PROVISIONS
In addition to the causes for termination of this Contract as herein set forth, the City reserves the right to terminate this Contract if the Contractor or any Subcontractor, whose subcontract covers any of the Work covered by this Contract, shall breach any of these Federal Labor Standards Provisions. A breach of these Federal Labor Standards Provisions may also be grounds for debarment as provided by the applicable regulations issued by the Secretary of Labor, United States Department of Labor.

69. EQUAL OPPORTUNITY PROVISIONS (E.O. 11246)
During the performance of this Contract, the Contractor agrees as follows:
A. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative actions to ensure that applicants for employment are employed and that employees treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
B. The Contractor shall post in conspicuous places, available to employees and applicants for employment notice to be provided Contracting Officer setting forth provisions of this nondiscrimination clause.
C. The Contractor shall state that all qualified applicants shall receive consideration for employment without regard to race, color, religion, sex, or national origin.
D. The Contractor shall incorporate foregoing requirements in all subcontracts.

70. CIVIL RIGHTS ACT OF 1964
Under Chapter 106 of the Civil Practice & Remedies Code of the Revised Civil Statutes of Texas, no person shall, on the ground of race, color, national origin, sex, age, or handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity of the City.

71. INDEMNIFICATION
A. The Contractor shall defend, indemnify and hold harmless the City and the City's Design Professional and their respective officers, agents and employees, from and against all damages, claims, losses, demands, suits, judgments and costs, including reasonable attorney's fees and expenses

arising out of or resulting from the performance of the Work or any act or omission of the Contractor or the Contractors employees, agents, suppliers or subcontractors.

B. The obligation of the Contractor under this Paragraph shall not extend to the liability of the City's Design Professional, their agents or employees arising out of preparation or approval of maps, drawings, reports, surveys, Change Orders, designs or Technical Specifications, or the giving of or failure to give directions or instructions by the City's Design Professional, their agents or employees, provided such giving or failure to give is the primary cause of the injury or damage.

72. DELAYS

The Contractor shall receive no compensation for delays or hindrances to the Work, except when the direct or unavoidable extra cost to the Contractor is caused by failure of the City to provide information or material, if any, which is to be furnished by the City. When such extra compensation is claimed, a written statement thereof shall be presented by the Contractor to the City or the City's Design Professional and, if found correct, shall be referred to the City Council for final approval or disapproval; and action thereon by the City Council shall be final and binding. If delay is caused by specific orders given by the City or the City's Design Professional to stop work, or by the performance of extra work, or by the failure of the City to provide material or necessary instructions for carrying on the Work, then such a delay shall entitle the Contractor to an equivalent extension of time, the application of which shall, however, be subject to the approval or disapproval of the City Council; and no such extension of time shall release the Contractor or the Surety on their performance bond from all obligations hereunder which shall remain in full force until the discharge of the Contract.

73. MAINTENANCE OF WORK

If, after approval of Final Payment and prior to expiration of the one (1) year date of Substantial Completion or such longer period as may be prescribed by law or any applicable special guarantee required by the Contract Documents, any work is found to be defective, the Contractor shall promptly, without cost to the City and in accordance with the City's written instructions, correct such defective work. If the Contractor does not promptly comply with such instructions, the City shall have defective work corrected and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be paid by the Contractor or the Contractor's Surety. The provisions of this paragraph shall not limit the obligation of the Contractor under Paragraph 15 (Guarantee of Work) of the General Conditions in any respect whatsoever, including the time period of such Guarantee of Work contained therein, as will arise under the laws of the State of Texas and said Paragraph 15 and without regard to the provisions of this Paragraph, nor shall this Paragraph be construed to establish any period of limitations for any cause of action against the Contractor under the obligations of said Paragraph 15.

74. ANTITRUST
The Contractor hereby assigns to the City any and all claims for overcharges associated with this Contract which arise under the anti-trust laws of the United States, 15 U.S.C.A. Sec. 1, et seq. (1973).

75. DELAY, DISRUPTION, OR OTHER CLAIMS
Any claim by the Contractor for delay, disruption or any other claim shall be based on a written notice delivered to the City and to the City's Design Professional promptly (but in no case later than ten (10) working days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Within ten (10) working days of delivering said notice, the Contractor shall deliver to the City and the City's Design Professional notice of the amount of the claim and specific and detailed support documentation and data on the impact claimed. Further, the Contractor shall furnish on a continuing basis all of the documents that in any way are purported to support the damages, costs, expenses, and impact of the claim event. The Contactor's failure to fully comply with any of these requirements with respect to any claim shall constitute a complete and final waiver of said claim.

76. SANITARY AND SAFETY FACILITIES
The Contractor shall be responsible for all sanitary and safety facilities necessary for the Project, including rest rooms, drinking facilities, wash areas, hardhats, trench shoring, etc.

77. SUBMITTALS
The Contractor shall be responsible for verifying that all submittals from the suppliers, manufacturers, subcontractors, and/or any other source of materials, processes, services, equipment, hardware, and/or software, conform to the Contract Documents and Technical Specifications. **ANY AND ALL** deviations, no matter how minor, shall be listed on the Contractor Submittal sheet and identified on the submittals/shop drawings. Failure to acknowledge deviations from the Contract Documents and Technical Specifications, even if noted "Acknowledged Receipt", "No Exception", or "Exceptions As Noted", by either the City or the City's Design Professional, does not alleviate the responsibility and such submittal shall be deemed be Defective Work and shall be corrected according to the Specified Item at no additional charge to the City.

78. WARRANTIES
All warranties and guarantees for all material, labor, equipment, processes, services, hardware, and/or software shall begin at the time that the Project is accepted by the Friendswood City Council, and not at the time of purchase, installation, startup, manufacture, or creation date. Warranties and guarantees shall be for the length of time as stated in the Contract Documents and Technical Specifications, and not that of the supplier, manufacturer, creator, or subcontractor, and shall **NOT** be changed unless authorized by a Change Order approved and signed by the City. Any disparity between the Contractor and the supplier, manufacturer, and /or creator's Warranty Period and the Warranty Period

as stated in the Contract Documents and Technical Specifications, it shall be the Contractors responsibility to fix, repair or replace damaged/defective items for the duration of the One-Year Maintenance Period at no additional cost to the City.

END OF SECTION

SUPPLEMENTAL CONDITIONS

1. GENERAL
   The Provisions of this Section of the Technical Specifications shall govern in the event of any conflict between them and General Conditions.

2. DESIGN PROFESSIONAL
   The words "Design Professional" in these Technical Specifications shall be understood as referring to [INSERT DESIGN PROFESSIONAL'S NAME AND ADDRESS], Design Professional of the City, or such other Design Professional, or persons as may be authorized by the City to act in any particular position.

3. LOCATION OF THE PROJECT
   This project is located in Friendswood, Texas, [INSERT COUNTY] County. Map showing the general location of this project is included in the Drawings.

4. CONSTRUCTION IN PUBLIC STREETS AND PRIVATE DRIVES
   A. No public road shall be entirely closed overnight. It shall be the responsibility of the Contractor to build and maintain all-weather bypasses and detours, if necessary, and to properly light, barricade and mark all bypasses and detours that might be required on and across the streets involved in the Work included in this Contract. The residents along the affected road(s) shall be contacted a minimum of forty-eight hours (48 Hrs) prior to the time the construction shall commence at their driveways or entrances and informed as to the length of time the driveways shall be closed.
   B. The Contractor shall make every effort to complete construction and allow immediate access to adjacent property at all driveway entrances located along the streets. The Owners or Tenants of commercial properties where access and/or entrance drives which shall be affected by construction shall be notified a minimum of twenty-four hours (24 Hrs) prior to the time the construction shall be started at their driveways or entrances and informed as to the length of time driveways shall be closed.
   C. During inclement weather the Contractor shall construct temporary gravel or shell crossings and wooden walkways to allow ingress and egress across excavated areas at no expense to the City and as directed by the Project Manager or the City's Design Professional.
   D. The Contractor shall be responsible for all streets and entrance reconstruction and repairs and maintenance of same for a period of one year (1 Yr) from the date of such reconstruction or Substantial Completion, whichever is longer. In the event the repairs and maintenance are not made immediately to the satisfaction of the City, and it becomes necessary for the City to make such repairs, the Contractor shall reimburse the City for the cost of such repairs.
   E. The Contractor shall, at all times, keep a sufficient width of the roadway clear of dirt and other material to allow the free flow of traffic. The Contractor shall assume any and all responsibility for damage, personal or otherwise, that may be caused by the construction along public streets or private drive.
   F. During the prosecution of the Work, the Contractor shall obstruct public travel

as little as possible and in no case shall there be less that twelve feet (12 Ft) in width of unobstructed roadway for traffic.

5. MAINTENANCE OF STORM SEWER, UTILITY CROSSINGS, AND EXISTING ROADWAYS

The Contractor shall maintain storm sewers, utilities, pipelines, and drainage facilities along the construction route at all times during construction at no additional expense to the City. Storm sewers and utilities crossing existing roadways shall be backfilled in accordance with these Technical Specifications and the Standard Details to an elevation six inches (6 In) below the elevation of the existing roadway. A temporary road patch of six inches (6 In) thick of compacted limestone base shall be constructed to or a little above the elevation of the existing roadway within the limits of the pavement removal at no additional cost to the City. The existing roadway shall be maintained throughout the construction. Pot hole appearing in the base or the existing pavement shall be deemed a hazard to the general public and shall be filled and maintained as directed by the Project Manager.

6. PUBLIC UTILITIES AND OTHER PROPERTY TO BE CHANGED

In case it is necessary to change or move the property of any owner or public utility, such property shall not be moved or interfered with until ordered to do so by the Project Manager. The right is reserved to the owner of public utilities to enter upon the limits of the project for the purpose of making such changes or repairs of their property that may be made necessary by performance of this Contract.

7. TEMPORARY CONSTRUCTION

No material which has been used by the Contractor for any temporary purpose whatever is to be incorporated in the permanent structure without written permission of the Project Manager.

8. PROJECT MAINTENANCE

The Contractor shall maintain and keep in good repair all work contemplated under these Drawings, Exhibits and/or Technical Specifications which shall include the maintenance and repair of all existing streets, storm sewer crossings, utility crossings, temporary crossings for access to adjacent property, wooden walkways, barricades, lights, danger signals and all work which is necessary for the well-being of the general public. In the event the Contractor fails to properly maintain the Work, the City shall make such repairs as are necessary and the cost of said repairs shall be deducted from payment due to the Contractor.

9. BORINGS

Wherever certain test borings are made on this site, the locations of such test borings and the information revealed by them is indicated on the Drawings and profiles for the project. These borings shall not be construed as a warranty on the part of the City of the exact nature of the subsurface conditions that will be encountered during construction of the Work. The information thus furnished is intended only as a guide to the Contractor in making their own investigations preliminary to submitting a price for the Work.

10. PROPERTY LINES AND MONUMENTS
The Contractor shall protect all property corner markers and when any such markers or monuments are in danger of being disturbed, they shall be properly referenced and if disturbed, shall be reset by a Professional Land Surveyor licensed by the State of Texas, at the expense of the Contractor.

11. EXISTING STRUCTURES
The Drawings show the locations of all known surface and subsurface structures. However, the City assumes no responsibility for failure to show any or all of these structures on the Drawings, or to show them in their exact locations. It is mutually agreed that such failure shall not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as to necessitate substantial changes in the lines or grades, or requires the building of special work, provisions which are not made in the Drawings and the Proposal, in which case the provisions in these Technical Specifications for extra work shall apply.

12. BARRICADES, LIGHTS, AND WATCHMEN
    A. Where the Work is carried on, in or adjacent to any street, alley or public place, the Contractor shall at their own cost and expense furnish and erect such barricades, fences, battery type flasher-markers and danger signals, shall provide watchmen, and shall provide such other precautionary measures for the protection of persons or property and the Work as are necessary. Barricades shall be painted using color that shall be visible at night and reflective. From sunset to sunrise the Contractor shall furnish and maintain at least one (1) battery type flasher-marker at each barricade and sufficient number of barricades shall be erected to keep vehicles from being driven on or into any work under construction. The Contractor shall furnish watchmen in sufficient numbers to protect the Work and the public.
    B. The Contractor shall be held responsible for all damage to the Work due to failure of barricades, signs, lights and watchmen to protect it, and whenever evidence is found of such damage, the Project Manager shall order the damaged portion to be immediately removed and replaced by the Contractor at no additional cost to the City. The Contractor's responsibility for the maintenance and repair of barricades, signs and lights, and for providing watchmen shall not cease until the project has been accepted by the City.
    C. Materials and equipment stored in or near the path of traffic shall be protected with red flags during the day and with lights during the night.

13. FENCES, DRAINAGE CHANNELS, AND CROP DAMAGE
    A. Boundary fences or other improvements removed to permit the installation of the Work shall be replaced in the same location and left in a condition as good or better than that in which they are found. This shall include landscaping, gardens, etc.

    B. Where surface drainage channels are disturbed or blocked during

construction, final restoration to their original condition of grade and cross section shall be accomplished after the Work of construction is completed. Interim reshaping and cleanup shall occur immediately after trench backfilling.

C. The Contractor shall not be held liable for unavoidable damage of crops provided such damage occurs within the construction easement provided by the City.

14. DISPOSAL OF WASTE AND SURPLUS EXCAVATION
    A. All trees, stumps, slashings, brush or other debris removed from the sites as a preliminary to the construction work shall be removed form the property and disposed of in a manner approved by the Project Manager.
    B. All excavated earth in excess of that required for backfilling shall be removed from the job site and disposed of in a satisfactory manner except in locations where, in the judgment of the Project Manager, it can be neatly spread over and along sites to form the finished contours.

15. WATER FOR CONSTRUCTION
    A. Water used for sprinkling, testing and flushing of waterlines or any other purpose incidental to this project, shall be furnished to the Contractor. The Contractor shall make necessary arrangements for securing and transporting said water and shall take said water in a manner and at such times that will not produce a harmful drain or decrease of pressure in the City's water system. Water shall not be used in a wasteful manner.
    B. Water shall be dispensed from a meter from the City' Department of Public Works. The Contractor shall not operate any valves on the existing water supply without a Public Works employee present. All water going into containers shall use a vacuum break.
    C. There shall be no jetting or flooding of trenches.

16. LIGHTS AND POWER
    The Contractor shall provide, at the Contractor's expense, electrical power, temporary lighting, and facilities required for the proper prosecution and inspection of the Work.

17. CLEANUP
    A. Cleanup shall follow the execution of the Work. At the conclusion of the Work, all tools, temporary structures, and materials belonging to the Contractor shall be promptly removed and all dirt, rubbish and other foreign substances shall be disposed of properly.
    B. The Contractor shall thoroughly clean all equipment and materials installed by the Contractor and shall deliver over such materials and equipment undamaged in a bright, clean polished and new appearing condition.
    C. During construction of the Work, the Contractor shall, at all times keep the site of the Work and adjacent premises as free of material, debris and rubbish, as is practicable and shall remove same from any portion of the site, if, in the opinion of the Project Manager, such material, debris or rubbish constitutes a nuisance or is objectionable.

D. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

18. EXISTING UTILITIES, PIPELINES, AND SERVICE LINES
The Contractor shall be responsible for the protection of all existing utilities, pipelines, and service lines crossed or exposed by the construction operations. Where existing utilities, pipelines, or service lines are cut, broken, or damaged, the Contractor shall replace or repair them with the same type of original material and construction, or better, at the Contractors own cost, with the exception of those items included in the price schedule.

19. POLES, SIGNS, GUY WIRES, ETC.
A. All utility poles and guy wires, private sign posts, signs and guy wires, and similar private obstructions which interfere with the construction of this project shall be removed and replaced, or moved to new permanent locations by the owners thereof, at the Contractor's expense. No separate compensation shall be paid for this work, but the costs thereof shall be included in such contract pay items as are provided.
B. The removal and replacement of the City's street sign post and signs are the responsibility of the Contractor. The Contractor shall be responsible for all damage to street sign posts and signs with in the limits of the Contractor's operations that remain in place or are removed and replaced. In the event street sign posts and/or signs are damaged or destroyed by the Contractor's operations, said sign posts, or signs shall be replaced by the Contractor at no cost to the City.
1) All signs on City Streets that are not Texas Department of Transportation (TxDOT) Highways shall be purchased directly from the Department of Public Works.

20. SALVAGED MATERIALS
All materials removed during the construction of the projects, and designation on the Drawings or by the Project Manager, as salvaged materials, shall be removed, cleaned, and stored as directed by the Project Manager. Salvaged materials shall be the property of the City.

21. PROTECTION OF IMPROVEMENTS
The Contractor shall be entirely responsible for the protection of all improvements that are not designated by the Project Manager to be removed for proper construction of the project; this shall include sidewalks, buildings, walls, existing inlets and manholes, underground utilities, shrubs trees, signs, sod and pavement.

22. PROTECTION OF TREES
No trees shall be removed or cut except upon the specific approval of the City. Trees adjacent to the Work shall be protected from all damage by construction operations and as specified in Tree and Plant Protection.

23. PROTECTION AND ADJUSTMENT OF EXISTING WATER VALVE BOXES

Water valve locations shall be furnished by the City prior to the grading operations. Protection of existing water valve boxes located within the limit of the Work shall subsequently be the responsibility of the Contractor. Failure to show water valve box locations on the Drawings does not relieve the Contractor of the responsibility to prevent damage to the valves and boxes. The Contractor shall adjust all water valve boxes which require adjustment to new pavement grade. Water valve boxes shall be adjusted as per Technical Specification 02310 – Adjusting Manholes, Inlets, and Valve Boxes to Grade.

24. ADJUSTMENT OF TOPS OF EXISTING SANITARY SEWER MANHOLES
Tops of existing sanitary sewer manholes shall be adjusted where necessary to match the grade of new pavement. Adjustment shall be made by breaking back the top portion of the manhole and rebuilding to conform to the new grade. Tops of manholes shall be adjusted as per Technical Specification 02310 – Adjusting Manholes, Inlets, and Valve Boxes to Grade.

25. PROTECTION AGAINST ACCIDENT TO EMPLOYEES AND THE PUBLIC
The Contractor and Contractor's Sureties shall indemnify, defend and save harmless the City and the City's Design Professional, and all their officers, agents and employees from all suits, actions and claims of any character, name and description brought for or on account of any injuries or damages received or sustained by any person or persons or property on account of any act, omission or fault of the Contractor, their agents or employees, in the execution of said Contract; or on account of the failure of the Contractor to provide the necessary barricades, warning lights or signs; and shall be required to pay any judgment, with costs, which may be obtained against the City and/or the City's Design Professional growing out of such injury or damage.

26. LINES AND GRADES
    A. The City's Design Professional shall furnish survey control to enable the Contractor to set construction stakes for the Work. Said controls shall be one (1) horizontal control and one (1) vertical control. The Contractor shall be responsible for all construction staking. Any field conditions that appear to be in conflict with the Drawings shall be submitted to the City's Design Professional in writing with adequate time allowed the City's Design Professional to resolve the conflict. No compensation for surveying shall be made without prior written approval from the City and the City's Design Professional.
    B. ***THE FURNISHING OF THE CONTROL DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF INSURING THAT THE WORK IS CONSTRUCTED TO THE LINES AND GRADES SHOWN ON THE DRAWINGS.***

27. AFFIDAVIT OF PAYMENT
    A. Request for payment shall be accompanied by an Affidavit of Payment, duly signed, and if a Corporation attested to, stating that all cost of labor, material, equipment, taxes, etc., pertinent to this project, have been paid and are

current.

B. The Final Payment, besides having the Document listed in Paragraph 27.A of Supplemental Conditions, shall also have filed Waiver and Release of Lien.

28. INTERRUPTION OF UTILITY SERVICES

Each and every Contractor and Subcontractor performing at the site of the Project shall not operate any valve or other control on existing systems and shall exercise care in performing work so as not to interrupt service. At house connections, every Contractor and Subcontractor performing at the site shall either lift trenching machine over lines or cut and reconnect with minimum interruption of service as approved by the City's Design Professional.

29. LOSSES FROM NATURAL CAUSES

Unless otherwise specified, all loss or damage to the Contractor arising out of the nature of the Work to be done, or from the action of the elements, or from any unforeseen circumstances in the prosecution of the same, or from unusual obstructions or difficulties which may be encountered in the prosecution of the Work, shall be sustained and borne by the Contractor at no additional cost to the City.

30. MAINTENANCE AND INSTRUCTION MANUALS

Furnish three (3) bound sets of Maintenance and Instruction Manuals. Bind manuals in volumes of not more than four inches (4 In) thick, in hard back nine inch by twelve inch (9 In x 12 In) binders. Include like equipment in one (1) volume with heavy duty dividers, separating equipment. Catalog and index all volumes. Operation and Maintenance Manuals or Bulletins shall include necessary data for reordering replacement parts, lubrications schedules, and procedures for required maintenance. These items shall be included but not limited to: exhaust fans, air conditioning units, louvers, generator sets, pumps, motors, variable speed drives, mechanical drives, electrical switchgear and controls, electrical fixtures, valves, instrumentation, chlorinators, meters, gauges and miscellaneous mechanical and electrical components supplied under this Contract.

31. SUBCONTRACTOR VALUES

The Contractor shall not employ Subcontractors whose aggregate value of work exceeds fifty percent (50%) if the total amount of the Contract Price as stipulated in the Standard Agreement.

32. PROJECT REPRESENTATIVE SERVICES

Project Representative Services shall be the responsibility of the Project Manager and these services shall be in accordance with the Standard Agreement between the City and the City's Design Professional. The Project Representative's duties shall include preparation of daily reports, determination that the project is proceeding in general compliance with the Contract Documents, measurement of material quantities and reporting to the Project Manager any work that should be stopped when it appears that the completed project may not comply with the requirements of the Contract Documents. The Project Representative shall be the liaison between the Contractor and the City's Design Professional and the City. The

Project Representative's responsibilities begin after the Contract is awarded and terminate after the Final Inspection.

33. CONTRACTOR SUBMITTED ALTERNATE DESIGNS
    A. If alternate design features are proposed for convenience of the Contractor, Contractor shall submit design calculations and detailed Drawings covering the proposed changes and related modifications of the Contract Drawings for review. Contractor shall make the Drawings the same size as the Contract Drawings and of comparable quality. The Contractor shall make payment to the City for all charges resulting from modifications, including engineering charges for checking such designs.
    B. If substitute items of equipment are allowed, and they vary materially from those shown on the Contract Drawings, Contractor shall prepare equipment data and detailed Drawings covering necessary modifications for the City's Design Professional for approval. Contractor shall make the Drawings the same size as the Contract Drawings and of comparable quality. The Contractor shall make payment to the City for all charges resulting from the modifications, including engineering charges for checking the modifications.

34. COST BREAKDOWN
    Within fifteen days (15 D) after the execution of the Contract, Contractor shall submit, in acceptable form, a schedule showing subdivision of the Contract into various items of permanent construction, stating quantities and prices, as basis for computing values to the City of permanent usable parts of the facility to be paid for on monthly estimates.

35. MATERIALS AND EQUIPMENT
    Contractor shall incorporate into the Work only new materials and equipment of domestic manufacture unless otherwise designated. Contractor shall store these materials and equipment in a manner to protect them from damages. The manner of protection is subject to the specific approval of the City's Design Professional. Pipe, fittings, equipment and other serviceable materials found on site of work or dismantled by reason of construction, remain property of the City. Contractor shall remove and deliver materials to the City at designated points. Contractor shall pay, at prevailing market price, for usable materials that are damaged through negligence.

36. SPECIAL SPECIFICATIONS AND SPECIAL PROVISIONS
    Basic Technical Specification Items are those which follow prescribed general requirements. Special Specifications are those which supplement the Technical Specifications and are specific to this project, where there are no Technical Specifications covering certain portions of the Work. When necessary, Special Provisions are inserted to describe additional requirements appreciable to this Contract. Special Provisions are to be used in conjunction with the Technical Specification and Special Specification Items. In event of conflict, the requirements set forth in the Special Provisions as set forth will govern. In the event of conflict between the requirements shown on the Drawings and those contained in the

Technical Specifications, then the governing item shall be as specified in General Conditions.

37. AS-BUILT DIMENSIONS
The Contractor shall make daily measurements of facilities. On completion of the project, the Contractor shall furnish the City with one (1) set of blue lines, marked with red pencil, to show as-built dimensions and location of all the Work constructed.

38. ARCHEOLOGICAL CONSTRUCTIONS
A. No activity which may affect a State Archeological Landmark is authorized until the City has complied with the provisions of the Antiquities Code of Texas. The City has previously coordinated with the appropriate agencies and impacts to known cultural or archeological deposits have been avoided or mitigated. However, the Contractor may encounter unanticipated cultural or archeological deposits during construction.
B. If archeological sites or historic structures are discovered after construction operations are begun, the Contractor shall immediately cease operations in that particular area and notify the City and the Texas Historical Commission at (512) 463-6096. The Contractor shall take reasonable steps to protect and preserve the discoveries until they have been inspected by the City and the appropriate State Agency. The City shall promptly coordinate with the Texas Historical Commission and any other appropriate agencies to obtain any necessary approvals or permits to enable the Work to continue. The Contractor shall not resume work in the area of the discovery until authorized to do so by the City.
C. Contractor, subcontractor and their respective employees shall have no claim to artifacts or treasure, found or discovered and shall assign any claim, as such, to the City.

39. ENDANGERED SPECIES
No activity is authorized that is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed fro listing under the Federal Endangered Species Act (ESA), and/or the State of Texas Parks and Wildlife Code on Endangered Species, or to destroy or adversely modify the habitat of such species. If a threatened or endangered species is encountered during construction, the Contractor shall immediately cease work in the area of the encounter and notify the applicable State Agency. The actions shall include reporting the encounter to the U.S. Fish and Wildlife Service, and the Texas Parks and Wildlife Department, obtaining any necessary approvals or permits to enable the Work to continue, or implement other mitigative actions. The Contractor shall not resume construction in the area of the encounter until authorized to do so by the City.
40. OPERATION OF FACILITIES
The Contractor shall not operate, tap, or tamper with any existing facilities. Where construction involves operation of any existing facilities the City shall perform such operation. Any connection to existing equipment or systems to be schedule and approved in advance with performance to occur in the presence of the Project Manager.

41. SCOPE OF WORK
    A. Under this Contract, the Contractor shall furnish all materials, appliances, tools, equipment, transportation, services and all labor and superintendence necessary for construction of the Work as described in these Technical Specifications and as shown in the Drawings. The completed installation shall not lack any part which can be reasonably implied as necessary to its proper functioning or any subsidiary item which is customarily furnished, and the Contractor shall deliver the completed and operating installation to the City.
    B. The Work in general under this Contract includes, but is not limited to, that Work which is enumerated in the Unit Price Form or Total Stipulated Price Form of the Contract Documents.

END OF SECTION

SECTION 00305SP
SUPPLEMENTAL CONDITIONS

The following provisions modify Section 00305– Supplemental Conditions. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete first and second sentence of item 26 LINES AND GRADES Section A and revise to the following:

"26. The Contractor shall have a surveyor set vertical and horizontal control points."

2. Add the following items:

"42. It is the intent of the Contractor that the aggregate amount of unit prices times unit work actually installed shall cover all work required by the Contract Documents, in place, complete and ready to use.

43. Prices in the Contract Documents include all compensation for full completion of all work items in place, and include providing all labor, materials, tools, equipment, services, supplies, incidentals, and all necessary operations.

44. No costs in connection with work required by the Contract Documents for proper and successful completion of the Contract will be paid outside of or in addition to the items and unit prices named in the Unit Price Form.

45. Incidental Construction Items - All items called out on the construction drawings or within the specifications which are not itemized in the Unit Price Form section of these documents shall be considered incidental to the cost of the project. Work not specifically set forth in the Unit Price Form as pay items shall be considered subsidiary obligations of Contractor and costs shall be included in the item bid prices named in the Unit Price Form.

47. Insurance Requirements – Besides the City of Friendswood, the Design Professional, its officers, agents, and employees must be named as an additional Insured on all insurance policies.

48. Use of Premises. The Contractor shall be required to restrict his efforts to the City's property and to the existing easements secured by the City. The Contractor, at his option and expense, may secure additional working easements from adjacent property owners, if desired.

If the Contractor utilizes any adjacent property for construction or storage, the Contractor will be required to submit a release letter from property owners stating that the property has been satisfactorily restored. The release will be required before the contract closeout can be completed and retainage released.

If the Contractor utilizes or damages any property outside of the public right of way, the Contractor shall repair the property to equal to or better than prior to construction. It is the Contractor's responsibility to make the repair to the satisfaction of the property owner. The Contractor is required to provide a release letter from the property owner after the repairs are complete.

The project site is located on an operating City street that services commercial and residential properties; therefore, public safety is of paramount importance.

The Contractor shall cover or enclose all open excavations, trenches, bore pits, and other hazardous areas at all times when construction is not actually in progress.

Contractor shall promptly remedy any hazardous conditions existing on the project site, whether or not he has been directed to do so by the Design Professional.

49. Any areas of grass which are disturbed or dug up during the construction shall be replaced with St. Augustine sod or grass which matches the grass removed or as stated on plans in a healthy green condition, regardless of the condition of the existing sod.

50. When construction occurs in City rights-of-way, alleys and easements on residential yard areas, care shall be taken to minimize construction damage to yard areas. Contractor shall return all areas to a condition equal or better than prior to construction as determined by the Owner.

51. The Contractor shall be aware that utilities and pipelines (including but not limited to telephone, gas, petrochemical or petroleum product lines, cable, and electric) are present in the easements and in the right-of-way. The possibility of encountering these lines during excavation is very high. The Contractor shall coordinate with all the pertinent utility companies and schedule his work in such a manner that delays, and interruptions of service do not occur. The Contractor will provide adequate protection to the utilities and pipelines as required or directed by the pertinent utility companies and include costs in the related bid items to work around the pertinent utilities and to complete the work.

52. The Contractor shall be aware that the location and depth of the existing utilities shown on the plans is based on information obtained from utility maps and information provided by others and has not been field verified. There is a potential for additional tie-ins to the existing utility not shown on the plans. The possibility of encasement (steel pipe, concrete pipe, stabilized sand, concrete) of the utility at various locations, and presence of manholes or structures not shown on plans exist. The potential for change in alignment due to additional manholes located in the field or potential for installing additional manholes on the existing main above and beyond those shown on plans exist. The Contractor shall coordinate and verify all the above prior to commencing construction. The information provided will in no way relieve the Contractor of his responsibility of verification prior to construction.

53. Subsurface Exploration - It is not represented that PLANS show all existing storm sewer, sanitary sewer, water, gas, telephone, petroleum or petroleum related pipelines and electrical facilities and other underground structures. It is the Contractor's responsibility to determine the depth, location and their existence which may conflict with the proposed construction by referring to available records, consulting appropriate municipal departments and utility owners and by making necessary exploration and excavations. All investigative work will be done, and all repairs required after completion of investigative work shall be performed by the Contractor at no additional cost to the project.

Whenever existing utilities, not indicated on PLANS, present obstructions to grade and alignment of pipe, immediately notify Professional and Owner, who without delay, will determine whenever existing utilities are to be relocated, or grade and alignment of proposed pipe changed. When necessary to move services, poles, guy wires, pipelines, or other obstructions, the Contractor shall contact and coordinate and make arrangements with owners of said utilities. Owner will not be liable for damages on account of delays due to changes or adjustments made by owners of privately owned utilities and faulty workmanship by owners of privately owned utilities which hinder progress of work regardless of work authorized by Owner or other entities.

It is the Contractor's responsibility to install the proposed water line and maintain proper clearances with all utilities and meet the regulatory requirements. Any damage to existing sprinklers or water and sanitary sewer service lines shall be repaired to Owner's satisfaction at no additional cost to the project.

54. In the event a utility (shown or not shown on plan drawings) including but not limited to (gas, electric, telephone, cable, petroleum or petroleum related pipelines) is exposed due to excavation and is in conflict, the appropriate company shall be contacted by the Contractor. The Contractor shall make a concerted effort to the Professional's satisfaction to identify the utility (if unknown) and avoid any conflict with the utility. The Contractor shall provide all the necessary documentation for the efforts extended by the contractor in locating the utility. The documentation shall be either telephone conversation memo's, letters, meetings on site and other coordination efforts utilized to identify the utility or pipeline. The Professional will review all the documentation provided by the Contractor. In the event of a conflict with the utility and the Professional concurs that the Contractor had made a concerted effort to avoid the conflict and in spite of his effort, the conflict cannot be avoided without the utility being relocated, the Owner will assist in coordinating the relocation efforts of the utility with the pertinent company. (The Contractor is still responsible for coordinating efforts with the utility or the pipeline company). The Contractor, during the period the utility is being relocated, will move his crew(s) to other areas at his own expense. The Contractor will not be due any compensation for delays or downtime resulting from the coordination and relocation efforts performed by the Contractor or the utility owner due to the utility conflict. The Contractor may request additional time if the relocation effort substantially hinders his construction effort. No additional payment will be made. If the Contractor chooses to assist the utility or pipeline company in the performance of their work, he shall be doing

that at his own risk. The Owner will not be responsible for costs incurred by the Contractor from providing such assistance to the utility or pipeline companies.

55. The Contractor shall accomplish the construction by hand excavation while working in close proximity to utilities, structures, landscaping, trees, shrubs, car ports, swimming pools, etc. and whenever necessary or as directed by the project representative. Any additional costs associated with utilizing hand excavation shall not be paid for separately and shall be included in the unit price bid for the related item.

56. The Contractor is made aware and shall make provisions in his unit price bid to allow for changes in alignment (vertical and horizontal) of the proposed utility (storm, water, sanitary sewer, or force main) and roadway during construction to avoid conflicts, conditions encountered in the field, and to expedite construction. The Contractor is made aware that the proposed utility may be required to be installed at a greater depth than shown on plan drawings to avoid conflicts and to maintain clearances with other utilities. No additional payment shall be made to the increased installation efforts expended by the Contractor. The Owner will not be responsible for any claims for downtime costs resulting from such conflicts. If the change in alignment results in increased quantities of the pertinent item, the Contractor shall be paid at the established bid unit price in the Contract. Any coordination or verification of existing utilities (including but not limited to gas, electric, water, sewer, petrochemical pipeline) resulting from the realignment shall not be paid for separately and shall be incidental to project costs. In the event the Contractor desires additional time due to the conflict, the Contractor shall submit documentation supporting such request to the Owner as per the project specifications. The Owner will review and evaluate such requests on a case by case basis.

57. The Contractor is made aware that trucks carrying all excavated materials/spoils shall utilize a designated route approved by the City. Such routes will be provided by the City at the pre-construction conference.

58. Interruption of Utility Services - Operate no valve or other control on existing systems. Exercise care in performing work so as not to interrupt service. Locate and uncover existing utilities ahead of heavy excavation equipment. At house connections, either lift trenching machine over lines or cut and reconnect with minimum interruption of service. In the event there is a need for interruption of water service, the Contractor shall contact the City in writing so that the City forces can operate the appropriate valves. The Contractor shall provide a minimum of 48 hours' notice to property owners whose service will be interrupted.

59. Resident and Property Owner Notification - Once the work begins it shall be constructed and completed in the shortest time possible to minimize inconvenience to property owners. Contractor shall assure that all affected property owners are notified between 72 hours and 2 weeks before work begins on their street/alley/easement. The Contractor shall provide property owners the minimum following information; work to be performed, starting and ending dates, and name and number of City official to be

contacted for questions. Written notices shall be approved by Design Professional prior to distribution.

60. Driveway Disturbance - Residents and property owners shall be notified, by the Contractor, between 72 hours and 2 weeks in advance of disturbance of driveways. Notice to property owners shall follow the procedure as stated in the previous item. Driveways that are open cut shall be reconstructed as soon as possible to minimize inconvenience to the property owners. The materials used for the replacement of the driveways shall be as shown on the plans and in all cases shall be equal to or better than the existing material. In the event an excavation at a driveway must be left open overnight, the excavation shall be covered and temporary access to the property shall be provided. Access shall be maintained to adjacent property at all times. Anchored steel sheeting, bridges, temporary driveway, or other substantial structure shall be used to provide temporary access to the property.

61. All traffic control devices, placement and activities shall be as per the latest version of the Texas Manual on Uniform Traffic Control Devices (TxMUTCD). If there is any conflict between the TxMUTCD and traffic control requirements with the Contract Documents, the Contractor shall notify the Design Professional immediately.

62. Traffic During Construction - When construction begins on a street, the Contractor shall maintain traffic on the streets at all times. Contractor shall also make necessary provisions to allow ambulance, police, fire, school buses, postal service and other emergency vehicles access to the street.

During construction, the Contractor shall allow resident traffic access to the street with proper guidance, direction, flagmen and traffic control and only at such times that damage will not occur to the new construction or to the vehicles.

63. Closing Streets to Traffic - The Contractor shall maintain traffic on the project streets throughout construction. In the event a Contractor must close a street to all traffic, he shall obtain prior permission from the Community Development Department and/or Public Works Department and he shall provide written notice a minimum of five working days (5 wD) in advance to the following: the Design Professional, Community Development Department, Public Works Department, Fire Department, Police Department, school districts and USPS.

In so far, as possible, the Contractor shall schedule and conduct its operations in the intersections as rapidly as possible to minimize the length of time the intersections will be closed to traffic.

Whenever a portion of a street is closed to traffic, the Contractor shall verify that alternate access is available for residents and property owners on that street or for residents and property owners desiring to access crossing streets. Appropriate detour signage shall be provided to clearly indicate detours, as per the Texas Manual on Uniform Traffic Control Devices.

Contractor shall maintain cross street traffic at other intersecting streets at appropriate times during the construction to facilitate local access as approved and coordinated with the Owner.

When the Contractor must close a roadway, 72-hour advance notice must be given to the Design Professional. All materials incorporated into the work pertaining to the road closure, must be on the jobsite 24-hours in advance of the road closure for inspection. All barricading and construction signage shall be in accordance with the Texas Manual on Uniform Traffic Control Devices for Streets and Highways.

The Contractor shall provide the Design Professional and Owner for authorization a schedule and plan of anticipated road blockages, alternative access and detours prior to implementing said schedule and plan.

64. Warning Signs and Barricades - When any street or any section of a street is closed, the Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags and lights at the end of each street and at all intersections along the street within the limits of the work. All expenses incurred for the above requirements shall be borne by the Contractor. All warning signs and barricades shall be in conformance with the Texas Manual on Uniform Traffic Control Devices latest edition.

65. Traffic Officer Required. Unless otherwise specified, off-duty uniformed peace officer shall be used for the regulation of traffic at the following locations:

a. Where multi-lane vehicular traffic must be diverted into single-lane vehicular traffic.

b. Where vehicular traffic must change lanes abruptly.

c. Where construction equipment either enters or crosses vehicular traffic lanes and walks.

d. Where construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and cross-walks.

e. Where construction activities might affect public safety and convenience.

f. Where traffic regulation is needed due to rerouting of vehicular traffic around the work site.

g. The use of flagmen is for the purpose of assisting in the regulation of traffic flow and movement and does not in any way relieve the Contractor of full responsibility for taking such other steps and provide such other flaggers or personnel as the Contractor may deem necessary to protect the work and the public, and does not in any way relieve the Contractor of his responsibility for any damage for which he would otherwise be liable.

   Flaggers shall be used and maintained, at such points, for such periods of time, as may be required to provide for the public safety and convenience of travel.

Flaggers, and their use, shall conform to Item 7, Article 7.7 of the TxDOT Standard Specifications.

h. No separate payment will be made for uniformed traffic officers and/or flaggers. Such services as outlined in this item are incidental to the cost of the project.

66. Certified flagmen may be used on the project. However, there may be situations that would warrant uniformed officers for traffic control. The Contractor is responsible for identifying such situations and utilizing uniformed officers for such situations. The Contractor is responsible for maintaining safe traffic control at the job site at all times. The Contractor must utilize uniformed peace officers for traffic control, in Harris County or TxDOT right of way, school vicinity, major thoroughfares and other areas designated by the City at no additional cost to the project. The City reserves the right to request the Contractor to utilize uniformed peace officers at any location throughout the project. A certified flagman must be formally trained in traffic control procedures. Certified flagmen must wear bright-colored vest and be equipped with appropriate flagging and communication devices while on the work site. They must also have in their possession while on duty a proof of training identification issued by a certified institute.

67. Work to protect items to remain by installation of temporary construction, including posting of warning signs, placement of protective fencing, barriers, barricades and covers, and restoration of damaged items to remain, will be considered incidental to the various pay items and no separate payment for this work will be made.

68. Excavated Material and Storage of Equipment and Materials - No equipment, material or excavated material shall be stored or deposited on streets, lawns, driveways, sidewalks, gardening, or shrubbery.

69. Work necessary to haul materials from original positions to points of disposition, including excavation of earth materials and utilization in construction or other disposition, will be considered incidental to the various pay items and no separate payment for this work will be made.

70. Construction materials storage facility site shall comply with applicable City of Friendswood’s requirements and meet the following minimum requirements:

a. Provide storage facility of neat and reasonable uniform appearance, structurally adequate for required purpose.

b. Maintain during entire construction period.

c. Prior to start of work, install enclosure fence with locked entrance gate.

d. Provide an all-weather surface with adequate drainage to City facilities. Do not drain onto adjacent property.

e. Clean mud and debris from City streets on a daily basis or more often as required. Construction operations may be temporarily suspended if the storage facility is not properly maintained.

71. Barricading Excavation Areas - All excavation areas shall be barricaded at all times to prevent motorists from inadvertently driving into bore pits, open cuts, and trenches. All excavation must also be cordoned off with 4-foot high orange polyethylene fence with mesh size 2.5" by 0.80", Tenax Beacon or approved equal, installed as per manufacturer's recommendations and acceptable to the City of Friendswood. The fence shall be supported with enough intermediate support to avoid excessive sagging. Adequate barricades with flashing yellow lights shall also be provided to protect pedestrian traffic and vehicular traffic.

No excavations shall be left open overnight.

All excavations which cannot be back filled overnight for the installation of manholes, storm and sanitary sewers, and utilities shall be covered with anchored steel sheeting, in paved areas, and 3/4" plywood, wood planking or some other material approved by the City in non-paved areas. The steel sheeting shall be of sufficient thickness to support H-20 loading, truck or lane that produces maximum stress. The excavation area must be well protected with traffic barricades equipped with flashing yellow lights.

It is the Contractor’s responsibility to ensure the safety of the public, himself, his employees, and all other persons. Provisions listed here are minimum measures and in no way relieves the Contractor of his responsibility or changes or alters other requirements within these contract documents.

The Contractor is hereby made aware that the work is being conducted in an area consisting of a high amount of pedestrian and vehicular traffic. The possibility of vandalism to his barricades, sheeting, tape, other protective devices, and equipment does exist. The Contractor is responsible for maintaining all traffic barricades, sheeting, tape, and other protective devices during construction hours and non-construction hours such as weekends, holidays, nights, and inclement weather periods. Upon notification of the need for maintenance of the barricaded areas, either by the Contractor’s own personnel, the City or its representatives, the Contractor shall promptly take the required corrective measures.

72. Replacement of Damage - If any damage is done to existing asphalt or concrete roads or appurtenances, by equipment, tires, metal tracks or other construction practices, damage shall be saw cut, removed, and replaced with materials equal to or superior to the existing material. Damage shall include but not limited to scrapes and tread marks. Repair of damaged areas will be at the Contractor’s expense.

73. Damage to pavement, curbs, driveways, sidewalks, or any other structure caused by the Contractor during construction shall be repaired at the Contractor’s expense.

74. Construction Sequence - It is important to the Owner that this project be accomplished in the most expedient manner possible.

The Contractor shall schedule his work such that each section will be substantially complete prior to moving his construction operation to another section. More than one section can be under construction at one time, only if each section has continuous, active, and uninterrupted construction operation and approved by the City.

The nature of this project is such that there are different sections along the project alignment where construction may occur. The Contractor shall not leave one construction section to begin work on another site unless:

The work on the section, in the Owner's opinion, is complete to the point where the Contractor can move to the next section.

The Contractor will maintain an active on-going construction effort on each section to a completion point which the Owner feels is adequate; and the Owner concurs that an active on-going construction effort is being maintained.

The Contractor has adequate forces to work multiple sections to the Owner's satisfaction; and the Owner concurs with the Contractor that adequate forces are available.

The Contractor has obtained concurrence from the Owner that work can begin on another section.

It is the Owner's desire not to have multiple partially completed sections on which minimal work is being performed. It is the Owner's desire not to have multiple sections on which cleanup is remaining to be performed.

It is the Owner's desire that each section be completed to the point where the installation is complete, testing is complete, cleanup is complete and grass or appropriate surface material has been installed prior to the Contractor moving to another section. If the Contractor desires to work multiple sections along the project alignment at any one time, then he shall provide adequate manpower on each section to maintain a continuous, active, on-going work effort on each section and obtain prior approval from Owner.

75. Other Contracts - Other construction may be underway concurrently in this area. Afford utility companies and other Contractors reasonable opportunity for introduction and storage of their materials and execution of their work. All work under this Contract must be properly connected and coordinated with that constructed by others. The City is not responsible or liable for any claims resulting from delays by other Contractors or utility companies in the area regardless of the entity authorizing such work and any faulty workmanship resulting from such work performed.

76. Alternate Designs - If alternate design features are proposed for convenience of Contractor, submit design calculations and detail drawings covering proposed changes and related modifications of Contract PLANS to Professional for review. Make drawings same size as Contract PLANS and of comparable quality. Make payment of charges

resulting from modifications, including Design Engineering charges for checking such designs.

77. Cleanup - Remove from site of work, and from public and private property, temporary structures, rubbish and waste materials including excess excavated materials. Dispose of surplus earth as directed or as specified. Complete cleanup not greater than 800 feet behind operation. The operation will be suspended temporarily if complete cleanup is further behind than 800 feet. Contractor is to be aware that the cleanup procedure will be strictly enforced by the Owner. There will be no extra pay for complying with said item.

Complete cleanup of a site shall be mandatory before the Contractor can begin work on another site. Multiple sites can be worked on simultaneously; however, complete cleanup must be conducted before a work crew leaves one site to work on another site.

78. Some manholes, valves or structures may have been paved over or otherwise covered up, may not exist, may not be correctly shown in the plans, or may be shown as a cleanout or vice versa. The cost to field locate and open the manhole, valve or the structure shall be incidental to the work specified.

The Contractor shall verify all the above prior to construction. If requested by the Contractor, the Owner will make a concerted effort to provide any available layout maps of the existing utilities, but the Owner does not guarantee the accuracy of such information. The information provided will in no way relieve the Contractor of his responsibility of verification prior to construction.

79. Any increased width of pavement, driveway, curb reconstruction or sidewalk repairs from that shown on the plans required due to over excavation, undermining (due to improper shoring) or for Contractor convenience shall be incidental to the cost of the pipe.

80. All testing equipment shall be calibrated at maximum twelve month intervals and after any repairs or adjustments by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants. The Contractor shall provide a written certification to the Design Professional on the calibration.

81. Repairs to curbs, driveways, roadways, and sidewalks shall be constructed with materials consistent with the existing and adjacent material and according to the detail shown in the plans as a minimum. All curbs, sidewalks, roadways, and driveways to be removed and replaced shall be saw cut (a straight, even, clean cut) at the point of removal so that an even joint results between existing pavement and new pavement. Jointing material shall be placed between the new and existing material.

82. Drainage During Construction - Drainage is of utmost importance to this project. Work necessary to provide proper drainage during construction, including maintaining sections, existing ditches, channels, culverts, and storm sewers and including temporary construction and maintenance of ditches and drainage systems, and pumping, will be

considered incidental to the various pay items and no separate payment for this work will be made. Where new curb is installed, Contractor shall backfill and regrade behind curb as necessary to maintain positive drainage from non-paved areas over top of curb. Regrading of existing ditches and swales shall be considered incidental, unless otherwise indicated in the Unit Price Form.

The Contractor is responsible for ensuring adequate drainage is maintained at each intersection as the drainage is converted from the existing system to the proposed system. This may require temporary systems, connection or pumping depending on the Contractor's construction activities. No separate payment will be made for such efforts and the cost for performing the work shall be included in the related work item.

83. The Contractor is made aware of rainfall events that may impact the construction efforts regardless of where the rainfall occurs, whether upstream or downstream of the project. The Contractor's construction operation shall not impede the drainage flow and shall maintain drainage at all times. The Contractor is responsible for the installation and removal of temporary pipes, pumps and/or structures or any other means as necessary to maintain drainage during construction operations. The Contractor shall submit a proposed plan to maintain drainage for approval by the Design Professional prior to commencing work in the area. The Contractor shall take all necessary measures to provide a safe condition during the construction operations to protect his workers, machinery and property. No separate payment shall be made for maintaining drainage or removing water from the ditch during the duration of construction and maintain drainage flow shall not be paid for separately and shall be considered incidental to the project cost.

Additionally, construction will not be allowed within the project area until such time when storm flows cease, and further rainfall is not anticipated in the short term forecast. No separate payment will be made for down-time associated with construction delays resulting from rain events or removing water from the ditch.

84. The Contractor is responsible for the verification of all key design elevations prior to commencing construction. Yard swales and pipe drains disturbed during construction shall be repaired or replaced with positive drainage towards the street or other existing drainage structure or swale at no additional cost to the Owner, unless otherwise indicated in the Unit Price Form. The Contractor shall perform all transitions to existing pavements and driveways so that positive drainage is maintained, and ponding is prevented. Any temporary storm sewer pipe installation necessary to maintain drainage shall be installed by the Contractor at no additional cost to the project. Transitions shall be performed so that a smooth driving surface is maintained. Contractor shall transition driveways so that vehicles will not "bottom out".

85. Water line service connection locations if shown on plans are approximate and marked as close as possible from the information available. This information shall be considered incomplete and approximate only and the Contractor is responsible for field verifying exact locations of these services.

86. The cost for pavement, driveway or sidewalk removal, repair and temporary pavement or any other surface restoration necessary for service connections for water lines shall be incidental to the cost of the service connection.

87. Tack Coat - During the time period from April 15th to October 16th, of each year, the asphaltic material used for tack coat shall be either SS-1, anionic slow setting emulsion or CSS-1, cationic slow setting emulsion. During the remainder of the year, the asphaltic material shall be either RC-250 or RC-2, rapid curing cutback asphalt.

88. The Contractor shall carry out his operations in strict accordance with all applicable Occupational Safety and Health Administration (OSHA) standards. Special attention is drawn to those safety requirements involving work on all elevated platforms and entry into a confined space. It shall be the Contractor's responsibility to familiarize himself with OSHA standards and regulations pertaining to all aspects of the work. All work shall be done in accordance with OSHA, Safety and Health Regulations of the United States Government for Construction, State of Texas laws and regulations, Harris County and Galveston County regulations and City ordinances. Contractor shall provide documentation that confirms there is personnel onsite with knowledge of safety steps that need to be taken for entering a confined space. No work in a confined space shall be allowed until the Contractor has proven competency for this type of work and measures have been taken to provide full safety for workers. Any person that enters a confined space must be certified for confined space entry.

89. The Contractor shall replace or repair pavement, sidewalks, driveways, culverts, inlets, curbs, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed to a condition equivalent to or better than existing condition. In the event sod is removed or disturbed it will be replaced to a healthy green condition, regardless of the condition of the existing sod.

90. The Contractor will have a representative available on the project site 24 hours/day during the duration of the diversion pumping. No separate payment shall be made for diversion pumping efforts and the cost expended must be included in the unit price for related items. The Contractor is responsible for maintaining additional standby pumps for diversion pumping in the event of failure of any pumps utilized during diversion pumping.

91. Due to the location of work (predominantly in a residential area), the Contractor must utilize quiet pumps with appropriate sound barriers for well pointing and diversion pumping. The noise generated by this equipment must be kept to a minimum. In the event the Contractor cannot keep the noise levels to a minimum, he shall utilize electric powered pumps at no additional cost to the project. No payment shall be made for additional sound barriers, switching from gasoline powered pumps to electric pumps.

92. Contractor shall be aware that groundwater is present in the construction sites. Seepage into excavation may occur. This seepage should be collected in sumps and

pumped out. This type of de-watering is considered incidental to the cost of the improvement.

If seepage cannot be handled by pumping sumps, then mechanical dewatering techniques such as well pointing shall be used. The Contractor shall be paid for well pointing as per the unit price bid.

Piezometers - Since ground water conditions can change depending on current conditions, the Contractor shall install piezometers at areas where dewatering is considered, and groundwater level and seepage conditions should be checked prior to construction. The installation of the piezometers to monitor ground water prior to construction shall be paid for at the unit price bid for piezometers. The Contractor shall utilize the services of a geotechnical firm to install the piezometers and report on the groundwater conditions. The installation of piezometers in advance of the excavation can give the Contractor advance notice for the need to well point and will therefore aid the Contractor in his scheduling efforts. If it is determined that well pointing is required, then the cost of the piezometer will be incidental to the well pointing.

Dewatering - Contractor shall maintain dewatering after the cement stabilized sand bedding and backfill has been installed so that a good set on the cement has been obtained. Do not remove well points immediately after placement of cement stabilized sand. The dewatering shall remain a minimum of 48 hours after placement of the cement stabilized sand bedding and backfill. The Contractor shall obtain site representative concurrence prior to the removal of dewatering.

93. Soils stratigraphy and groundwater conditions encountered during excavations may vary from those observed in the geotechnical investigation report provided in this specification. The Contractor should collect additional subsurface information as he deems necessary to determine the conditions of the site. If conditions significantly differ from those presented in the geotechnical report attached to these specifications, the Contractor shall notify the Owner and Professional immediately.

94. The Contractor shall monitor all excavations and retaining structures on a continuous basis by experienced personnel who can make evaluations as to the appropriateness of the retention system used.

95. In the event it is necessary to remove and replace a sidewalk which terminates at a street radius, a wheelchair ramp shall be constructed as per ADA specifications.

96. The Contractor shall comply with the new Texas Worker's Compensation Commission Rule, 28 TAC§110.110 relating to Reporting Requirements for Building or Construction Projects for Governmental Entities.

97. Trench Safety - Contractor shall be aware that conditions may exist whereby solid sheeting and shoring may be more appropriate than trench boxes.

The Contractor shall provide an excavation safety system as approved by OSHA 29 CFR Part 1926 (latest revision) indicating the use of sheeting, shoring, bracing, under pinning,

etc., to be utilized where conditions warrant such system. This system shall be provided in addition to other excavation systems the Contractor selects as per section 02280 - "Trench Safety Systems".

98. Permanent solid sheeting trench safety is added as a supplementary bid item of this project and is intended to be used when wet sand is encountered and is not able to be controlled by standard trench safety. This Bid Item is not intended to be used as standard trench safety. In locations of wet sand where permanent solid sheeting trench safety is used, it will be paid for in lieu of standard trench safety and not in addition to. Permanent solid sheeting trench safety used at other locations will be paid for as standard trench safety.

99. All claims for extension of time shall be made in writing to the Owner no more than ten days after the occurrence of the delay or after the cause of the delay has become apparent; otherwise, they shall be waived. In the case of the continuing cause of delay, only one claim is necessary. Any request for an extension of time shall be accompanied by a revised construction schedule which, if approved by the Owner, shall become the Contractor's construction schedule.

When the Contract is on a calendar day basis, no extension of time shall be allowed for adverse weather conditions reasonably anticipatable from historical weather data, and such weather conditions shall not be deemed a casualty beyond the Contractor's control. The Contractor may be granted an extension of time because of unusual inclement weather which is beyond the normal weather recorded. Listed as follows is the mean number of days in which there occurred 0.01 inch or more of precipitation for Harris County:

January	10	February	8	March	9	April	7
May	8	June	10	July	9	August	9
September	9	October	8	November	8	December	9

Rain days per month in amounts exceeding the number of days shown above may be credited as a "Rain Day" if a claim is made in accordance with the Contract Documents. A "Rain Day" is any day in which a rain event occurs at the site and is sufficient to prevent the Contractor from performing work critical to maintaining the project schedule.

100. Dust Control - The Contractor shall take necessary measures to control dust on the site and minimize blowing dust. The Contractor shall water the site as necessary and when requested by the Owner to control blowing dust. The site shall be watered to the Owner's satisfaction.

101. The Contractor shall provide a minimum of 24 hours' notice in writing to the Owner and the Design Professional and the project's on-site representative of any testing. The Contractor shall document the test results and provide a copy to the Owner and the Design Professional. All testing procedures shall conform to the specifications and standards of the Owner. The Contractor shall keep in daily contact with the on-site

representative through completion of the project and shall have a superintendent on the job site who can communicate in English with the on-site representative at all times.

102. The Contractor is responsible for locating the existing water lines, including valves prior to construction. The Contractor shall provide 72 hours' notice in writing to the City for assistance in operating the valves in the system. The Contractor shall be aware there are water lines with no existing valves necessary for their isolation. The Contractor is responsible for making the tie-ins (wet connections) under pressure in those areas. The Contractor shall be paid at the bid unit price for wet connection. No additional payment shall be made performing such work under unfavorable conditions.

103. The locations of the proposed fire hydrants shown on plans are approximate. The Contractor shall field verify the locations with the Owner's representative and the Design Professional prior to installation. In the event the Contractor fails to obtain concurrence with the Owner's representative or the Design Professional regarding the locations, the Contractor shall relocate the said fire hydrants to the locations determined by the Owner at no cost to the project.

104. The Contractor shall remove and replace fence sections as necessary to accomplish the construction at no additional cost to the Project. In the event of damage to fences or other improvements, structures, plants, landscaping, car ports, etc. due to Contractor's performance of work, the Contractor will replace them with equal or better product, to Owner's satisfaction, all at no additional cost to the project.

105. The Contractor shall be aware that the work may be performed in areas that are in close proximity to structures (power poles, buildings, car ports, pipelines, and other structures). The Contractor shall take all precautions necessary to protect such structures from damage and ensure safety to his personnel during construction. Any damages resulting from the Contractor's operations to such structures shall be repaired at no additional cost to the project.

In the event the Contractor determined certain structures conflict with the proposed improvements, the Contractor shall provide a written notice to the City documenting the location of such structure. The City will coordinate with the pertinent Owner and try to expedite the relocation efforts. However, the City does not guarantee the time of relocation efforts.

106. The Contractor is responsible for addressing all complaints from citizens and commercial property owners caused due to the performance of his work. The Contractor shall take appropriate measures to address all complaints from the citizen and commercial property owners to their satisfaction in a timely manner. The Contractor shall submit to the Design Professional a letter from the citizen and commercial property owner acknowledging the complaints have been addressed and any repair work necessary has been completed by the Contractor.

107. The Contractor shall have a supervisor present on the site at all times when on-site activities relating to the Work are occurring, except for periods of absence approved by

the Design Professional or the Owner when: (i) the supervisor's absence from the site is caused by compelling or emergency circumstances, and (ii) the Contractor makes suitable provisions for substitute supervision. The Contractor shall notify the Owner and the Design Professional as soon as the need for an absence is known. Approvals of absences will not be unreasonably withheld.

If the Design Professional and the Owner jointly notify the Contractor that the current supervisor should be replaced for good cause, the Contractor will replace the supervisor as soon as practicable, and in any event within ten days (or such other time period as may be approved by the Design Professional and Owner). For this purpose, "good cause" means: (i) the supervisor is not causing the Work to be performed in accordance with the Contract Documents, (ii) the supervisor is not communicating effectively with the Owner, the Design Professional or other persons affected by the Work, or (iii) the supervisor is failing to prevent (or remedy) needless dislocation, damage or inconvenience related to the work.

108. The Contractor is made aware that the bid quantities shown in the Unit Price Form are approximate and may change. No additional payment shall be made for increase and/or decrease in bid quantities. The City reserves the right to make adjustments (tie-in at different locations or extend water line or storm sewer main limits) in the field. Payment for performing the work shall be made at the established bid unit price in the contract.

109. The Contractor will be responsible for obtaining right of entry from the property owners for extension of driveways into private property as required by driveway details. If the extension of driveway is in close proximity to car ports, the Contractor shall take all precautions necessary to protect the car port from damage and insure safety to his personnel during construction. Any damages resulting from the Contractor's operations to car ports shall be repaired at no additional cost to the project.

110. The Contractor is made aware that the proposed improvements are in conflict with the following utilities at this time:

* CenterPoint Energy Gas Lines
* CenterPoint Energy Street Lights
* AT&T Texas
* Comcast

HDR Engineering, Inc. is coordinating the relocation efforts with the utility companies for the known conflicts and the utility companies are currently in the process of relocating their lines. It is not guaranteed that the conflicts will be resolved prior to the Contractor commencing construction. There is a potential for additional conflicts to exist along the project alignment. In an effort to verify the elevation and also provide adequate time for resolving any conflicts, the Contractor is responsible for determining the location and actual elevation (by excavation) of the private utilities prior to commencing

construction. The Contractor must notify the Design Professional of any potential conflicts. No additional payment shall be made for performing the investigative efforts and such costs must be included in the unit price bid for related item. The actual number of conflicts with the utilities is unknown and will not be known until the completion of construction. No separate payment will be made for delays and costs expended by the Contractor due to these conflicts and any other additional conflicts.

111. Negotiation or changes to unit prices due to material/labor price increases will not be allowed for duration of this project. The bid unit prices of the successful bidder for the project shall govern regardless of the magnitude of price decrease or increase in material costs during the project duration.

112. Temporary field office is not required on this project.

113. As part of the pay estimate submitted monthly, Contractor shall include an updated schedule with their pay estimate."

END OF SPECIAL PROVISION

PRE-CONSTRUCTION MEETING CHECKLIST

Blackhawk Boulevard Reconstruction Phase II – Repackage C

1. Check availability of Contractor and reserve a room. ☐
3. Invite Director of Public Works (If Applicable). ☐
4. Invite Storm Water Coordinator (If Applicable). ☐
5. Invite Superintendent of Streets & Drainage (If Applicable). ☐
6. Invite Superintendent of Water & Sewer (If Applicable). ☐
7. Invite Plant Manager – Water Plant Operations (If Applicable). ☐
8. Invite Police Department (If Applicable). ☐
9. Invite Fire Marshal (If Applicable). ☐
10. Invite FISD Transportation (If Applicable). ☐
11. Invite the Engineering Representative ☐
12. Invite the Testing Firm Representative ☐
13. Invite Utility Companies
    - A. TNMP Representative ☐
    - B. Centerpoint Representative ☐
    - C. ATT Representative ☐
    - D. Pipeline Representative(s) (If Applicable) ☐
14. Prepare Pre-Construction Meeting Outline and Sign In Sheet. ☐
15. Generate Notice to Proceed. ☐
17. Bring Final Construction Plan Set. ☐

END OF DOCUMENT

PRE-CONSTRUCTION MEETING OUTLINE (CITY PROJECT)

Project Name: Blackhawk Boulevard Reconstruction Phase II – Repackage C
Date: [INSERT MEETING DATE]
Time: [INSERT MEETING TIME]

Item		Discussed
1.	Set out Sign-in sheet.	☐
2.	Introductions.	☐
3.	Advise Contractor of testing lab. ([INSERT TESTING LAB NAME]).	☐
4.	Notice to Proceed: Date on Letter: [INSERT DATE OF NTP] Beginning Date: [INSERT DATE TO START TIME] Completion Date: [INSERT ESTIMATED COMPLETION DATE]	☐
5.	Contract is 540 Calendar Days Working Day is from 7 AM to 8 PM, Monday through Friday. This is based on noise ordinance, under 58 decibels 8PM to 7AM. No Weekend work unless approved by City Engineer.	☐
6.	Construction Schedule/discuss time extension request forms	☐
7.	Communication Channels A. All inspection requests shall be directed to the Community Development Department Permit Office at (281) 996-3201. B. Any requests to work weekends, design conflicts, etc. shall be directed to the City Engineer.	☐
8.	Emergency Phone Numbers.	☐
9.	Advise Contractor of responsibility to maintain a superintendent on job.	☐
11.	Will Contractor have office on job? If so does location meet Owner's approval? Discuss Location.	☐
12.	Permits are Contractors Responsibility.	☐
13.	Pre-Construction Photographs are suggested.	☐
14.	Safety Practice & Accident Reports.	☐
15.	Staking is Contractor’s Responsibility.	☐
16.	Protection of adjoining property.	☐
17.	Turn over to Stormwater Management Coordinator.	☐

18. Shop Drawings/Submittals to Engineer of Record, copy Project Manager. ☐

19. Change Orders. Procedures and forms. ☐
No work to be done prior to written approval.

20. Discuss Contractor Payment Application ☐

21. As-builts. ☐

22. Walkthroughs will not be scheduled until Project Manager ☐
feels that project is substantially completed.

23. Technical Specifications and Standard Details available online. ☐
http://www.ci.friendswood.tx.us

24. Confirm Sign-in sheet is complete and state that it will be shared via email. ☐

25. Schedule Progress Meetings. ☐

26. Questions/Contractor suggestions. ☐

END OF DOCUMENT

TIME EXTENSION REQUEST

Date: [INSERT DATE]

Project Name: Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number: 10390880

Attention: [INSERT CITY REP] Month of: [INSERT MONTH]

We request the extension of completion of time on our contract in the amount of [INSERT #DAYS] working days specified as follows:

1 __	2 __	3 __	4 __	5 __	6 __	7 __
8 __	9 __	10 __	11 __	12 __	13 __	14 __
15 __	16 __	17 __	18 __	19 __	20 __	21 __
22 __	23 __	24 __	25 __	26 __	27 __	28 __
29 __	30 __	31 __				

Please put an “X” in Saturday and Sunday Boxes. For Cold Weather enter “C”, for Rain enter “R” and for Other enter “O” and add comments below.

__

_____
[INSERT CONTACT NAME]
[INSERT CONTACT TITLE]

_____ Days Approved: _____
[INSERT CITY REPRESENTATIVE]
[INSERT TITLE]
City of Friendswood

END OF DOCUMENT

WORK CHANGE DIRECTIVE (WCD)

WCD No.: WCD-[INSERT #]

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C

PROJECT NUMBER: [INSERT PROJECT #]

TO: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR NAME]
[INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]

You are hereby directed to make the following changes in the Work, as described below and specified or shown on attachments, if applicable.

1.1 DESCRIPTION OF CHANGES:

A. Brief description of changes in the Work:
[INSERT CHANGE DESCRIPTION]

B. Justification for change(s):
[INSERT JUSTIFICATION]

1.2 PROPOSED ADJUSTMENTS:

A. Contract Price (Check one):

☐ Lump sum [INSERT INCREASE OR DECREASE] of $.

☐ Unit Price of $[INSERT UNIT PRICE] per [INSERT UNIT].

☐ As provided in subparagraph [INSERT PRAGRAPH #] of General Conditions.

☐ As follows: [INSERT SPECIAL CONDITIONS].

B. Contract Time: Contract Time is proposed to [INSERT BE ADJUSTED OR REMAIN THE SAME]. Proposed adjustment, if any, is [INSERT INCREASE OR DECREASE] of [INSERT # OF DAYS] working days.

1.3 NOTICE TO PROCEED BY THE CITY

Signature by City Manager indicates notice to proceed to Contractor for the described work and outlines proposed method of adjustment in Contract Price and Contract Time.

_____ _____
[INSERT YOUR NAME] Date
[INSERT YOUR TITLE]

_____ _____
[INSERT DIRECTOR NAME] Date
Director of [INSERT YOUR DEPARTMENT]

_____ _____
[INSERT CM NAME] Date
City Manager

1.4 ACCEPTANCE BY CONTRACTOR

Signature by Contractor indicates Contractor's agreement with the above proposed adjustments in Contract Price and Contract Time.

_____ _____
[INSERT CONTACT NAME] Date
[INSERT CONTACT TITLE]

END OF SECTION

CHANGE ORDER

CHANGE ORDER No.: CO-[INSERT #]

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C

PROJECT NUMBER: [INSERT PROJECT #]

TO: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR NAME]
[INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]

Proposed Change:	Add	Deduct
	$	$
	$	$
	$	$
	$	$
	$	$
Request For Time Change		

Original Contract Amount:	$_____	Original Contract Time:	_____
Net Previous Change Orders:	$_____	Net Previous Time Changes:	_____
Total Contract Amount:	$_____	Total Time Amount:	_____
This Change Order Amount Adds:	$_____	This Change Order Time Adds:	_____
This Change Order Amount Deducts:	$_____	This Change Order Time Deducts:	_____
New Contract Amount:	$_____	New Contract Time:	_____

We, the undersigned, enter to agreement on the change of Contract Price and/or change in Contract Time.

_____ _____
[INSERT CONTRACTOR REP] Date
[INSERT TITLE]

_____ _____
[INSERT CM NAME] Date
City Manager
City of Friendswood

END OF DOCUMENT

Project Name:	Blackhawk Boulevard Reconstruction Phase II – Repackage C
Contractor Name:	Enter Contractor Name
Contractor Address:	Enter Contractor Address
Contractor City, State and Zip Code	Enter Contractor City, State and Zip Code
Contractor Phone:	Enter Contractor Phone
Contractor Email:	Enter Contractor Email

Line Item	Item Description	QTY	UNIT	Unit Cost	Contract Amount
1					$0.00
2					$0.00
3					$0.00
4					$0.00
5					$0.00
6					$0.00
7					$0.00
8					$0.00
CO1					$0.00
CO2					$0.00
Totals:					**0.00**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #1

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #2

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #3

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #4

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #5

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #6

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #7

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #8

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #9

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Quantities Current	Quantities Total	Payments Previous	Payments Current	Payments Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #10

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #11

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Pay Application #12

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
Retainage Held									$0.00	$0.00	$0.00		
Totals:					**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Enter Contractor Name
Enter Contractor Address
Enter Contractor City, State and Zip Code
Enter Contractor Phone

Blackhawk Boulevard Reconstruction Phase II – Repackage C
Invoice Number
Date of Invoice
Final Pay Application (Retainage)

Line Item	Item Description	QTY	UNIT	Unit Price	Bid Amount	Work Completed Quantities Prev.	Current	Total	Payments Previous	Current	Total to Date	Total Contract Balance	Work Percent Complete
1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
3	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
4	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
5	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
6	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
7	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
8	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO1	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
CO2	0	0	0	$0.00	$0.00	0		0	$0.00	$0.00	$0.00	$0.00	0.0%
	Retainage Paid										$0.00		
	Totals:				**$0.00**				**$0.00**	**$0.00**	**$0.00**	**$0.00**	**#DIV/0!**

Department Name:	Enter Department Name
Project Name:	Blackhawk Boulevard Reconstruction Phase II – Repackage C
Project Number:	Enter Project Number
Vendor Number:	Enter Vendor Number
Purchase Order Number:	Enter Purchase Order Number
Contractor Name:	Enter Contractor Name
Contractor Address:	Enter Contractor Address
Contractor City, State and Zip Code	Enter Contractor City, State and Zip Code
Contractor Phone:	Enter Contractor Phone
Work Retainage Percentage:	5%
Original Contract Amount:	$0.00
CO#1:	$0.00
CO#2:	$0.00
CO#3:	$0.00
CO#4:	$0.00
CO#5:	$0.00
CO#6:	$0.00
CO#7:	$0.00
CO#8:	$0.00
CO#9:	$0.00
CO#10:	$0.00
Total Approved Change Orders:	$0.00
Current Contract Amount:	$0.00

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**1**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**2**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**3**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**4**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**5**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**6**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**7**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**8**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**9**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**10**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**11**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**12**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM **Date**
Director of Engineering

CITY OF FRIENDSWOOD
Enter Department Name

Payment Authorization for
Blackhawk Boulevard Reconstruction Phase II – Repackage C

Project Number:	**Enter Project Number**	**Contractor:**	**Enter Contractor Name**
Vendor Number:	**Enter Vendor Number**	**Address:**	**Enter Contractor Address**
Purchase Order (PO) Number:	**Enter Purchase Order Number**	**City, State Zip:**	**Enter Contractor City, State and Zip**
Current PO Number (if rolled over):		**Phone Number:**	**Enter Contractor Phone**

Invoice Number:	
Invoice Date:	
Pay Application Number:	**Final-Retainage Payout**
Amount Requested:	**$0.00**
Original Contract Amount:	**$0.00**
Approved Change Orders to Date:	**$0.00**
Current Contract Amount:	**$0.00**
Total Work Completed per this Invoice:	**$0.00**
Total Retainage Held per this Invoice:	**$0.00**
Total Previously Paid:	**$0.00**
Amount Recommended for Payment:	**$0.00**
Total Paid Inclusive of this Invoice:	**$0.00**
Total Retainage Inclusive of this Invoice:	**$0.00**
Total Funds Expended To Date:	**$0.00**
Remaining Contract Funds	**$0.00**

Prepared By:

Name of Office Manager or Project Manager — **Date**
Office Manager or Project Manager

Reviewed By:

Michael Medwedeff, CFM — **Date**
Projects Coordinator

Approved By:

Jil Arias, PE, CFM — **Date**
Director of Engineering

FINAL WAIVER OF LIEN

STATE OF TEXAS §
COUNT OF GALVESTON §

For and in consideration of the receipt of [INSERT WRITTEN AMOUNT DUE] ($[INSERT # AMOUNT]) is hereby acknowledged by [INSERT GENERAL CONTRACTOR NAME], does hereby waive and relinquish any and all claims and rights of lien to the extent of the amount hereon for the work, labor, materials, machinery or other goods, equipment or services done, performed or furnished in respect to invoice number [INSERT INVOICE #] billed to the City of Friendswood and located at [INSERT PROJECT ADDRESS] hereinafter described as: Blackhawk Boulevard Reconstruction Phase II – Repackage C.

We, the undersigned, do by means of this instrument, affirm and confirm the face that there are no claims for labor, materials, or services outstanding against us on this project and on the contrary, all have been paid and otherwise discharged, including retainage.

In witness wherefor, the undersigned has caused these present to be duly executed this the [INSERT DATE] day of [INSERT MONTH], [INSERT YEAR].

_____
Name: [INSERT AUTHORIZED NAME]
Title: [INSERT THEIR TITLE]
Address: [INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]
Telephone: [INSERT TEL #]
EMAIL: [INSERT EMAIL]

Subscribed and sworn to before me this _____ day _____ of, _____.

Notary Public In and For the State of [INSERT STATE]

My Commission Expires: _____

END OF SECTION

NON-CONFORMANCE REPORT (NCR)

REPORT No.: NCR-[INSERT #]

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C
PROJECT NUMBER: [INSERT PROJECT #]

TO: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR NAME]
[INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]

1.1 DESCRIPTION OF NONCONFORMANCE:
[INSERT DESCRIPTION OF NON-CONFORMANCE AND SPECIFIC REFERENECES]

Reported by: [INSERT YOUR NAME]
Date Reported: [INSERT REPORT DATE]
Method of Notifying Contractor: [INSERT METHOD OF NOTIFICATION]
Date of Notification: [INSERT DATE OF NOTIFICATION]

1.2 DESCRIPTION OF CONFORMANCE:
[INSERT DESCRIPTION OF CONFORMANCE AND SPECIFIC REFERENECES]

Conformance shall be accomplished within seven (7) days after receipt of this notice and is to be coordinated with [INSERT YOUR TITLE]. If further information is needed, advise [INSERT YOUR TITLE] immediately. This non-conformance is considered an open item until resolved and accepted by the [INSERT YOUR TITLE].

1.3 ACKNOWLEDGEMENT

_____ _____

[INSERT CONTRACTOR REP] Date
[INSERT TITLE]

_____ _____

[INSERT YOUR NAME] Date
[INSERT YOUR TITLE]

END OF SECTION

STOP WORK ORDER

DATE: [INSERT DATE]

To: [INSERT CONTACT NAME]
[INSERT PROJECT/PROPERTY]
[INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]

On this date notice has been served on the above referenced construction project to cease and desist [INSERT WORK TO BE STOPPED] construction on this [INSERT EXTENT OF COVERAGE] on this Stop Work Order until further notice. Once remedy has been made and submitted to [INSERT YOUR NAME & TITLE], he shall issue a Notice to Rescind this Stop Work Order. This Notice shall be approved and countersigned by the [INSERT DEPARTMENT DIRECTOR NAME] before any future work may proceed on the extent of work covered by this Stop Work Order.

_____ _____

[INSERT DIRECTOR NAME] Date
Director of [INSERT DEPARTMENT]
City of Friendswood

END OF DOCUMENT

Notice to Rescind Stop Work Order

DATE: [INSERT DATE]

To: [INSERT CONTACT NAME]
[INSERT PROJECT/PROPERTY]
[INSERT ADDRESS]
[INSERT CITY, STATE, ZIP]

On this date notice has been served on the above referenced construction project that the Contractor has remedied the construction on the Stop Work Order dated [INSERT STOP WORK ORDER DATE], made and submitted by [INSERT YOUR NAME AND TITLE]. This Notice to Rescind the Stop Work Order by [INSERT DEPARTMENT DIRECTOR] acknowledges that [INSERT WORK THAT HAS BEEN STOPPED] has been remedied to the satisfaction of the City and work may proceed on the extent of work that was covered by the Stop Work Order.

_____ _____

[INSERT DIRECTOR NAME] Date
Director of [INSERT DEPARTMENT]
City of Friendswood

END OF DOCUMENT

FINAL WALKTHROUGH CHECKLIST

PART I: GENERAL HOUSEKEEPING

1.1 All trash, concrete wash out, concrete spillage, and debris has been removed from the site.

1.2 Streets have been cleaned and are still clean.

1.3 Used or unused construction materials have been removed from the site.

PART II: SANITARY SEWER SYSTEM

2.1 All lid covers read City of Friendswood Sanitary Sewer as shown in the City of Friendswood Standard Details.

2.2 All lid covers must be clean and free of concrete.

2.3 All manhole elevation adjustment rings are grouted appropriately.

2.4 Manhole service entrance diameter is thirty-two (32) inches.

2.5 All manholes are clean - No debris or mud inside.

2.6 Any piping entering a manhole should be grouted watertight so there are no spaces between the pipe and the manhole.

2.7 Pipe connections to existing manholes must be cored – NOT chipped or broken.

2.8 Finish elevation of manhole cover shall be as stated in Adjusting Manholes, Inlets and Valves Boxes to Grade.

2.9 Manhole cover inflow protector is in place.

2.10 Service leads are installed and extend a minimum of one (1) foot above finished grade.

2.11 Curbs should be painted green at each manhole or service lead aligned with the centerline of that manhole or service lead as specified in Temporary Utility Identification Markings.

2.12 Service lead end cap to be completely painted green.

2.13 Temporary plug is removed at the point of connection to the existing system.

2.14 All manholes shall be opened during the final walkthrough.

PART III: STORM WATER SYSTEM

3.1 All lid covers must read City of Friendswood Storm Sewer as shown in the City of Friendswood Standard Details.

3.2 All lid covers must be clean and free of concrete.

3.3 All manholes or inlets must be grouted smooth on the interior.

3.4 All manholes are clean - No debris or mud inside - No standing water.

3.5 All inlets are clean - No debris or mud inside - No standing water.

3.6 All piping is clean - No debris or mud inside - No standing water.

3.7 All inlets must have silt fence protecting front of inlet from debris.

3.8 All formwork must be removed from manholes or inlets.

3.9 All lifting hook places shall be grouted so no metal is showing.

3.10 Pipe protrusions into manholes or inlets must be cut flush with the inner wall of the manhole or inlet and grouted smooth and watertight.

3.11 Drainage inverts must be installed within manholes and inlets.

3.12 All joint cracks must be grouted appropriately.

3.13 All inlet grates must be installed and should be unmarked.

3.14 All Inlets and manholes shall be opened during final walkthrough.

PART IV: POTABLE WATER SYSTEMS

4.1 All main valves at point of connection to existing system are open and operable.

4.2 All main valves within the newly installed system are open and operable.

4.3 All fire hydrant valves are open and operable.

4.4 All valve covers are free of concrete.

4.5 All valve covers are painted blue.

4.6 All valve cover boxes are encased in concrete per City of Friendswood Standard Details.

4.7 All valve cover boxes are Tyler type “A” valve boxes.

4.8 All valve cover boxes are a minimum of three (3) inches above finished grade unless they are contained within a poured sidewalk at the time of the walk through, then they should be painted blue and flush with the sidewalk surface – No trip hazard.

4.9 Curbs should be painted blue at each valve, fire hydrant, blow-off, or meter service lead aligned with the centerline of that valve, fire hydrant, blow-off, or meter service lead as specified in Utility Identification Markings.

4.10 All valves shall be turned during final walkthrough.

PART V: FIRE HYDRANTS

5.1 All fire hydrants must be either Mueller Centurion or American Darling per the City of Friendswood Technical Specifications.

5.2 All fire hydrants must be sandblasted, painted with the approved City of Friendswood colors, and audited as specified in Fire Hydrant Assemblies. The City of Friendswood will accept a letter from the audit firm acknowledging they are under contract to perform the work.

5.3 All fire hydrants are set at the proper elevation based upon the finished grade and meeting the twenty-two (22) inch clearance to open the steamer nozzle.

5.4 All fire hydrant valves are open.

5.5 All fire hydrant valve covers are Type “A” covers and are painted blue.

5.6 All pumper nozzles shall face the street.

5.7 Blue reflectorized raised pavement marker shall be offset eight (8) inches from the centerline on the side where fire hydrant is located. Reflectorized side shall face direction of traffic.

5.8 Fire hydrants to be flowed during the final walkthrough.

PART VI: WATER METER SERVICE CONNECTIONS

6.1 Proper number of meter service connections have been installed.

6.2 Meter service boxes are located within the right of way or easement.

6.3 Meter service boxes are located off the property line a minimum of nine (9) inches laterally for a minimum spread between services of eighteen (18) inches.

6.4 Meter service boxes are seta minimum of three (3) inches above grade and undamaged.

6.5 Corporation stop set with the shutoff in the vertical position for easy “T” handle access.

6.6 Services are to be flowed during the final walkthrough.

6.7 Service lead and stop set to a maximum depth of twelve (12) inches below finished grade.

PART VII: POLLUTION PREVENTIVE PROTECTION

7.1 Erosion control must be provided around perimeter of property.

7.2 Erosion control must be provided at the back of curb for all lots, islands, and reserves.

7.3 Erosion control measures must be in place at all swales, curb inlets, and area inlets.

7.4 All erosion control measures must be in good condition for the walk through.

7.5 Hydro-mulch or sod must be provided at the back of curb, reserves, detention pond, and any drainage areas.

PART VIII: PROPERTY

8.1 Lots must be staked with lot numbers at the right of way and back of the lot.

8.2 Back lot stakes must have elevation control marks to match the design elevations.

8.3 Reserves must be identified on lot staking where adjacent to lots.

8.4 Property pins must be in place at the right of way and back lots.

8.5 Lots must exhibit positive drainage to match the plan design.

8.6 Lots must be graded to finish grades per the plan design.

PART IX: DETENTION POND

9.1 Drainage slopes for detention areas shall not exceed 4:1 (Horizontal versus Vertical) per both HCFCD and GCCDD.

9.2 Open channel drainage swales shall not exceed 4:1 (Horizontal versus Vertical) per the HCFCD criteria.

9.3 Open channel drainage swales shall not exceed 3:1 (Horizontal versus Vertical) per the GCCDD criteria.

9.4 GCCDD approval of drainage and detention facilities is required prior to the City of Friendswood walk through in Galveston County.

9.5 HCFCD acknowledges the City of Friendswood as their approval authority at the time of the walk through unless the site outfalls directly into an HCFCD Facility.

9.6 Outfall structures are complete.

9.7 Pipe projections at the outfall structures must be cut flush with the face of the outfall structure and grouted smooth.

PART X: PAVING AND SIDEWALKS

10.1 Street paving must be free of cracks and defects as defined in the City of Friendswood Technical Specification Concrete Paving.

10.2 Concrete spillage must be removed from the street travel surface.

10.3 No surface defects such as name imprints, bike tracks, tire tracks, animal tracks, etc. will be accepted.

10.4 Curbs must be free of defects.

10.5 Joint sealants have been installed at all construction joints, saw joints, and inlet joints.

10.5 Sidewalks have been installed at all islands, detention areas, utility easements, and reserves where indicated on the approved sidewalk accessibility plan.

10.6 Sidewalks have been installed along major thoroughfares adjoining the new subdivision.

10.7 Wheel Chair Ramp access has been provided at all locations as shown on the sidewalk accessibility plan, the five (5) foot by (five (5) foot turn area at the back of the Wheel Chair Ramp is part of the Wheel Chair Ramp.

10.8 Wheel Chair Ramps shall have the integral charcoal color per City of Friendswood Colored Concrete for Wheelchair Ramps.

10.9 Traffic control signage has been installed per City of Friendswood Standard Details.

10.10 The City of Friendswood and a lab representative must be present to witness each and every concrete placement.

10.11 Pavement markings are installed per the plans for traffic control islands, medians, turn lanes, and crosswalks.

10.12 Raised reflective blue and white pavement markers have been installed near the street centerline at each fire hydrant.

PART XI: TESTING

11.1 The City of Friendswood must be copied directly on all lab results and should have all reports in hand prior to the scheduling of the walk through.

11.2 A City of Friendswood representative should have been present to witness all concrete placements.

11.3 A testing lab representative should have been present to witness all concrete placements.

11.4 All testing has been completed successfully

11.5 Bacteria Test – City of Friendswood representative on site to witness test.

11.6 Sanitary Sewer low-pressure air test, deflection test and manhole vacuum test – City of Friendswood representative on site to witness test.

11.7 Waterline Test waterline pressure test – City of Friendswood representative on site to witness test.

11.8 Lime Depth Check Test – City of Friendswood representative on site to witness test.

11.9 Density and gradation tests – City of Friendswood representative on site to witness all tests.

11.10 Twenty-eight (28) day concrete compressive strength test results have been received by the City of Friendswood and all results are satisfactory.

11.11 Twenty-eight (28) day concrete pavement cores or pre-placement form checks have been taken for thickness and all results are satisfactory.

PART XII: LIFT STATIONS

12.1 All lift stations shall be tested as specified in the City of Friendswood Technical Specification Sanitary Sewer Lift Stations prior to scheduling the final walkthrough.

PART XIII: AS-BUILT DRAWINGS

13.1 Electronic drawing files formatted in AutoCAD and contained on two (2) individual CD's.

13.2 One (1) black line copy in full size and one (1) black line copy in half size.

13.3 Reflect any and all deviations in the field versus the original design documents on the As-Built sets.

13.4 Incorporate any and all design revisions from the original design.

13.5 Stamped conspicuously as "As-Built Drawings".

13.6 Must be a reproducible Mylar.

13.7 Must include one (1) set of blue line drawings for the acceptance final walkthrough.

PART XIV: MAINTENANCE BOND

14.1 Maintenance bond must name the City of Friendswood as the bondholder, dated to commence on the date the Work is scheduled for City Council approval.

14.2 In Galveston County the GCCDD requires a maintenance bond independent of the City of Friendswood.

14.3 Must be for the full value of the infrastructure improvements including work performed through Change Order to the Original Contract.

14.4 A copy of the Original Contract and any Change Orders that would establish the value of the infrastructure improvements shall be submitted with the Maintenance Bond.

Note: This document is intended to assist in preparing for the acceptance walk through and is not intended to be a site specific Punch list.

END OF DOCUMENT

CERTIFICATE OF SUBSTANTIAL COMPLETION

Date: [INSERT DATE]

[INSERT CONTRACTOR NAME]
ATTN: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR ADDRESS]
[INSERT CITY, STATE, ZIP]

RE: Project Name:Blackhawk Boulevard Reconstruction Phase II – Repackage C
Project No.: [INSERT PROJECT #]
[INSERT RFQ, RFP or BID #]No.: [INSERT RFQ, RFP or BID #]

Dear [INSERT CONTRACTOR CONTACT]:

1.1 NOTIFICATION

On NOTIFICATION DATE Projects Division received notification that the Contractor wished to declare the Work of the above referenced project Substantially Complete.

1.2 INSPECTION

A site visit and inspection of the Work performed under this Contract was carried out on INSPECTION DATE by the City to ascertain the compliance of the Work with the Contract. The Date of Substantial Completion is hereby established as DATE OF SUBSTANTIAL COMPLETION. During this site visit a punch list of incomplete or non-conforming work was identified and agreed to by the City of Friendswood and the Contractor.

1.3 PUNCH LIST

The list of incomplete or outstanding items to be completed or corrected by the Contractor and verified by the Project Manger, (Document 00785 – Punch List) is attached hereto. The project shall not be considered complete until those items have been corrected or otherwise brought into compliance with the Contract and that correction is demonstrated to the City. Failure to include any items on such list shall not alter the responsibility of the Contractor to complete the Work in accordance with the Contract. The Contractor shall complete or correct the Work on the Punch List attached hereto within ten (10) working days from the date shown on the punch list generated on the date of the Substantial Completion walk-through.

1.4 WARRANTY PERIOD

However, with the issuance of this certificate, the project is considered and accepted as Substantially Complete and the Contractor’s warranty period of one (1) year shall commence from the above Date of Substantial Completion, or as stated in the contract if different, shall begin as of the date of this Certificate.

1.5 OCCUPANCY BY THE CITY

Substantial Completion of the Work entitles the City to take possession and make use of the Work and to conduct routine operations therein. Such operation by the City shall take precedence over all activities of the Contractor. The DEPARTMENT shall assume full possession of the Work at TIME on DATE. {or will not take possession until after Final Completion.}

1.6 TRANSITION OF RESPONSIBILITIES

The City and the Contractor agree that security, maintenance, heating, ventilating, air conditioning, utilities, damage to the Work, and provision of insurance, during the period after Substantial Completion and prior to Final Completion, transfer to the City. The Contractor shall remove all his locks from gates at this time. Entry to the site by the Contractor from this point forward shall be by means of scheduled appointment that shall be approved by the City's operations staff.

1.7 COORDINATION OF CORRECTIVE WORK

All corrective activities conducted by the Contractor, his forces, subcontractors, and suppliers, shall comply with the City's operational schedule and shall in no way interfere with, impinge, or prevent the City's use of the project or benefit from its service. Any corrective actions that may require temporary shut down of any part or component of the project shall be reported in writing, scheduled, and approved by the City's operational staff at least twenty-four (24) hours prior to conducting that work. A list of all the Contractor's personnel, suppliers, and subcontractors expected or required to enter the project site shall be furnished to the City's operations staff prior to the scheduled work beginning. No exceptions shall be made.

The Contractor shall contact the City's operations staff at (281) 996-EXT for scheduling all further work on the project. Projects Division retains administrative control of the contract and all questions regarding approval of corrective work or payment for that work shall be directed to same.

1.8 ACCEPTANCE BY THE CITY

[*Printed Name*]		
Project Manager	Signature	Date
[*Printed Name*]		
Director of Community Development	Signature	Date
[*Printed Name*]		
City Manager	Signature	Date

END OF DOCUMENT

PUNCH LIST

Date: [INSERT DATE]

[INSERT CONTRACTOR NAME]
ATTN: [INSERT CONTRACTOR CONTACT]
[INSERT CONTRACTOR ADDRESS]
[INSERT CITY, STATE, ZIP]

RE: Project Name: Blackhawk Boulevard Reconstruction Phase II – Repackage C
Project No.: [INSERT PROJECT #]
[INSERT RFQ, RFP or BID #]No.: [INSERT RFQ, RFP or BID #]

Dear [INSERT CONTRACTOR CONTACT]:

At the Substantial Completion walk-through on [INSERT SUBSTANTIAL COMPLETION DATE], the following items were discussed and need to be completed or corrected before a Final walk-through will be scheduled. The Project Manager shall conduct the Final walk-through and verify that all Items have been either completed or corrected. All necessary work shall be completed within ten (10) working days from the date shown on this notice.

ITEM NO.	ITEM DESCRIPTION	DATE COMPLETED

[INSERT YOUR NAME]
[INSERT YOUR TITLE]
City of Friendswood

END OF DOCUMENT

AFFIDAVIT OF PAYMENT TO SUBCONTRACTORS AND SUPPLIERS

The undersigned, [INSERT SUBCONTRACTOR], states that they are the [INSERT TYPE OF WORK], of [INSERT CONRACTOR NAME] and that he is duly authorized to execute this Certification of Payment to the Subcontractors and the Suppliers; that he swears and subscribes that the Contractor has made payments to the Subcontractors and the Suppliers for all labor, materials, equipment, and services furnished to date for the Work on Project No. [INSERT PROJECT #] in the amounts for which the Contractor has been paid; that the labor, materials, equipment, and services covered by this Certificate of Payment have been furnished in accordance with and all in compliance with the Contract Documents; that no sums have been withheld by the Contractor for the Subcontractors and the Suppliers as a result of any allegations of deficiencies in the Work; and further that such payments were made in accordance with the Contract Documents and with the laws of the State of Texas.

_____
Affiant's Signature

SWORN AND SUBSCRIBED before me on _____
Date

_____
Notary Public in and for the State of [INSERT STATE]

_____
Print or type name

My Commission Expires: _____
Expiration Date

END OF DOCUMENT

DOCUMENT 00790

CONTRACTOR'S CERTIFICATION OF FINAL COMPLETION

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C

PROJECT NUMBER: INSERT PROJECT NUMBER]

[INSER BID, CSP, RFP] No.: INSERT BID, CSP OR RFP NUMBER

CONTRACT DATED: [INSERT CONTRACT DATE]

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared [INSERT PRINCIPAL NAME] who, being by me duly sworn, on his oath says that he or she represents [INSERT CONTRACTOR COMPANY], the Contractor who has performed a contract with the City of Friendswood for the construction of the Work described above, and is duly authorized to make this affidavit; that he or she has personally examined the Work described above as required by the Contract Documents; that said Work and all items thereof have been completed and all known defects made good; that all surplus material, refuse, dirt and rubbish have been cleaned up and removed or disposed of as directed by the [INSERT YOUR TITLE]; that all parts of Work are in a neat, tidy, finished condition and ready in all respects for acceptance by the City; that all gravel or shell roadway surfaces removed during the course of the Work have been replaced in accordance with the City of Friendswood Technical Specifications, that rates of pay for all labor employed on said Work have not been below the minimum set out in "Labor Classification and Minimum Wage Scale" in the Contract Documents and that within the knowledge of affiant all just bills for labor and material and for the rental or use of any equipment or apparatus, used in, on, or in connection with the Work have been paid in full by the Contractor.

_____
Affiant's Signature

SWORN AND SUBSCRIBED before me on _____
Date

_____
Notary Public in and for the State of [INSERT STATE]

_____
Print or type name

My Commission Expires: _____
Expiration Date

THIS IS TO CERTIFY that I have thoroughly inspected the Work performed by the above named Contractor on the above described Contract and find all things in accordance with the Contract documents governing this Work.

_____ _____

[INSERT YOUR NAME] Date
[INSERT YOUR TITLE]
City of Friendswood

END OF DOCUMENT

NOTICE OF FINAL COMPLETION

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C
PROJECT NUMBER: [INSERT PROJECT #]
[INSERT BID, CSP OR RFP] NUMBER: [INSERT BID, CSP OR RFP #]

1.1 DATE OF FINAL COMPLETION

On [INSERT DATE] the [INSERT YOUR DEPARTMENT] received notification that the Contractor, [INSERT CONTRACTOR NAME], wished to declare the Work on the above referenced project being complete and all the Work being acceptable to the City.

A site visit was carried out on [INSERT DATE] by the City to ascertain the compliance of the Work with the Contract for Substantial Completion. During that site visit, a punch list of incomplete or non-conforming work was identified and agreed to by the City and the Contractor.

1.2 PUNCH LIST

Contractor certified in Contractor's Certification of Final Completion that all Punch List items were completed or corrected.

The [INSERT YOUR TITLE] scheduled a review of punch list items on [INSERT DATE] and the project is now considered to be complete since those items on the punch list have been corrected or otherwise brought into compliance with the Contract and that such correction has been demonstrated to the City.

Failure by the City to identify incomplete work items or requirements of the Contract prior to issuance of this Certificate shall not relieve the Contractor of the responsibility to comply with all provisions of the Contract.

1.3 ONE-YEAR MAINTENANCE PERIOD

With the issuance of this Notice, the project is considered and accepted as Final and that the Contractor's warranty period of one (1) year began on the date of Final Completion, or as stated in the contract if different, and shall remain in effect until [INSERT COUNCIL DATE]. The Contractor shall provide the City with a One-Year Maintenance Bond in the amount of $[INSERT CONTRACT AMOUNT] to secure this warranty. All corrective activities conducted by the Contractor, his forces, subcontractors, and suppliers under the One-Year Maintenance period, shall comply with the City's operational schedule and shall in no way interfere with, impinge, or prevent the City's use of the project or benefit from its service. Any corrective actions that may require temporary shut down of any part or component of the project shall be reported in writing, scheduled, and approved by the City's operational staff at least twenty-four (24) hours prior to conducting that work.

At the end of the One-Year Maintenance Period, it is incumbent on the Contractor to contact the City to schedule a One-Year Maintenance walk-through. At that time, a list of deficient items shall be given to the Contractor who shall remedy the items in an expeditious manner. The One-Year Maintenance Bond shall be written so as to remain in effect until completion of all items and a Certificate of One-Year Maintenance Acceptance is issued to the Contractor and to the bonding company.

Contractor shall contact the City's operations staff at 281-[INSERT DEPT MAIN#] for scheduling any corrective or warranty work on the project. The [INSERT YOUR DEPARTMENT] retains administrative control of the project and all questions regarding approval of corrective work or payment for that work shall be directed to 281-[INSERT PHONE NUMBER].

1.4 ACCEPTANCE OF THE WORK

Based on inspection and to the best of our knowledge, information and belief, the Work has been completed in accordance with the terms and conditions of the Contract and we recommend acceptance of the Work by City Council.

Notwithstanding the City's acceptance of the Work, nothing herein shall serve to waive or otherwise extinguish any outstanding claims on the City's part for recovery of Liquidated Damages pursuant to Article IV of the Contract, all such claims being hereby reserved.

1.5 RECOMMENDATION BY STAFF

[INSERT YOUR NAME] Date
[INSERT YOUR TITLE]
City of Friendswood

[INSERT DIR NAME] Date
Director of [INSERT DEPARTMENT]
City of Friendswood

[INSERT CM NAME] Date
City Manager
City of Friendswood

1.6 ACCEPTANCE OF PROJECT

Notice was given to the City Council of the recommendation by City Staff to accept [INSERT PROJECT NAME] as final and complete. The City Council on INSERT COUNCIL DATE] voted to accept the Work; the Project is hereby deemed final and complete; and authorizes the Mayor to sign this Notice of Final Completion as acceptance of the above listed Project.

[INSERT MAYOR'S NAME] DATE
Mayor
City of Friendswood

ATTEST:

[INSERT CITY SECRETARY'S NAME] DATE
City Secretary
City of Friendswood

END OF DOCUMENT

ONE-YEAR MAINTENANCE BOND

THAT WE, [INSERT CONTRACTOR NAME], as Principal, hereinafter called the Contractor, and the other subscriber hereto, [INSERT SURETY NAME], as the Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Friendswood, a municipal corporation, in the sum of [INSERT WRITTEN DOLLAR AMOUNT] dollars and [INSERT WRITTEN CENTS AMOUNT] cents ($[INSERT NUMBERS]), for the payment of which sum well and truly to be made to the City of Friendswood and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a Contract in writing with the City of Friendswood for [INSERT INSTALLATION OR CONSTRUCTION] of [INSERT PROJECT NAME], all of such work to be done as set out in full in said Contract Documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein; and, whereas, certain work was found to be defective at the end if the One-year Maintenance period;

NOW THEREFORE, if the said Contractor shall comply with the provisions of the General Conditions, and correct work not in accordance with the Contract Documents discovered within the established one-year period, then this obligation shall become null and void, and shall be of no further force and effect; otherwise, the same is to remain in full force and effect.

Notices required or permitted hereunder shall be in writing and shall be deemed delivered when actually received or, if earlier, on the third (3rd) day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other party at the address prescribed in the Contract Documents, or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie in Galveston County, Texas.

IN WITNESS THEREOF, the Bidder and Surety have signed and sealed this instrument on the respective dates written below their signatures and have attached current Power of Attorney.

_____	_____
Principal/Contractor	Surety
By:_____	By: _____ (Attorney-in-Fact Signature)
Printed Name:_____	Printed Name:_____
Address:_____	Address:_____
_____	_____
ATTEST:	ATTEST:
_____	_____
Secretary (if corporation)/Witness	Secretary (if corporation)/Witness
[Corporate Seal if corporation]	[Surety Seal]
	Registered Agent of Surety for Delivery of notice and service of process:
	Name: _____
	Address:_____
	Phone Number:_____

NOTE: Attach Certified Copy of Power of Attorney

END OF DOCUMENT

EXTENDED WARRANTY MAINTENANCE BOND

THAT WE, [INSERT CONTRACTOR NAME], as Principal, hereinafter called the Contractor, and the other subscriber hereto, [INSERT SURETY NAME], as the Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Friendswood, a municipal corporation, in the sum of [INSERT WRITTEN DOLLAR AMOUNT] dollars and [INSERT WRITTEN CENTS AMOUNT] cents ($[INSERT NUMBERS]), for the payment of which sum well and truly to be made to the City of Friendswood and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a Contract in writing with the City of Friendswood for [INSERT INSTALLATION OR CONSTRUCTION] of [INSERT PROJECT NAME], all of such work to be done as set out in full in said Contract Documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein; and, whereas, certain work was found to be defective at the end if the One-year Maintenance period;

NOW THEREFORE, if the said Contractor shall comply with the Correction of Work provision of the General Conditions, and warrant work not in accordance with the Contract Documents discovered within [INSERT ADDITIONAL WARRANTY PERIOD] from the date that the One-year Maintenance Bond has expired, then this obligation shall become null and void, and shall be of no further force and effect; otherwise, the same is to remain in full force and effect.

Notices required or permitted hereunder shall be in writing and shall be deemed delivered when actually received or, if earlier, on the third (3rd) day following deposit in a United States Postal Service post office or receptacle, with proper postage affixed (certified mail, return receipt requested), addressed to the respective other party at the address prescribed in the Contract Documents, or at such other address as the receiving party may hereafter prescribe by written notice to the sending party.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie in Galveston County, Texas.

IN WITNESS THEREOF, the Bidder and Surety have signed and sealed this instrument on the respective dates written below their signatures and have attached current Power of Attorney.

_____	_____
Principal/Contractor	Surety
By:_____	By: _____ (Attorney-in-Fact Signature)
Printed Name:_____	Printed Name:_____
Address:_____	Address:_____
_____	_____
ATTEST:	ATTEST:
_____	_____
Secretary (if corporation)/Witness	Secretary (if corporation)/Witness
[Corporate Seal if corporation]	[Surety Seal]
	Registered Agent of Surety for Delivery of notice and service of process:
	Name: _____
	Address:_____
	Phone Number:_____

NOTE: Attach Certified Copy of Power of Attorney

END OF DOCUMENT

CERTIFICATE OF ONE-YEAR MAINTENANCE ACCEPTANCE

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C
PROJECT NUMBER: [INSERT PROJECT #]
[INSERT BID, CSP OR RFP] NUMBER: [INSERT BID, CSP OR RFP #]

On [INSERT NOTIFICATION DATE] the [INSERT YOUR DEPARTMENT] received notification that the Contractor wished to declare the One-Year Maintenance Period of the Work on the above referenced project was coming to completion. A site visit was requested to inspect the Work for release of the One-Year Maintenance Bond.

A site visit was carried out on [INSERT SUBSTANTIAL COMPLETION DATE] by the City to ascertain the compliance of the Work with the Contract for Substantial Completion. During that site visit, a punch list of incomplete or non-conforming work was identified and agreed to by the City and the [INSERT CONTRACTOR NAME]. All work is declared Acceptable and the One-year Maintenance Period is complete and accepted by the City Council on [INSERT COUNCIL DATE].

This Certificate acknowledges that the Contractor has fulfilled all of the requirements of the Contract with the City of Friendswood and both the City and the Contactor considers this Contract complete. It dissolves any claim from either the Contactor or the City pertaining to any part of this Contract, except for Manufacturer's Warranties that extend past the One-Year Maintenance Period in which any problems will be dealt with between the City and the Manufacturer.

_____ _____

[INSERT YOUR NAME] Date
[INSERT YOUR TITLE]

END OF DOCUMENT

CERTIFICATE OF EXTENDED WARRANTY MAINTENANCE ACCEPTANCE

PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C
PROJECT NUMBER: [INSERT PROJECT #]
[INSERT BID, CSP OR RFP] NUMBER: [INSERT BID, CSP OR RFP #]

On [INSERT NOTIFICATION DATE] the [INSERT YOUR DEPARTMENT] received notification that the Contractor wished to declare the [INSERT AMOUNT OF TIME FOR EXTENDED WARRANTY] Extended Warranty Maintenance Period of the Work on the above referenced project was coming to completion. A site visit was requested to inspect the Work for release of the [INSERT AMOUNT OF TIME FOR EXTENDED WARRANTY] Extended Maintenance Bond.

A site visit was carried out on [INSERT INSPECTION DATE] by the City to ascertain the compliance of the Work with the Contract for Substantial Completion. During that site visit, a punch list of incomplete or non-conforming work was identified and agreed to by the City and the Contactor. The Contractor has, as of [INSERT DATE OF VERIFICATION], performed all necessary corrections. All work is declared Acceptable and [INSERT AMOUNT OF TIME FOR EXTENDED WARRANTY] Extended Maintenance Period is complete and accepted by City Council on [INSERT COUNCIL DATE].

This Certificate acknowledges that the Contractor has fulfilled all of the requirements of the Contract with the City of Friendswood and both the City and the Contactor considers this Contract complete. It dissolves any claim from either the Contactor or the City pertaining to any part of this Contract, except for Manufacturer's Warranties that extend past the [INSERT AMOUNT OF TIME FOR EXTENDED WARRANTY] Extended Maintenance Period in which any problems will be dealt with between the City and the Manufacturer.

_____ _____

[INSERT YOUR NAME] Date
[INSERT YOUR TITLE]
City of Friendswood

END OF DOCUMENT

RELEASE OF BOND

Date: [INSERT DATE]
PROJECT NAME: Blackhawk Boulevard Reconstruction Phase II – Repackage C
PROJECT NUMBER: [INSERT PROJECT #]

TO: [INSERT CONTRACTOR NAME]
[INSERT CONTRACTOR ADDRESS]
[INSERT CONTRACTOR CITY/STATE/ZIP CODE]

The Contractor and the Surety having complied with the provisions of the General Conditions, and all work is in accordance with the Contract Documents at the end of the [INSERT ONE-YEAR OR EXTENDED WARRANTY] This Project was brought before the City Council on [INSERT DATE] for the acceptance of the One-Year Maintenance Period. The City Council accepted the One-Year Maintenance as complete and renders this obligation null and void, releasing the [INSERT ONE-YEAR OR EXTENDED WARRANTY] Maintenance Bond, Bond Number [INSERT BOND NUMBER] from [INSERT BONDING COMPANY NAME], [INSERT BONDING COMPANY ADDRESS], [INSERT BONDING COMPANY CITY/STATE/ZC], which is enclosed.

_____
[INSERT YOUR NAME]
[INSERT YOUR TITLE]

END OF DOCUMENT

SUBMITTAL PROCEDURES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Submittal procedures for:

1. Schedule of Values.
2. Construction Schedules and Cash Flow Curve (billing forecast).
3. Shop Drawings, Product Data and Samples.
4. Operations and Maintenance (O&M) Data.
5. Manufacturer's Certificates.
6. Construction Photographs.
7. Project Record Documents and monthly certification.
8. Video Media.
9. Design Mixes.

1.2 SUBMITTAL PROCEDURES

A. Scheduling and Handling:

1. Submit Shop Drawings, Product Data and Samples for related components as required by the Technical Specifications and the Project Manager.
2. Schedule submittals well in advance of need for construction Products. Allow time for delivery of Products after submittal approval.
3. Develop submittal schedule that allows sufficient time for initial review, correction, resubmission and final review of all submittals. Allow a minimum of thirty days (30 D) for initial review. The Project Manager will review and return submittals to the Contractor as expeditiously as possible but time required for review will vary depending on complexity and quantity of data submitted.
4. The Project Manager's review of submittals covers only general conformance to the Drawings, the Technical Specifications and dimensions that affect layout. The Contractor is responsible for quantity determination. No quantities will be verified by the Project Manager. The Contractor is responsible for errors, omissions or deviations from Contract Document requirements; review of submittals does not relieve the Contractor from the obligation to furnish required items in accordance with the Drawings and the Technical Specifications.
5. Submit two (2) copies of documents unless otherwise specified.
6. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
7. Assume risk for fabricated Products delivered prior to approval. Do not incorporate Products into the Work, or include payment

for Products in periodic progress payments, until approved by the Project Manager.

B. Transmittal Form and Numbering:
   1. Transmit each submittal to the Project Manager with Transmittal letter which includes:
      a. Date and submittal number.
      b. Project title and number.
      c. Names of the Contractor, the Subcontractor, the Supplier and the Manufacturer.
      d. Identification of Product being supplied.
      e. Location of where Product is to be installed.
      f. Applicable Technical Specification section number.
   2. Identify deviations from Contract Documents clouding submittal drawings. Itemize and detail on separate eight and one-half inch by eleven inch (8-1/2 In x 11 In) sheets entitled "DEVIATIONS FOR _____." When no deviations exist, submit a sheet stating no deviations exist.
   3. Have design deviations signed and sealed by an appropriate Professional Engineer licensed by the State of Texas.
   4. Sequentially number transmittal letters beginning with number one (1). Use original number for re-submittals with an alphabetic suffix [i.e., 2A for the first (1st) re-submittal of submittal 2, or 15C for third (3rd) re-submittal of submittal 15, etc.]. Show only one (1) type of work or Product on each submittal. Mixed submittals will not be accepted.

C. The Contractor's Stamp:
   1. Apply the Contractor's Stamp certifying that the items have been reviewed in detail by the Contractor and that they comply with Contract Document requirements, except as noted by requested variances.
   2. As a minimum, the Contractor's Stamp shall include:
      a. The Contractor's name.
      b. Job number.
      c. Submittal number.
      d. Certification statement the Contractor has reviewed submittal and it is in compliance with the Contract Documents and the Technical Specifications.
      e. Signature line for the Contractor.

D. Submittals will be returned with one (1) of the following Responses:
   1. "ACKNOWLEDGE RECEIPT" when no response and re-submittal is required.
   2. "NO EXCEPTION" when sufficient information has supplied to determine that item described is accepted and that no re-submittal is required.
   3. "EXCEPTIONS AS NOTED" when sufficient information has been supplied to determine that item will be acceptable subject

to changes, or exceptions, which will be clearly stated. When exceptions require additional changes, the changes must be submitted for approval. Re-submittal is not required when exceptions require no further changes.

4. "REJECTED-RESUBMIT" when submittal does not contain sufficient information, or when information provided does not meet Contract Document requirements and the Technical Specifications. Additional data or details requested by the Project Manager must be submitted to obtain approval.

1.3 MANUFACTURER'S CERTIFICATES

A. When required by the Technical Specification sections, submit manufacturers' certificate of compliance for review by the Project Manager.
B. Place the Contractor's Stamp on front of certification.
C. Submit supporting reference data, affidavits, and certifications as appropriate.
D. Product certificates may be recent or from previous test results, but must be acceptable to the Project Manager.

1.4 DEIGN MIXES

A. When required by the Technical Specification sections, submit design mixes for review.
B. Place the Contractor's Stamp, as specified in this section, on the front of each design mix.
C. Mark each mix to identify proportions, gradations, and additives for each class and type of mix submitted. Include applicable test results from samples for each mix. Perform tests and certifications within twelve months (12 Mo) of the date of the submittal.
D. Maintain copies of approved mixes at mixing plant.

1.5 CHANGES TO THE CONTRACT

A. Changes to the Contract may be initiated by completing a Request for Information form. The Project Manager will provide a response to the Contractor by completing the form and returning it to the Contractor.
   1. If the Contractor agrees that the response will result in no increase in cost or time, a Minor Change in the Work will be issued by the Project Manager.
   2. If the Contractor and the Project Manager agree that an increase in time or cost is warranted, the Project Manager will forward the Request for Proposal for negotiation of a Change Order.

PART II: PRODUCTS – NOT USED.

PART III: EXECUTION – NOT USED.

END OF SECTION

MINIMUM CONCEPTUAL DRAWING REQUIREMENTS

PART I: SUBMITTAL

1.1 CITY OF FRIENDSWOOD (COF)
- A. Submit two (2) copies of drawings.
- B. Submit by 5:00 PM a minimum of fourteen (14) calendar days prior to the next regularly scheduled meeting of the commission.

PART II: REFERENCES

2.1 CITY OF FRIENDSWOOD
- A. City of Friendswood Code of Ordinances (COFCO).

PART III: DRAWINGS

3.1. GENERAL REQUIREMENTS
- A. All drawings shall have a title block.
- B. All drawings shall have a sheet number.
- C. All drawings shall be printed on twenty-four inch by thirty-six inch (24 In x 36 In) nominal paper.
- D. All drawings shall have a graphic scale.
- E. Current Flood Zone Determination statement.

3.2 ALL OTHER DRAWINGS
- A. Scale shall be a minimum of one-inch equals one hundred feet (1" = 100') and shall be a graphic depiction.
- B. COF Standard Signature Block.
- E. Revisions.
- F. Date.
- G. Benchmark, reference and adjustment data.
- H. Show plan and profile for all water, sanitary sewer and storm sewer utilities.
- I. Seal, date and original signature of the Professional Engineer licensed by the State of Texas.

3.3 OVERALL LAYOUT AND PLAT
- A. Show Boundaries of Ownership.
- B. Adjacent landowners shall be identified.
- C. Contour lines shall be at one-half foot (1/2 Ft) intervals on the proposed development site and one-foot (1 Ft) intervals surrounding the proposed development site. Contour lines shall extend two hundred feet (200 Ft) beyond proposed development site.
- D. Public Land shall be identified including but not limited to reserves and parks, ROW and easements,
- E. Legal Description of proposed development site.

F. Total Acreage.
G. Tracts larger than one hundred acres (100 Ac) or cut out of a tract larger than one hundred acres (100 Ac) shall have a Drainage Impact Study completed and approved.
H. Tracts larger than one hundred acres (100 Ac) or cut out of a tract larger than one hundred acre (100 Ac) shall have a Master Conceptual Plan.
I. Benchmark, reference and adjustment data.

3.4 DRAINAGE
A. Show limits of one hundred year (100-Yr) flood plain.
B. Location of drainage pipes, ditches and easements.
C. Contour lines shall be at one-half foot (1/2 Ft) intervals on the proposed development site and one foot (1 Ft) intervals surrounding the proposed development site. Contour lines shall extend two hundred feet (200 Ft) beyond proposed development site.
D. All drainage pipes, ditches, channels, arteries, etc. within two hundred feet (200 Ft) of the proposed development site.
E. Location of Inlets and Manholes.
F. Current Flood Zone determination statement.
G. Inlet capacity table.

3.5 WATER AND SEWER
A. Location of waterlines, sewer lines, manholes, valves and fire hydrants.
B. Location of water and sewer service leads.
C. Location of Force Mains and Lift Stations.
D. Location of all water and sewer within two hundred feet (200 Ft) of the proposed development site.

3.6 STREETS
A. Location of all streets.
B. Name of all streets.
C. Location of Rights-of-way and width.
D. Location of Street Signage and Traffic Control Devices.
E. Location of all streets and rights-of-way within two hundred feet (200 Ft) of the proposed development site.
F. Location of Sidewalks.

3.7 UTILITIES (CABLE, GAS, ELECTRIC AND TELEPHONE)
A. Location and types of all utilities and utility easements.
B. Location of all utilities and types within two hundred feet (200 Ft) of the proposed development site.

END OF DOCUMENT

MINIMUM CONSTRUCTION DRAWING REQUIREMENTS

PART I: SUBMITTAL

1.1 CITY OF FRIENDSWOOD (COF)
- A. Submit two (2) copies of drawings.
- B. Submit by 5:00 PM a minimum of fourteen calendar days (14 cD) prior to the next regularly scheduled meeting of the City's Planning and Zoning Commission.

PART II: REFERENCES

2.1 CITY OF FRIENDSWOOD
- A. City of Friendswood Code of Ordinances (COFCO).

PART III: DRAWINGS

3.1. GENERAL REQUIREMENTS
- A. All drawings shall have a title block.
- B. All drawings shall have a sheet number.
- C. All drawings shall be printed on twenty-four inch by thirty-six inch (24 In x 36 In) nominal paper.
- D. All drawings shall have a graphic scale.
- E. Current Flood Zone Determination statement.

3.2 TITLE SHEET
- A. Proposed Name of Project or Subdivision.
- B. Detailed area key and vicinity map.
- C. Owner:
  1. Name: If a corporation, also list a contact person.
  2. Address (include City, ST and ZIP).
  3. Phone Number.
- D. Engineer:
  1. Company Name.
  2. Address (include City, ST and ZIP).
  3. Phone Number.
  4. Contact Person.
  5. NOTE: Shall be licensed by the State of Texas.
- E. Surveyor:
  1. Company Name.
  2. Address (include City, ST and ZIP).
  3. Phone Number.
  4. Contact Person.
  5. NOTE: Shall be licensed by the State of Texas.
- F. Date.

3.3 GENERAL NOTES

A. Use current COF General Notes Standard Detail Drawing.

3.4 DETAILS AND SPECIFICATIONS

A. Use the current COF Standard Details.
B. Use the current COF Technical Specifications.
C. There shall be no deviations from City of Friendswood Standard Details. If the development has other details that apply to the specific project that are not shown on COF Standard Details they shall be submitted on separate sheet and listed as “Special Details”.
D. There shall be no deviations from City of Friendswood Technical Specifications. If the development has other details that apply to the specific project that are not shown on COF Technical Specifications they shall be submitted on separate paper and listed as “Special Specifications”.

3.5 ALL OTHER DRAWINGS

A. Scale shall be a minimum of one inch equals one hundred feet (1” = 100’) and shall be a graphic depiction.
B. COF Standard Signature Block.
E. Revisions.
F. Date.
G. Benchmark, reference and adjustment data.
H. Show plan and profile for all water, sanitary sewer and storm sewer utilities.
I. Seal, date and original signature of the Professional Engineer licensed by the State of Texas.

3.6 OVERALL LAYOUT AND PLAT

A. Show Boundaries of Ownership.
B. Adjacent landowners shall be identified.
C. Contour lines shall be at one-half foot (1/2 Ft) intervals on the proposed development site and one foot (1 Ft) intervals surrounding the proposed development site. Contour lines shall extend two hundred feet (200 Ft) beyond proposed development site.
D. Public Land shall be identified including but not limited to reserves and parks, ROW and easements.
E. Legal Description of proposed development site.
F. Total Acreage.
G. Tracts larger than one hundred acres (100 Ac) or cut out of a tract larger than one hundred acres (100 Ac) shall have a Preliminary Engineering Report completed and approved.
H. Tracts larger than one hundred acres (100 Ac) or cut out of a tract larger than one hundred acres (100 Ac) shall have a Master Conceptual Plan.
I. Benchmark, reference and adjustment data.

3.7 DRAINAGE

A. Show limits of one hundred year (100-Yr) flood plain.
B. Location of drainage pipes, ditches and easements.
C. Location of major drainage arteries and detention facilities.
D. Contour lines shall be at one-half foot (1/2 Ft) intervals on the proposed development site and one foot (1 Ft) intervals surrounding the proposed development site. Contour lines shall extend two hundred feet (200 Ft) beyond proposed development site.
E. Points of crossing major existing arteries.
F. All drainage pipes, ditches, channels, arteries, etc. within two hundred feet (200 Ft) of the proposed development site.
G. Location of Inlets and Manholes.
H. COF Storm Sewer Standard Details Drawing.
I. Current Flood Zone determination statement.
J. Inlet capacity table.
K. Five year (5-Yr) storm table.
L. Detention facility (if applicable).

3.8 WATER AND SEWER

A. Location of waterlines, sewer lines, manholes, valves and fire hydrants.
B. Location of water and sewer service leads.
C. Location of Force Mains and Lift Stations.
D. Location of all water and sewer within two hundred feet (200 Ft) of the proposed development site.
E. COF Water Standard Details Drawing.
F. COF Sanitary Sewer Standard Details Drawing.

3.9 STREETS

A. Location of all streets.
B. Name of all streets.
C. Location of Rights-of-way and width.
D. Location of Street Signage and Traffic Control Devices.
E. Location of all streets and right-of-way within two hundred feet (200 Ft) of the proposed development site.
F. Location of Sidewalks.
G. COF Paving Standard Details Drawing.
H. COF Miscellaneous Standard Details Drawing.

3.10 UTILITIES (CABLE, GAS, ELECTRIC AND TELEPHONE)

A. Location and types of all utilities and utility easements.
B. Location of all utilities and types within two hundred feet (200 Ft) of the proposed development site.

END OF DOCUMENT

CONTINGENCIES AND ALLOWANCES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Schedule of monetary amounts of allowances in the Contract Sum for designated products or services.
- B. Costs in Contract Sum other than in Allowances.
- C. Administrative and procedural requirements governing the following:
  1. Lump-sum allowances.
  2. Unit-cost allowances.
  3. Quantity allowances.
  4. Contingency allowances.
  5. Testing and inspecting allowances.

1.2 SCHEDULE OF ALLOWANCES
- A. To be determined.

1.3 COSTS INCLUDED IN ALLOWANCES
- A. Cost of product to the Contractor or subcontractor, less applicable trade discounts.
- B. Delivery to site.
- C. Labor required under allowance, only when labor is specified to be included.

1.4 CONTRACTOR COSTS INCLUDED IN CONTRACT SUM
- A. Products handling at site, including unloading, uncrating, and storage.
- B. Protection of products from elements and from damage.
- C. Labor for installation and finishing, except when installation is specified as part of allowance.
- D. Other expenses required to complete installation.
- E. Contractor overhead and profit.

1.5 ADJUSTMENT OF COSTS
- A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.
- B. Submit claims for anticipated additional costs at the site, or other expenses caused by the selection under the allowance, prior to execution of the Work.
- C. Submit documentation for actual additional costs at the site, or other expenses caused by the selection under the allowance, prior to execution of the work.
- D. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.

1.6 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the Project Manager of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At the Project Manager's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by the Project Manager from the designated supplier.

1.7 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

D. Schedule shop drawings, product data, samples, and delivery dates, in Progress Schedule for products selected under allowances.

1.8 COORDINATION

A. Coordinate allowance items with other portions of the Work.

B. Furnish templates as required to coordinate installation.

1.9 PROJECT MANAGER RESPONSIBILITIES

A. Consult with the Contractor in consideration of products, suppliers, and installers.

B. Select products and transmit full information in writing to the Contractor as follows:

1. Manufacturer, product, model or catalog number, accessories, attachments, and finishes.
2. Supplier and installer as applicable.
3. Cost to Contractor, delivered to site, and installed, if so specified.

1.10 CONTRACTOR RESPONSIBILITIES

A. Assist the Project Manger in determining suppliers and installers; obtain proposals when requested.

B. Make recommendations for the Project Manager's consideration.

C. Promptly notify the Project Manager of any reasonable objections against supplier or installer.

D. On notification of selection, execute purchase agreement with designated supplier and installer.

E. Arrange for and process shop drawings, product data, and samples.

F. Arrange for delivery. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
G. Install, adjust, and finish products.
H. Provide warranties for products and installation.

1.11 CONTINGENCY ALLOWANCE

A. Use the contingency allowance only as directed by the Project Manager for the City's purposes, and only by Change Orders which designate amounts to be charged to the allowance.
B. The Contractor's related costs for products or equipment ordered by the City under the contingency allowance, including delivery, installation, taxes, insurance, equipment rental, and similar costs that are not part of the Contract Sum.
C. Change Orders authorizing use of funds from the contingency allowance will not include the Contractor's related costs and reasonable overhead and profit margins. Contractor shall include in base bid, Contractor's overhead, profit, insurance, bond and other direct cost.
D. At Project closeout, credit unused amounts remaining in the contingency allowance to City by Change Order or transfer the remaining amounts to other allowances as directed by the Project Manager.

1.12 INSPECTION AND TESTING ALLOWANCES

A. Inspection and testing allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
B. The allowance does not include incidental labor required to assist the testing agency, or costs for retesting upon failure of previous tests and inspections. The allowance also does not include costs of services not required by the Contract Documents. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
C. At Project closeout, credit unused amounts remaining in the inspection and testing allowance to City by Change Order.

1.13 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to City, after installation has been completed and accepted.
    1. If requested by the Project Manager, prepare unused material for storage by the City when it is not economically practical to return the material for credit. If directed by the Project Manager, deliver unused material to the City's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.
B. Where it is not economically feasible to return unused material for credit and when requested by the Project Manager, prepare unused material

for the City's storage, and deliver to the City's storage space as directed. Otherwise, disposal of excess material is the Contractor's responsibility.

PART II: PRODUCTS – NOT USED.

PART III: EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION

CHANGE ORDER PROCEDURES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Procedures for processing Change Orders, including:
  1. Documentation of change in Contract Price and Contract Time;
  2. Execution of Change Orders;
  3. Correlation of Contractor submittals.

1.2 REFERENCES
- A. Blue Book is defined as the Rental Rate Blue Book for Construction Equipment (a.k.a. Data Quest Blue Book).
  1. Rental Rate is defined as the full-unadjusted base rental rate for the appropriate item of construction equipment.

1.3 DOCUMENTATION OF CHANGE IN THE CONTRACT PRICE AND THE CONTRACT TIME
- A. Maintain detailed records of changes in the Work. Provide full information required for identification and evaluation of proposed changes, and substantiate costs of changes in the Work.
- B. Document each proposal for change in the Contract Price or the Contract Time with sufficient data to allow evaluation of proposal.
- C. Include the following minimum information on proposals:
  1. Quantities of items in original Unit Price Form with additions, reductions, deletions, and substitutions.
  2. Quantities and cost of items in the original Schedule of Values with additions, reductions, deletions and substitutions.
  3. Provide Unit Prices for new items, with supporting information, for inclusion in the Schedule of Unit Price Work.
  4. Justification for changes in the Contract Time.
  5. Additional data upon request.
- D. For changes in the Work performed on a time-and-material basis, provide the following additional information:
  1. Quantities and description of Products.
  2. Taxes, insurance and Bonds.
  3. Overhead and profit.
  4. Dates, times and by who work was performed.
  5. Time records and certified copies of applicable payrolls.
  6. Invoices and receipts for Products, rental equipment, and subcontracts, similarly documented.
- E. For changes in the Work performed on a time-and-materials basis, rental equipment is paid as follows:
  1. Actual invoice cost for duration of time required to complete extra work without markup for overhead and profit. When extra work comprises only a portion of a rental invoice where

equipment would otherwise be on site, compute hourly equipment rate by dividing the actual monthly invoice by one hundred and seventy-six (176). One day (1 D) equals eight hours (8 Hrs) and one week (1 Wk) equals forty hours (40 Hrs).

2. Do not exceed estimated operating costs given in Houston Area Blue Book for items of equipment. Overhead and profit will be allowed on the operating cost.

F. For changes in the Work performed on a time-and-materials basis using Contractor-owned equipment, use Houston Area Blue Book rates as follows:

1. Contractor-owned equipment will be paid at the Houston Area Blue Book Rental Rate for the duration of time required to complete extra work without markup for overhead and profit. Utilize lowest cost combination of hourly, daily, weekly or monthly rates. Use one hundred fifty percent (150%) of Rental Rate for double shifts, one (1) extra shift per day, and two hundred percent (200%) of Rental Rate for more than two (2) shifts per day. Standby rates shall be fifty percent (50%) of the appropriate Rental Rate shown in Houston Area Blue Book. No other rate adjustments apply.
2. Do not exceed estimated operating costs given in Houston Area Blue Book. Overhead and profit will be allowed on operating costs. Operating costs will not be allowed for equipment on standby.

1.4 WORK CHANGE DIRECTIVE

A. The Project Manager may issue a signed Work Change Directive instructing the Contractor to proceed with a change in the Work. The Work Change Directive shall subsequently be incorporated into a Change Order.

B. Work Change Directives shall describe changes in the Work and designate the method of determining change in the Contract Price or the Contract Time.

C. Proceed promptly to execute changes in the Work in accordance with the Work Change Directive.

1.5 UNIT PRICE CHANGE ORDER

A. Where Unit Prices for affected items of the Work are included in the original Unit Price Form, the Change Order will be based on Unit Prices.

B. Where Unit Prices of the Work are not pre-determined in the original Unit Price Form, the Work Change Directive shall specify the Unit Prices to be used.

1.6 TIME-AND-MATERIAL CHANGE ORDER

A. Provide itemized account and supporting data after completion of change, within time limits indicated for claims.

B. The Project Manager shall determine the change allowable in the Contract Price and Contract Time.
C. Provide full information required for evaluation of changes and substantiate costs for changes in the Work. The Project Manager shall verify all time-and-material items submitted.

1.7 CORREALATION OF CONTRACTOR SUBMITTALS
A. For Total Stipulated Price Contracts, promptly revise the Schedule of Values and Application for Payment forms to record authorized Change Orders as a separate line item.
B. For Unit Price Contracts, the next month's estimate of the Work after acceptance of a Change Order shall be revised to include new items not previously included with appropriate Unit Prices.
C. Promptly revise progress schedules to reflect change in the Contract Time, and to adjust time for other items of work affected by the change and resubmit for review.
D. Promptly enter changes to on-site and record copies of the Drawings, the Technical Specifications or the Contract Documents.

1.8 ACCEPTANCE OF CHANGE ORDER
A. Change Orders, once executed by the Contractor and the City, shall be the only acceptable document that shall be allowed to change the Contract Price or the Contract Time.
B. No work shall be performed that changes the Contract Price without an approved and signed Work Change Directive or Change Order. Any and all work that proceeds without authorization shall be at the Contractors expense and risk.
C. If no change in the Contract Time is submitted at the time request for change in the Contract is submitted, it shall be awarded no time for the change. Time shall not be submitted at the end of the project to recoup lost time due to changes in the Work.
D. Time-and-material changes shall be finalized in a Change Order after the change in work has been completed. Actually time paid under this Change Order shall be added to the Contract to change the Contract Time.

END OF SECTION

WORK RESTRICTIONS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. General use of the site including properties inside and outside the rights-of-way, work affecting road, ramps, streets and driveways and notification to adjacent occupants.

1.2 RIGHTS-OF-WAY

A. Confine access, operations and storage areas to rights-of-way provided by the City; trespassing on abutting lands or other lands in area shall not be allowed.

B. Make arrangements, at no cost to the City, for temporary use of private properties. The Contractor and the Surety shall indemnify and hold harmless the City against claims or demands rising from such use of properties outside of rights-of-way.

C. No material shall be stored in esplanades or medians without prior written approval by the Project Manager.

D. Restrict total length of distributed materials along the route of construction to one thousand linear feet (1000 Lf) unless otherwise approved by the Project Manager in writing.

1.3 PROPERTIES OUTSIDE THE RIGHTS-OF-WAY

A. Do not alter the condition of properties adjacent to and along rights-of-way.

B. Do not use ways, means, methods, techniques, sequences, or procedures that result in damage to properties or improvements.

C. Restore damaged properties outside of rights-of-way at no cost to the City to as good as or better than the original condition prior to construction.

1.4 USE OF SITE

A. Obtain approvals from governing authorities prior to impending or closing public roads and streets. Do not close more than two (2) consecutive intersections at one (1) time.

B. Notify the Project Manager a minimum of five working days (5 wD) prior to closing a street or street crossing. Obtain any required permits for street closures in advance.

C. Maintain ten foot (10 Ft) wide minimum access for emergency vehicles including access to Fire Hydrants.

D. Avoid obstructing drainage ditches or inlets. When obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.

E. Locate, document, and protect private and public lawn sprinkler

systems that may exist within the site. Repair or replace all damaged systems to original or better conditions at the start of the Work.

F. Conform to daily clean-up requirements.

G. Beware of overhead power lines existing in the area and in proximity of the Work. When ten feet (10 Ft) of clearance between energized power line and construction-related activity cannot be maintained, request that the power company responsible for the power line de-energize or move the conflicting overhead power line. Schedule, coordinate and pay costs associated with de-energizing or moving the conflicting overhead power lines. When there is no separate pay item for this work, include these costs in various items of bid that make such work necessary.

1.5 NOTIFICATION OF ADJACENT OCCUPANTS

A. Notify individual occupants in the areas to be affected by the Work of construction and time schedule. Notify not less than seventy-two hours (72 Hrs) no more than two weeks (2 Wks) prior to work being performed within two hundred feet (200 Ft) of homes and/or businesses.

B. Include in notification nature of the Work, and names and telephone numbers of two (2) company representatives for resident contact that shall be available on twenty-four-hour (24 Hr) call.

C. Submit proposed notification to the Project Manager for approval at least of twenty-four hours (24 Hrs) in advance of schedule timed to notify adjacent occupants.

1.6 PUBLIC, TEMPORARY AND CONSTRUCTION ROADS AND RAMPS

A. Construct and maintain temporary detours, ramps and roads to provide for normal public traffic flow when it is necessary to close public roads or streets.

B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment, large tandem axle trucks and/or equipment that will damage existing roadway surfaces.

C. Construct and maintain access roads and parking areas.

1.7 EXCAVATION IN STREETS AND DRIVEWAYS

A. Avoid hindering or inconveniencing public travel on streets and roadways for more that two hours (2 Hrs) at one (1) time, except with prior written approval by the Project Manager.

B. Obtain the approval of the Director of Engineering and the Director of Public Works when the nature of the Work requires closure of an entire street. Permits required for street closure are the Contractor's responsibility. Avoid unnecessary inconvenience to adjacent property owners.

C. Remove surplus materials and debris and open each block for public use as work in that block is complete.

D. Acceptance of any portion of the Work shall not be based solely on the return of the street to public use.

E. Do not obstruct the ingress/egress of driveways or entrances to private properties without prior written approval by the Project Manger.
F. Provide temporary crossings or complete excavation and backfill in one (1) continuous operation to minimize the duration of obstruction when excavation is required to cross driveways and entrances.
G. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices – latest edition.

1.8 SURFACE RESTORATION

A. Restore the site to as good as or better than the condition existing before construction commenced.
C. Repair damaged turf, level with bank sand or topsoil. Water and level newly sodded areas with adjoining turf using appropriate steel wheel rollers for sodding. Do not use spot sodding, checkerboard sodding or sprigging unless otherwise specified or directed by the Project Manager.

1.9 LIMITS OF CONSTRUCTION

A. Confine operations to lands within construction work limits shown on the Drawings. Unless otherwise noted on the Drawings adhere to the following:
   1. Where utility alignment is within esplanade or median, and construction limits are shown on the Drawings to extend to the edge of the esplanade or median, keep equipment, materials and stockpiles a minimum of five feet (5 Ft) from back of curb.
   2. Where construction limits shown on the Drawings extend to the property line, keep sidewalks free of equipment, materials, and stockpiles.

1.10 EQUIPMENT AND MATERIAL SALVAGE

A. Upon completion of the Work, carefully remove salvageable equipment and material. Deliver them to the City of Friendswood as directed by the Project Manager. Dispose of all other equipment not designated to be salvaged offsite at no additional cost to the City.

1.11 WORKING TIME

A. Normal work hours shall be from seven (7) A.M. to eight (8) P.M Monday through Friday, Central Standard Time.
B. Work hours for work that does not require inspection shall be from nine (9) A.M. to six (6) P.M. on Saturdays, Sundays and Holidays.
C. No work shall be done at any other time than those stated above without prior written approval by the Project Manager.
D. No work that is need of inspection shall be undertaken beyond the time listed in paragraph 1.13.A in this Section.
E. The Contractor can request that unusual circumstances require work, which must be inspected, that must be accomplished outside of the

normal hours listed in paragraph 1.13.A in this Section. In such circumstances the request shall be a minimum of forty-eight hours (48 Hrs) before the day requested and the following shall apply:

1. The Contractor shall request in writing approval to work beyond the normal work hours. In this request, the Contractor shall state the reason for each request. Permission is at the sole discretion of the Director of Engineering.
2. The Contractor shall pay to the City for the Project Manager or other City Personnel in accordance with the City's Adopted Fee Schedule.
3. The Contractor shall also pay for the Independent Testing Laboratory if needed.

F. Request to work on days other than normal working days does not constitute an approval to do so. Work on Saturday, Sunday and/or Holidays shall only be done after such request has been approved by the Director of Engineering.

END OF SECTION

STABILIZED CONSTRUCTION EXIT

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Installation of erosion and sediment control for stabilized construction exits used during construction and prior to final development of site.

1.2 SUBMITTALS
- A. Submit manufacturers catalog sheets and other Product Data on geotextile fabric.
- B. Submit sieve analysis of aggregates conforming to requirements of this Technical Specification.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D 4632 -Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- C. Storm Water Management Plan Manual prepared by the City of Friendswood.

PART II: PRODUCTS

2.1 GEOTEXTILE FABRIC
- A. Provide woven or non-woven geotextile fabric made of polypropylene, polyethylene, ethylene, or polyamide material.
- B. Geotextile fabric: Minimum grab strength of two hundred seventy pounds per square inch (270 psi) in any principal direction (ASTM D-4632) and equivalent opening size between fifty millimeters (50 mm) and one hundred forty millimeters (140 mm).
- C. Geotextile and threads: Resistant to chemical attack, mildew, and rot and contain ultraviolet ray inhibitors and stabilizers to provide minimum of six months (6 Mos) of expected usable life at temperature range of zero degrees Fahrenheit (0° F) to one hundred twenty degrees Fahrenheit (120° F).
- D. Representative Manufacturers: Mirafi, Inc. or equal.

2.2 COARSE AGGREGATES
- A. Coarse aggregate: Crushed stone, gravel, crushed blast furnace slag, or combination of these materials. Aggregate shall be composed of clean, hard, durable materials free from adherent coatings of, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.
- B. Coarse aggregates shall conform to gradation requirements in TABLE 4.1 – GRADATION REQUIREMENTS FOR COARSE AGGREGATES in this Section.

PART III: EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Provide stabilized construction roads and exits at construction staging, parking, storage and disposal areas to keep streets clean of mud carried by construction vehicles and equipment. Construct erosion and sediment controls in accordance with the Drawings and Technical Specification requirements.

B. Do not clear grub or rough cut until erosion and sediment control systems are in place, unless approved by the Project Manager to allow soil testing and surveying.

C. Maintain existing construction site erosion and sediment control systems until acceptance of the Work or until removal of existing systems is approved by the Project Manager.

D. Regularly inspect, repair or replace components of stabilized construction exits. Unless otherwise directed, maintain stabilized construction roads and exits until the City accepts the Work. Remove stabilized construction roads and exits promptly when directed by the Project Manager. Discard removed materials off-site.

E. Remove and dispose of sediment deposits at designated spoil site for the Project. If a spoil site is not designated on the Drawings, dispose of sediment off-site at a location not in or adjacent to stream or flood plain. Assume responsibility for off-site disposal.

F. Spread compacted and stabilized sediment evenly throughout site. Do not allow sediment to flush into streams or drainage ways. Dispose of contaminated sediment in accordance with existing federal, state, and local rules and regulations.

G. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sediment control systems caused by construction traffic.

H. Conduct construction operations in conformance with erosion control requirements of Section 01045 – Storm Water Pollution Prevention Plan Controls.

3.2 CONSTRUCTION METHODS

A. Provide stabilized access roads, subdivision roads, parking areas, and other on-site vehicle transportation routes where shown on the Drawings.

B. Provide stabilized construction exits and truck washing areas, when approved by the Project Manager, of sizes and at locations shown on the Drawings or as specified in this Section.

C. Clean tires to remove sediment on vehicles leaving construction areas prior to entering public right-of-ways. Construct truck washing areas needed to remove sediment. Wash trucks on stabilized areas that drain into drainage systems protected by erosion and sediment control measures.

D. Details for stabilized construction exits are shown on the Drawings.

Construct other stabilized areas to same requirements. Maintain minimum roadway widths of fourteen feet (14 Ft) for one-way traffic and twenty feet (20 Ft) for two-way traffic and of sufficient width to allow ingress and egress. Place geotextile fabric as a permeable separator to mixing of coarse aggregate with underlying soil. Limit exposure of geotextile fabric to elements between laydown and cover to a maximum fourteen days (14 D) to minimize potential damage.

E. Grade roads and parking areas to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar materials to prevent sediment from entering public right-of-ways, receiving streams or storm water conveyance systems.

F. Inspect and maintain stabilized areas daily. Provide periodic top dressing with additional coarse aggregates to maintain required depth. Repair and clean out damaged control systems used to trap sediment. Immediately remove spilled, dropped, washed, or tracked sediment from public right-of- ways.

G. Maintain lengths of stabilized areas as shown on the Drawings or a minimum of fifty feet (50 Ft). Maintain a minimum thickness of eight inches (8 In). Maintain minimum widths at all points of ingress or egress.

H. Stabilize other areas with the same thickness, and width of coarse aggregate required for stabilized construction exits, except where shown otherwise on the Drawings.

I. Stabilized areas may be widened or lengthened to accommodate truck washing areas when authorized by the Project Manager.

J. Clean streets daily before end of workday. When excess sediments have tracked onto streets, the Project Manager may direct the Contractor to clean street as often as necessary. Remove and legally dispose of sediments.

K. Use other erosion and sediment control measures to prevent sediment runoff during rain periods and non-working hours and when storm discharges are expected.

PART IV: TABLES

4.1 GRADATION REQUIREMENTS FOR COARSE AGGREGATES

SIEVE SIZE (Square Mesh)	**PERCENT RETAINED (By Weight)**
2-1/2”	0%
2”	0% - 20%
1-1/2”	15% - 50%
3/4"	60% - 80%
No. 4	95% - 100%

END OF SECTION

CONTROL OF GROUND AND SURFACE WATER

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Dewatering, depressurizing, draining, and maintaining trenches, shaft excavations, structural excavations and foundation beds in stable condition, and controlling ground water conditions for tunnel excavations.
B. Protecting work against surface runoff and rising floodwaters.
C. Trapping suspended sediment in the discharge from the surface and ground water control systems.

1.3 REFERENCES

A. ASTM – American Society for Testing and Materials.
   1. ASTM D698 – Standard Test Methods for Laboratory Compaction of Soils Using Standard Effort (12,400 ft-lbf/ft^3 (600kN-m/m^3).
B. CFSWMP – City of Friendswood Storm Water Management Plan manual.
C. Federal Regulations.
   1. Federal Regulation 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
D. TCEQ – Texas Commission on Environmental Quality.
E. TWWDA – Texas Water Well Drillers Association.

1.4 DEFINITIONS

A. Ground water control system: system used to dewater and depressurize water-bearing soil layers.
   1. Dewatering: Lowering the water table and intercepting seepage that would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts; and disposing of removed water. Intent of dewatering is to increase stability of tunnel excavations and excavated slopes, prevent dislocation of material from slopes or bottoms of excavations, reduce lateral loads on sheeting and bracing, improve excavating and hauling characteristics of excavated material, prevent failure or heaving of bottom of excavations, and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.
   2. Depressurization: Includes reduction in piezometric pressure within strata not controlled by dewatering alone, necessary to prevent failure or heaving of excavation bottom or instability of tunnel excavations.
B. Excavation drainage: Includes keeping excavations free of surface and seepage water.
C. Surface drainage: Includes use of temporary drainage ditches and dikes

and installation of temporary culverts and sump pumps with discharge lines necessary to protect Work from any source of surface water.

D. Monitoring facilities for ground water control system: Includes piezometers, monitoring wells and flow meters for observing and recording flow rates.

1.5 PERFORMANCE REQUIREMENTS

A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems. Submit proposed method and spacing of readings for review prior to obtaining water level readings.

B. Design ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 to produce following results:
   1. Effectively reduce hydrostatic pressure affecting:
      a. Excavations.
      b. Tunnel excavation, face stability or seepage into tunnels.
   2. Develop substantially dry and stable subgrade for subsequent construction operations.
   3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities and other work.
   4. Prevent loss of fines, seepage, boils, quick condition, or softening of foundation strata.
   5. Maintain stability of sides and bottom of excavations.

C. Provide ground water control systems that include single-stage or multiple-stage well point systems, eductor and ejector-type systems, deep wells, or combinations of these equipment types.

D. Provide drainage of seepage water and surface water, as well as water from other sources entering excavation. Excavation drainage may include placement of drainage materials, crushed stone and filter fabric, together with sump pumping.

E. Provide ditches, berms, pumps and other methods necessary to divert and drain surface water from excavation and other work areas.

F. Locate ground water control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.

G. Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, adjacent water wells, or potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of system to protect property as required.

H. Install an adequate number of piezometers installed at proper locations and depths, necessary to provide meaningful observations of conditions

affecting excavation, adjacent structures and water wells.

I. Install environmental monitoring wells at proper locations and depths necessary to provide adequate observations of hydrostatic conditions and possible contaminant transport from contamination sources into work area or ground water control system.

1.6 SUBMITTALS

A. Submit Ground Water and Surface Water Control Plan for review by the Project Manager prior to start of excavation work. Include the following:
   1. Results of subsurface investigations and description of extent and characteristics of water bearing layers subject to ground water control.
   2. Names of equipment Suppliers and installation Subcontractors.
   3. Description of proposed ground water control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria and operation and maintenance procedures.
   4. Description of proposed monitoring facilities indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics.
   5. Description of proposed filters including types, sizes, capacities and manufacturer's application recommendations.
   6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.
   7. Operating requirements, including piezometric control elevations for dewatering and depressurization.
   8. Excavation drainage methods including typical drainage layers, sump pump application and other means.
   9. Surface water control and drainage installations.
   10. Proposed methods and locations for disposing of removed water.

B. Submit following records upon completion of initial installation:
   1. Installation and development reports for well points, eductors, and deep wells.
   2. Installation reports and baseline readings for piezometers and monitoring wells.
   3. Baseline analytical test data of water from monitoring wells.
   4. Initial flow rates.

C. Submit the following records weekly during control of ground and surface water operations:
   1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Refer to Paragraph 3.2, Requirements for Eductor, Well Points, or Deep Wells.

2. Maintenance records for ground water control installations, piezometers and monitoring wells.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of agencies having jurisdiction.
B. Comply with Texas Commission on Environmental Quality (TCEQ) regulations and Texas Water Well Drillers Association for development, drilling, and abandonment of wells used in dewatering system.
C. Obtain necessary permits from agencies with jurisdiction over use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Since review and permitting process may be lengthy, take early action to obtain required approvals.
D. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites.

PART II: PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Select equipment and materials necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review by the Project Manager.
B. Use experienced contractors, regularly engaged in ground water control system design, installation, and operation, to furnish and install and operate eductors, well points, or deep wells, when needed.
C. Maintain equipment in good repair and operating condition.
D. Keep sufficient standby equipment and materials available to ensure continuous operation, where required.
E. Portable Sediment Tank System: Standard fifty-five gallon (55 Gal) steel or plastic drums, free of hazardous material contamination.
   1. Shop or field fabricate tanks in series with main inlet pipe, inter-tank pipes and discharge pipes, using quantities sufficient to collect sediments from discharge water.

PART III: EXECUTION

3.1 GROUND WATER CONTROL

A. Perform necessary subsurface investigation to identify water bearing layers, piezometric pressures and soil parameters for design and installation of ground water control systems. Perform pump tests, if necessary to determine draw down characteristics. Present results in the Ground Water and Surface Water Control Plan submittal.
B. Provide labor, material, equipment, techniques and methods to lower, control and handle ground water in manner compatible with construction methods and site conditions. Monitor effectiveness of installed system and its effect on adjacent property.

C. Install, operate, and maintain ground water control systems in accordance with the Ground Water and Surface Water Control Plan. Notify the Project Manager in writing of changes made to accommodate field conditions and changes to Work. Provide revised drawings and calculations with notification.

D. Provide continuous system operation, including nights, weekends, and holidays. Arrange appropriate backup if electrical power is primary energy source for dewatering system.

E. Monitor operations to verify systems lower ground water piezometric levels at rate required to maintain dry excavation resulting in stable subgrade for subsequent construction operations.

F. Depressurize zones where hydrostatic pressures in confined water bearing layers exist below excavations to eliminate risk of uplift or other instability of excavation or installed works. Define allowable piezometric elevations in the Ground Water and Surface Water Control Plan.

G. Removal of ground water control installations.
   1. Remove pumping system components and piping when ground water control is no longer required.
   2. Remove piezometers, including piezometers installed during design phase investigations and left for the Contractor's use, upon completion of testing, as required in accordance with Part III of applicable specification.
   3. Remove monitoring wells when directed by the Project Manager.
   4. Grout abandoned well and piezometer holes. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.

H. During backfilling, maintain water level a minimum of five feet (5 Ft) below prevailing level of backfill. Do not allow the water level to cause uplift pressures in excess of eighty percent (80%) of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement-stabilized sand until at least forty-eight hours (48 Hrs) after placement.

I. Provide uniform pipe diameter for each pipe drain run constructed for dewatering. Remove pipe drains when no longer required. If pipe removal is impractical, grout connections at fifty foot (50 Ft) intervals and fill pipe with cement-bentonite grout or cement-sand grout after removal from service.

J. The extent of ground water control for structures with permanent perforated underground drainage systems may be reduced, for units designed to withstand hydrostatic uplift pressure. Provide a means to drain affected portions of underground systems, including standby equipment. Maintain drainage systems during construction operations.

K. Remove systems upon completion of construction or when dewatering and control of surface or ground water is no longer required.

L. Compact backfill to not less than ninety-five percent (95%) of maximum dry density in accordance with ASTM D698.

M. Foundation Slab: Maintain saturation line at least three feet (3 Ft) below lowest elevations where concrete is to be placed. Drain foundations in

areas where concrete is to be placed before placing reinforcing steel. Keep free from water for three days (3 D) after concrete is placed.

3.2 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS

A. For aboveground piping in ground water control system, include a twelve inch (12 In) minimum length of clear, transparent piping between each eductor well or well point and discharge header to allow visual monitoring of discharge from each installation.

B. Install sufficient piezometers or monitoring wells to show that trench or shaft excavations in water bearing materials are pre-drained prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for selected method of work.

C. Install piezometers or monitoring wells at least one week (1 Wk) in advance of the start of associated excavation.

D. Dewatering may be omitted for portions of under drains or other excavations, where auger borings and piezometers or monitoring wells show that soil is pre-drained by existing systems and that ground water control plan criteria are satisfied.

E. Replace installations that produce noticeable amounts of sediments after development.

F. Provide additional ground water control installations, or change method of control if, ground water control plan does not provide satisfactory results based on performance criteria defined by plan and by specifications. Submit revised plan according to Paragraph 1.6.B.

3.3 SEDIMENT TRAPS

A. Install sediment tank as shown on approved plan.

B. Inspect daily and clean out tank when one-third (1/3) of sediment tank is filled with sediment.

3.4 SEDIMENT SUMP PIT

A. Install sediment sump pits as shown on approved plan.

B. Construct standpipe by perforating twelve inch (12 In) to twenty-four inch (24 In) diameter corrugated metal or PVC pipe.

C. Extend standpipe twelve inches (12 In) to eighteen inches (18 In) above lip of pit.

D. Convey discharge of water pumped from standpipe to sediment trapping device.

E. Fill sites of sump pits, compact to density of surrounding soil and stabilize surface when construction is complete.

3.5 EXCAVATION DRAINAGE

A. Use excavation drainage methods if well-drained conditions can be achieved. Excavation drainage may consist of layers of crushed stone and filter fabric, and sump pumping, in combination with sufficient ground water control wells to maintain stable excavation and backfill conditions.

3.6 MAINTENANCE AND OBSERVATION

A. Conduct daily maintenance and observation of piezometers or monitoring wells while ground water control installations or excavation drainage is operating at the site, or water is seeping into tunnels, and maintain systems in good operating condition.

B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedules.

C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make specified observations.

D. Remove and grout piezometers inside or outside of excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by the Project Manager.

3.7 MONITORING AND RECORDING

A. Monitor and record average flow rate of operation for each deep well, or for each wellpoint or eductor header used in dewatering system. Also, monitor and record water level and ground water recovery. Record observations daily until steady conditions are achieved and twice weekly thereafter.

B. Observe and record elevation of water level daily as long as ground water control system is in operation, and weekly thereafter until Work is completed or piezometers or wells are removed, except when the Project Manager determines more frequent monitoring and recording are required. Comply with the Project Manager's direction for increased monitoring and recording and take measures necessary to ensure effective dewatering for intended purpose.

3.8 SURFACE WATER CONTROL

A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. Requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.

B. Divert surface water and seepage water into sumps and pump it into drainage channels or storm drains, when approved by agencies having jurisdiction. Provide settling basins when required by agencies.

END OF SECTION

SECTION 01040SP

CONTROL OF GROUND AND SURFACE WATER

The following Special Provision shall be added to Section 01040 – Control of Ground and Surface Water Standard Specification.

1.2 MEASUREMENT AND PAYMENT

A. UNIT PRICES

1. Subsurface investigation and groundwater control plan preparation and monitoring shall be incidental to the project and shall include subsurface investigation to identify groundwater conditions, design, install, operate, maintain, and monitor ground water control systems.

2. No separate payment will be made for control of ground water and surface water except for well pointing, piezometer and 24-inch transmission main. Include the cost to control ground water and surface water in unit price for work requiring such controls. Dewatering required to lower water table, for utility installation, construction of structures, removal of standing water, surface drainage seepage, or to protect against rising waters or floods shall be considered incidental to work.

3. Follow Section 01015 – Measurement and Payment for unit price procedures.

END OF SPECIAL PROVISION

STORM WATER POLLUTION CONTROL

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Implementation of Storm Water Pollution Prevention Plans (SW3P) described in Section 01055 -TPDES Requirement.

B. Installation and maintenance of storm-water pollution prevention structures: diversion dikes, interceptor dikes, diversion swales, interceptor swales, down spout extenders, pipe slope drains, paved flumes and level spreaders. Structures are used during construction and prior to final development of the site.

C. Filter Fabric Fences:
   1. Type 1: Temporary filter fabric fences for erosion and sediment control in non-channelized flow areas.
   2. Type 2: Temporary reinforced filter fabric fences for erosion and sediment control in channelized flow areas.

D. Straw Bale Fence.

1.2 REFERENCE STANDARDS

A. ASTM – American Society for Testing and Materials.
   1. A36 – Standard Specification for Carbon Structural Steel.
   2. D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
   3. D3786 – Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Nonwoven Fabrics.
   4. D4355 – Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
   5. D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
   6. D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
   7. D4833 – Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
   8. D6382 – Standard Practice for Dynamic Mechanical Analysis and Thermogravimetry of Roofing and Waterproofing Membrane Material.

B. City of Friendswood Storm Water Management Plan manual.

1.3 SYSTEM DESCRIPTIONS

A. Filter Fabric Fence Type 1 and Type 2: Install to allow surface or channel runoff percolation through fabric in sheet-flow manner and to retain and accumulate sediment. Maintain Filter Fabric Fences to remain in proper position and configuration at all times.

B. Straw Bale Fence: Install to allow surface runoff percolation through straw in sheet-flow manner and to retain and accumulate sediment. Maintain Straw Bale Fence to remain in proper position and configuration at all times.

C. Interceptor Dikes and Swales: Construct to direct surface or channel runoff around the project area or runoff from the project area into sediment traps.

D. Drop Inlet Baskets: Install to allow runoff percolation through the basket and to retain and accumulate sediment. Clean accumulation of sediment to prevent clogging and backups.

E. Sediment traps: Construct to pool surface runoff from construction area to allow sediment to settle onto the bottom of trap.

1.4 SUBMITTALS

A. Submit manufacturer's literature for product specifications and installation instructions.

B. Submit manufacturers catalog sheets and other product data on geotextile or filter fabrics, outlet pipe, perforated riser and connectors.

C. Submit proposed methods, equipment, materials, and sequence of operations for storm-water pollution prevention structures.

D. Submit shop drawings for Drop Inlet Baskets.

PART II: PRODUCTS

2.1 AGREGATE MATERIALS

A. Use poorly graded cobbles with diameter greater than three inches (3 In) and less than five inches (5 In).

B. Provide clean cobbles and gravel consisting of crushed concrete or stone. Use clean, hard crushed concrete or stone free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic matter.

C. Sediment Pump Pit Aggregate: Use nominal two inch (2 In) diameter river gravel.

2.2 PIPE

A. Polyethylene culvert pipe or PVC sewer pipe in accordance with Section 02220 – High Density Polyethylene (HDPE) Solid and Profile Wall Pipe and Section 02235 – Polyvinyl Chloride Pipe (PVC) or as shown on the Drawings.

B. Inlet Pipes: Galvanized steel pipe in accordance with Section 02210 – Corrugated Metal Pipe (CMP) or as shown on the Drawings.

C. Standpipe for Sediment Pump Pits: Galvanized round culvert pipe or

round PVC pipe, a minimum of twelve inch (12 In) and a maximum of twenty-four inch (24 In) diameter, perforate at six inch (6 In) to twelve inch (12 In) centers around circumference.

2.3 GEOTEXTILE FILTER FABRIC

A. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.

B. Grab Strength: one hundred pounds per square inch (100 psi) in any principal direction (ASTM D4632), Mullen burst strength > two hundred pounds per square inch (200 psi) (ASTM D3786), and equivalent opening size between fifty millimeters (50 mm) and one hundred forty millimeters (140 mm).

C. Furnish ultraviolet inhibitors and stabilizers for a minimum six months (6 Mos) of expected usable construction life at temperature range of zero degrees Fahrenheit (0° F) to one hundred twenty degrees Fahrenheit (120° F).

D. Mirafi, Inc., Synthetic Industries, or equivalent.

2.4 FENCING

A. Wire Fencing: Woven galvanized steel wire, fourteen (14) gauge by six inch (6 In) square mesh spacing, a minimum twenty-four inch (24 In) roll or sheet width of longest practical length.

B. Fence Stakes: Nominal two inch by two inch (2 In x 2 In) moisture-resistant treated wood or steel posts [min. of one and one-quarter pounds per linear foot (1.25 Lbs/Lf) and Brinell Hardness greater than one hundred forty (140)] with safety caps on top; length as required for a minimum eight inch (8 In) bury and full height of filter fabric.

2.5 DROP INLET BASKET

A. Provide steel frame members in accordance with ASTM A36.

B. Construct top frame of basket with two (2) short sides of two inch by two inch (2 In x 2 In) and single long side of one inch by one inch (1 In x 1 In), one-eighth inch (1/8 In) angle iron. Construct basket hangers of two inch by one-quarter inch (2 In x 1/4 In) iron bars. Construct bottom frame of one inch by one-quarter inch (1 In x 1/4 In) iron bar or one- quarter inch (1/4 In) plate with center three inches (3 In) removed. Use a minimum one-quarter inch (1/4 In) diameter iron rods or equivalent for sides of inlet basket. Weld a minimum of fourteen (14) rods in place between top frame/basket hanger and bottom frame. Exact dimensions for top frame and insert basket shall be determined based on dimensions of type of inlet being protected.

2.6 STRAW BALE

A. Straw: Standard-baled agricultural hay bound by wire, nylon, or polypropylene rope. Do not use jute or cotton binding.

B. Straw Bale Stakes (applicable where bales are on soil): No. 3 (3/8 inch

diameter) reinforcing bars, deformed or smooth at Contractor's option, length as required for a minimum eighteen inch (18 In) bury and full height bales.

PART III: EXECUTION

3.1 PREPARATION, INSTALLATION AND MAINTAINANCE

A. Do not clear, grub or rough cut until erosion and sediment control systems are in place unless approved by the Project Manger to allow installation of erosion and sediment control systems, soil testing and surveying.

B. Maintain existing erosion and sediment control systems located within the project site until acceptance of the Project or until directed by the Project Manger to remove and discard existing system.

C. Regularly inspect and repair or replace damaged components of erosion and sediment control structures. Unless otherwise directed, maintain erosion and sediment control structure until the project area stabilization is accepted. Redress and replace granular fill at outlets as needed to replenish depleted granular fill. Remove erosion and sediment control structures promptly when directed by the Project Manger.

D. Remove and dispose sediment deposits at the designated spoil site for the Project.

E. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated right of way and easements for construction. Immediately repair damage caused by construction traffic to erosion and sediment control structures.

3.2 SEDIMENT TRAPS

A. Install sediment traps so that surface runoff shall percolate through system in sheet flow fashion and allow retention and accumulation of sediment.

B. Inspect sediment traps after each rainfall, daily during periods of prolonged rainfall, and at a minimum once each week. Repair or replace damaged sections immediately.

C. Use fill material for embankment.

D. Excavation length and height shall be as specified on the Drawings. Use side slopes of two to one (2:1) or flatter.

E. Stone outlet sediment traps:

1. Maintain a minimum of six inches (6 In) between top of core material and top of stone outlet, a minimum of four inches (4 In) between bottom of core material and existing ground and a minimum of one foot (1 Ft) between top of stone outlet and top of embankment.
2. Embed cobbles a minimum of four inches (4 In) into existing ground for stone outlet. Core shall be a minimum of one foot (1 Ft) in height and in width and wrapped in triple layer of geotextile filter fabric.

F. Sediment Basin with Pipe Outlet Construction Methods: Install outlet pipe and riser as shown on the Drawings.
G. Remove sediment deposits when design basin volume is reduced by one-third (1/3) or sediment level is one foot (1 Ft) below principal spillway crest, whichever is less.

3.3 FILTER FABRIC FENCE CONSTRUCTION METHODS.
A. Fence Type 1:
1. Install stakes three feet (3 Ft) on center maximum and firmly embed a minimum eight inches (8 In) in soil. If filter fabric is factory preassembled with support netting, then maximum support spacing is eight feet (8 Ft). Install wood stakes at a slight angle toward the source of anticipated runoff.
2. Trench in the toe of the fence lines so the downward face of the trenches is flat and perpendicular to direction of flow. V-trench configuration as shown on the Drawings may also be used.
3. Lay fabric along edges of trenches in longest practical continuous runs to minimize joints. Make joints only at a support post. Splice with a minimum six inch (6 In) overlap and seal securely.
4. Staple filter fabric to stakes at maximum three inches (3 In) on center. Extend fabric a minimum eighteen inches (18 In) and a maximum thirty-six inches (36 In) above natural ground.
5. Backfill and compact trench.

B. Fence Type 2:
1. Layout fence same as for Type 1.
2. Install stakes at six feet (6 Ft) on center maximum and at each joint in wire fence, firmly embedded one foot (1 Ft) minimum, and inclined it as for Type 1.
3. Tie wire fence to stakes with wire at six inches (6 In) on center maximum. Overlap joints a minimum one (1) bay of mesh.
4. install trench same as for Type 1.
5. Fasten filter fabric wire fence with tie wires at three inches (3 In) on center maximum.
6. Layout fabric same as for Type 1. Fasten to wire fence with wire ties at three inches (3 In) on center maximum and, if applicable, to stakes above top of wire fence it as for Type 1.
7. Backfill and compact trench.

C. Attach filter fabric to wooden fence stakes spaced a maximum of six feet (6 Ft) apart or steel fence stakes spaced a maximum of eight feet (8 Ft) apart and embedded a minimum of twelve inches (12 In). Install stakes at a slight angle toward source of anticipated runoff.
D. Trench in toe of filter fabric fence with spade or mechanical trencher so that downward face of trench is flat and perpendicular to direction of flow. A V-trench configuration may also be used. Lay filter fabric along edges of trench. Backfill and compact trench upon completion of Construction.
E. Filter fabric fence shall have a minimum height of eighteen inches (18 In)

and a maximum height of thirty-six inches (36 In) above natural ground.

F. Cut length of fence to minimize use of joints. When joints are necessary, splice fabric together only at support post with a minimum six inch (6 In) overlap and seal securely.

G. Triangular Filter Fabric Fence Construction Methods:
   1. Attach filter fabric to wire fencing, eighteen inches (18 In) on each side. Provide a fabric cover and skirt with continuous wrapping of fabric. Skirt should form continuous extension of fabric on upstream side of fence.
   2. Secure triangular fabric filter fence in place using one (1) of the following methods:
      a. Toe-in skirt six inches (6 In) with mechanically compacted material;
      b. Weight down skirt with continuous layer of three inch (3 In) to five inch (5 In) graded rock; or
      c. Trench-in entire structure four inches (4 In).
   3. Anchor triangular fabric filter fence structure and skirt securely in place using six inch (6 In) wire staples on two foot (2 Ft) centers on both edges and on skirt, or staked using eighteen inch (18 In) by three-eighths inch (3/8 In) diameter re-bar with tee ends.
   4. Lap fabric filter material by six inches (6 In) to cover segment joints. Fasten joints with galvanized shoat rings.

H. Reinforced Filter Fabric Barrier Construction Methods
   1. Attach woven wire fence to fence stakes.
   2. Securely fasten filter fabric material to wire fence with tie wires.
   3. When used in swales, ditches or diversions, elevation of barrier at top of filter fabric at flow line location in channel shall be lower than bottom elevation of filter fabric at ends of barrier or top of bank, whichever is less, in order to keep storm water discharge in channel from overtopping bank.
   4. Remove sediment deposits when silt reaches depth one-third (1/3) height of barrier or six inches (6 In), whichever is less.

3.4 DIKE AND SWALE

A. Unless otherwise indicated, maintain a minimum dike height of eighteen inches (18 In), measured from cleared ground at up slope toe to top of dike. Maintain side slopes of two to one (2:1) or flatter.

B. Dike and Swale Stabilization: When shown on the Drawings, place gravel lining three inches (3 In) thick and compacted into the soil or six inches (6 In) thick if truck crossing is expected. Extend gravel lining across bottom and up both sides of swale a minimum height of eight inches (8 In) vertically, above bottom. Gravel lining on dike side shall extend up the up slope side of dike a minimum height of eight inches (8 In), measured vertically from interface of existing or graded ground and up slope toe of dike, as shown on the Drawings.

C. Divert flow from dikes and swales to sediment basins, stabilized outlets, or sediment trapping devices of types and at locations shown on the

Drawings. Grade dikes and swales as shown on the Drawings, or, if not specified, provide positive drainage with a maximum grade of one percent (1%) to outlet or basin.

D. Carry out excavation for swale construction so that erosion and water pollution is minimal. A minimum depth shall be one foot (1 Ft) and bottom width shall be four feet (4 Ft), with level swale bottom. Excavation slopes shall be two to one (2:1) or flatter. Clear, grub and strip excavation area of vegetation and root material.

3.5 DOWN SPOUT EXTENDER

A. Down spout extender shall have slope of approximately one percent (1%). Use pipe diameter of four inches (4 In) or as shown on the Drawings.

3.6 PIPE SLOPE DRAIN

A. Compact soil around and under drain entrance section to top of embankment in lifts appropriately sized for method of compaction utilized.

B. Inlet pipe shall have slope of one percent (1%) or greater. Use pipe diameter as shown on the Drawings.

C. Top of embankment over inlet pipe and embankments directing water to pipe shall be at least one foot (1 Ft) higher at all points than top of inlet pipe.

D. Pipe shall be secured with hold-down grommets spaced ten feet (10 Ft) on centers.

E. Place riprap apron with a depth equal to pipe diameter with two to one (2:1) side slopes.

3.7 PAVED FLUME

A. Compact soil around and under the entrance section to top of the embankment in lifts appropriately sized for method of compaction utilized.

B. Construct subgrade to required elevations. Remove and replace soft sections and unsuitable material. Compact subgrade thoroughly and shape to a smooth, uniform surface.

C. Construct permanent paved flumes in accordance with the Drawings.

D. Remove sediment from riprap apron when sediment has accumulated to depth of one foot (1 Ft).

3.8 LEVEL SPREADER

A. Construct level spreader on undisturbed soil and not on fill. Ensure that spreader lip is level for uniform spreading of storm runoff.

B. Maintain at required depth, grade, and cross section as specified on the Drawings. Remove sediment deposits as well as projections or other irregularities which shall impede normal flow.

3.9 INLET PROTECTION BARRIER

A. Place sandbags and filter fabric fences at locations shown on the SW3P.

3.10 DROP INLET BASKET CONSTRUCTION METHODS

A. Fit inlet insert basket into inlet without gaps around insert at locations shown on the SW3P.
B. Support for inlet insert basket shall consist of fabricated metal as shown on the Drawings.
C. Push down and form filter fabric to shape of basket. Use sheet of fabric large enough to be supported by basket frame when holding sediment and extend at least six inches (6 In) past frame. Place inlet grates over basket/frame to serve as fabric anchor.
D. Remove sediment deposit after each storm event and whenever accumulation exceeds one inch (1 In) depth during weekly inspections.

3.11 STRAW BALE FENCE CONSTRUCTION METHODS

A. Place bales in row with ends tightly abutting adjacent bales. Place bales with bindings parallel to ground surface.
B. Embed bale in soil a minimum of four inches (4 In).
C. Securely anchor bales in place with Straw Bale Stakes driven through bales a minimum of eighteen inches (18 In) into ground. Angle first (1st) stake in each bale toward previously laid bale to force bales together.
D. Fill gaps between bales with straw to prevent water from channeling between bales. Wedge carefully in order not to separate bales.
E. Replace with new straw bale fence every two months (2 Mos) or as required by the Project Manager.

3.12 BRUSH BERM CONSTRUCTION METHODS

A. Construct brush berm along contour lines by hand placing method. Do not use machine placement of brush berm.
B. Use woody brush and branches having diameter less than two inches (2 In) with six inches (6 In) overlap. Avoid incorporation of annual weeds and soil into brush berm.
C. Use a minimum height of eighteen inches (18 In) measured from top of existing ground at upslope toe to top of berm. Top width shall be twenty-four (24) inches minimum and side slopes shall be two to one (2:1) or flatter.
D. Embed brush berm into soil a minimum of four inches (4 In) and anchor using wire, nylon or polypropylene rope across berm with a minimum tension of fifty pounds (50 Lbs). Tie rope securely to eighteen inch (18 In) by three-eighths inch (3/8 In) diameter rebar stakes driven into ground on four foot (4 Ft) centers on both sides of berm.

3.13 STREET AND SIDEWALK CLEANING

A. Keep areas clean of construction debris and mud carried by construction vehicles and equipment. If necessary, install stabilized construction exits at construction, staging, storage, and disposal areas.

B. In lieu of or in addition to stabilized construction exits, shovel or sweep pavements as required to keep areas clean. Do not waterhose or sweep debris and mud off street into adjacent areas, except, hose sidewalks during off-peak hours, after sweeping.

3.14 WASTE COLLECTION AREAS

A. Prevent water runoff from passing through waste collection areas, and prevent water runoff from waste collection areas migrating outside collection areas.

3.15 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose, so fuels, lubricants, solvents, and other potential pollutants are not washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid and solid waste. Clean and inspect maintenance areas daily.

B. Where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.16 VEHICLE/EQUIPMENT WASHING AREAS

A. Install wash area (stabilized with coarse aggregate) adjacent to stabilized construction exit(s), as required to prevent mud and dirt run-off. Release wash water into drainage swales or inlets protected by erosion and sediment controls. Build wash areas and install gravel or rock base beneath wash areas.

B. Wash vehicles only at designated wash areas. Do not wash vehicles such as concrete delivery trucks or dump trucks and other construction equipment at locations where runoff flows directly into watercourses or storm water conveyance systems.

C. Locate wash areas to spread out and evaporate or infiltrate wash water directly into ground, or collect runoff in temporary holding or seepage basins.

3.17 WATER RUNOFF AND EROSION CONTROL

A. Control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties.

B. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas, and to direct drainage to proper runoff courses to prevent erosion, sedimentation or damage.

C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.

D. Dispose of drainage water to prevent flooding, erosion, or other damage to the site or adjoining areas. Follow environmental requirements.

E. Retain existing drainage patterns external to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as required to control conditions.
F. Plan and execute construction and earth work to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
    1. Hold area of bare soil exposed at one (1) time to a minimum.
    2. Provide temporary controls such as berms, dikes, and drains.
G. Construct fill and waste areas by selective placement to eliminate surface silts or clays which shall erode.
H. Inspect earthwork periodically to detect start of erosion. Immediately apply corrective measures as required to control erosion.
I. Dispose of sediments offsite, not in or adjacent to streams or floodplains, nor allow sediments to flush into streams or drainage ways. Assume responsibility for offsite disposal location.
J. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in a maximum of eight inch (8 In) layers. Provide compaction density at a minimum ninety-five percent (95%) Standard Proctor ASTM D698-78 density. Make at least one (1) test per five hundred cubic yards (500 Cy) of embankment.
K. Do not maneuver vehicles on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sedimentation control systems caused by construction traffic.
L. Do not damage existing trees intended to remain.

3.18 REMOVAL OF CONTROLS
A. Remove erosion and sediment controls when the site is finally stabilized or as directed by the Project Manager.

END OF SECTION

SWPPP INSPECTION FORM

City of Friendswood
Storm Water Pollution Prevention Plan
Construction Site Inspection Report

TPDES/EPA Permit Number: _____
COF Permit Number: _____
Date: _____

☐ No Exceptions noted.

If any of the following are checked they must be corrected prior to continuing work.

☐ Public Notice improperly posted.

☐ Initial Construction Site Inspection Report information requires updating.

☐ Copy of NOI not on site.

☐ Storm water pollution prevention plan not on site.

☐ Erosion and sediment controls improperly installed.

☐ Erosion and sediment controls improperly maintained.

☐ Fueling or washout areas not properly protected.

☐ Port-o-can or other sanitary facilities not properly protected.

☐ Self-inspection and maintenance records incomplete.

☐ Sediment from site outside area of construction.

☐ Other (see description below)

_____

_____

Once the above items have been corrected, call to arrange for re-inspection. No further inspections for any construction related activity shall be made until the above items have been corrected.

_____ _____
Inspector's Name Contractor's Name

_____ _____
Inspector's Signature Contractor's Signature

END OF DOCUMENT

TPDES REQUIREMENTS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the Texas Pollutant Discharge Elimination system (TPDES) Construction General Permit Number TXR-150000 latest version from TCEQ.

B. Implementation, maintenance inspection, and termination of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other appropriate practices shown on the Drawings or specified elsewhere in the Contract Documents.

C. Review of the Storm Water Pollution Prevention Plan (SWP3) implementation in a meeting with the Project Manager prior to start of construction.

1.2 DEFINITIONS

A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavating.

B. Large Construction Activity Project that:
   1. Disturbs five acres (5 Ac) or more, or
   2. disturbs less than five acres (5 Ac) but is part of a larger common plan of development that will disturb five acres (5 Ac) or more of land.

C. Small Construction Activity Project that:
   1. Disturbs one or more acres (1+ Ac) but less than five acres (5 Ac), or
   2. disturbs less than one acre (1 Ac) but is part of a larger common plan of development that will ultimately disturb one or more acres (1+ Ac) but less than five acres (5 Ac).

D. TPDES Operator:
   1. The person or persons who have day-to-day operational control of the construction activities which are necessary to ensure compliance with the SWP3 for the site or other Construction General Permit conditions.

1.3 REFERENCES

A. CFCO – City of Friendswood Code of Ordinances.
   1. Ordinance 2005-01.

C. TCEQ – Texas Commission on Environmental Quality.
   1. Texas Pollutant Discharge Elimination system (TPDES) Construction General Permit Number TXR-150000

PART II: PRODUCTS – NOT USED.

PARTIII: EXECUTION

3.1 SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWP3)

A. Prepare a SWP3 following Part III of the Construction General Permit in accordance with City Ordinance 2005-01.

B. Update or revise the SWP3 as needed during the construction following Part III, Section E of the Construction General Permit.

C. Submit the SWP3 and any updates or revisions to the Project Manager for review and address comments prior to commencing, or continuing, construction activities.

3.2 NOTICE OF INTENT (NOI) for Construction Activity

A. Submit a signed Notice of Intent (NOI) and fee electronically through the ePermitting system in STEERS at https://www3.tceq.texas.gov/steers/ unless you qualify for an electronic waiver.

B. Submission of the Notice of Intent form by both the City and the Contractor to TCEQ is required a minimum of two (2) days before Commencement of Construction Activities.

3.3 CONSTRUCTION SITE NOTICE FOR LARGE CONSTRUCTION ACTIVITY

A. Complete the Large Construction Site Notice, located at: https://www.tceq.texas.gov/assets/public/permitting/stormwater/txr15-large-primary.pdf

B. Transmit the signed Construction Site Notice to the Project Manager at least seven days (7 D) prior to Commencement of Construction Activity.

3.4 CONSTRUCTION SITE NOTICE FOR SMALL CONSTRUCTION ACTIVITY

A. Complete the Small Construction Site Notice, located at: https://www.tceq.texas.gov/assets/public/permitting/stormwater/txr15-small-site.pdf

B. Transmit the signed Construction Site Notice to the Project Manager at least seven days (7 D) prior to Commencement of Construction Activity.

3.5 INSPECTIONS

A. Conduct inspections in accordance with TCEQ requirements. An electronic version of the Inspection Report Template is available at: https://www.epa.gov/npdes/npdes-applications-and-forms-epa-forms.

3.6 RECORDS RETENTION

A. Keep a copy of this document and the SWP3 in a readily accessible location at the construction site from Commencement of Construction Activity until the submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR 150000). The Contractors with day-

to-day operational control over SWP3 implementation shall have a copy of the SWP3 available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SWP3. Upon submission of the NOT, submit all required forms and a copy of the SWP3 with all revisions to the Project Manager.

3.7 REQUIRED NOTICES

A. Post the following notices from the effective date of the SWP3 until the date of final site stabilization as defined in the Construction General Permit:
   1. Post the TPDES permit number for Large Construction Activity or a signed TCEQ Construction Site Notice for Small Construction Activity. Signed copies of the City's and the Contractor's NOI must also be posted.
   2. Post notices near the main entrance of the construction site in a prominent place for public viewing. Post name and telephone number of the Contractor's local contact person, brief project description and location of the SWP3.
      a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with the Project Manager to conform to requirements of the Construction General Permit.
      b. If the Project is a linear construction project (e.g.: road, utilities, etc.), post notice in a publicly accessible location near active construction. Move notice as necessary.

C. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction exit area.

D. Post a notice of waste disposal procedures in a readily visible location on site.

3.8 ON-SITE WASTE MATERIAL STORAGE

A. On-site waste material storage shall be self-contained and shall satisfy appropriate local, state, and federal rules and regulations.

B. Prepare list of waste material to be stored on-site. Update list as necessary to include up-to-date information. Keep a copy of updated list with the SWP3.

C. Prepare description of controls to reduce pollutants generated from on-site storage. Include storage practices necessary to minimize exposure of materials to storm water, and spill prevention and response measures consistent with best management practices. Keep a copy of the description with the SWP3.

3.9 NOTICE OF CHANGE (NOC) for Construction Activity

A. Submit a Notice of Change (NOC) electronically through the ePermitting system in STEERS at https://www3.tceq.texas.gov/steers/ within ten days (10 D) prior to the change in Operator status.

3.10 NOTICE OF TERMINATION (NOT) for Construction Activity

A. Submit a Notice of Termination (NOT) electronically through the ePermitting system in STEERS at https://www3.tceq.texas.gov/steers/ within thirty (30 D) after:.

1. Final stabilization has been achieved on all portions of the site that are the responsibility of the Contractor; or
2. Another operator has assumed control over all areas of the site that have not been stabilized; and
3. All silt fences and other temporary erosion controls have been removed, scheduled to be removed as defined in the SWP3, or transferred to a new operator if the new operator has sought permit coverage.

B. The Project Manager shall complete the City's NOT and submit the Contractors and the City's notices to the TCEQ and MS4 entities.

END OF DOCUMENT

PROJECT SIGNAGE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Requirements for furnishing, fabricating and installing non-reflectorized plywood project signs.
- B. Requirements for furnishing, fabricating and installing various interior and exterior aluminum and plastic signs.
- C. Installation of aluminum reflectorized street signage.
- D. Commemorative Plaques.

1.2 PAYMENT AND MEASUREMENT
- A. Unit Prices:
  1. Payment for Project Signs shall be per each sign, which shall be full compensation for sign blanks, fabrication of the sign, signposts, all mounting hardware, washing, cleaning, repairing, all incidentals needed to furnish, fabricate and erect sign, and removal of the sign.
  2. Payment for signage in buildings shall be on an allowance basis.

B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. APA – The Engineered Wood Association.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM A 153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  2. ASTM A 307 – Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  3. ASTM B 209 – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
  4. ASTM B 449 – Standard Specification for Chromates on Aluminum.
  5. ASTM B 695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
  6. ASTM D 4956 – Standard Specification for Retroreflective Sheeting for Traffic Control.
- C. Canadian Council of Forest Industries (COFI).
- E. TxDOT – Texas Department of Transportation.
  1. Compliant Work Zone Traffic Control Devices (CWZTCD), latest edition.
  2. Department of Materials Specification DMS-7100 Plywood Sign Blanks.

3. Department of Materials Specification DMS-7110 Aluminum Sign Blanks.
4. Department of Materials Specification DMS-8300 Sigh Face Materials.
5. Standard Specifications for Construction of Highways, Streets and Bridges Item 634 – Plywood signs (Type A).
6. Standard Specifications for Construction of Highways, Streets and Bridges Item 636 – Aluminum Signs (Type A).
7. Texas Manual on Uniform Traffic Control Devices (TMUTCD), Latest Edition.

F. U.S. Product Standards PS – 1.

1.4 SUBMITTALS

A. Submit manufacturers' product data for following items for approval for each type of signage specified in this Section.
B. Submit shop drawings and proofs for Interior and Exterior signage and Commemorative Plaque.
C. Submit manufacturer's certification that all signage meets requirements in this Specification.

PART II: PRODUCTS

2.1 PLYWOOD SIGN BLANKS

A. Plywood signs shall conform to Item 634 of the "Texas Department of Transportation Standard Specifications for Construction of Highways, Streets and Bridges" ("TxDOT") and TxDOT Department of Materials Specification DMS-7100.
B. Plywood blanks shall be five-eighths (5/8) inch thick. Plywood shall be smooth, weather-resistant, of one (1) piece construction and free of scarf or finger joints.
C. Plywood shall bear legible grade markings of APA – The Engineered Wood Association or the Canadian Council of Forest Industries (COFI) and shall meet the following requirements:
    1. Use plywood that is natural in color or the color approved by the Project Manager.
    2. Classification of Species shall be a group one (1) species classification.
    3. Exposure Durability Classification shall be for exterior.
    4. Use Grade B or better for face and back veneers.
    5. Inner plies shall be:
        a. Grade B jointed or
        b. Grade C plugged jointed
    6. Inner ply gaps:
        a. Do not exceed three-eighths (3/8) inch for any gaps between adjacent pieces of jointed inner ply and do not exceed three-sixteenths (3/16) inch for average of all

gaps in a panel.

b. Do not exceed four (4) core gaps and edge splits per eight (8) feet of cross-band layer.

7. Use overlay sheets on both sides of the plywood panel of high density material that meets or exceeds the latest revision of U.S. Product Standards PS – 1.
8. Plywood shall maintain a flatness that shall not deviate from a plane surface by more that two (2) inches.
9. Sign blanks shall be of one continuous piece of plywood and shall not be spliced.
10. Plywood blanks shall be used for Temporary or Construction Traffic Signage only.

2.2 ALUMINUM SIGN BLANKS

A. Aluminum sheet or coil sign blanks shall meet all requirements of TxDOT Standards Specification Item 635, TxDOT DMS-7110 Aluminum Sign Blanks and ASTM B 209, Alloys 6061-T-6 or 5052-H38.
B. Sign blanks made from sheet or coil shall be free of buckles, warps, dents, cockles, burrs and other defects an must be a plane surface. Sign blank thickness shall be eight-hundredths (0.08) inch.
C. Treat all sign blanks fabricated from sheet and coil with a chromate chemical process resulting in a coating meeting the requirements of ASTM B 449, Class 2. The coating shall be light colored, tight and free from powdery residues.
D. Manufacturer shall furnish mill test reports for aluminum sheet or coil which reflect the chemical and physical properties of the aluminum.

2.3 SIGN MOUNTING HARDWARE AND ADHESIVES

A. All material for sign posts and mounting hardware shall be galvanized steel and be in compliance with ASTM A307, ASTM A153 and ASTM B695.
B. Sign posts shall be galvanized steel two and three-eighths (2-3/8) inch outside diameter.
C. Sign Post mounting shall be “Pos-Lok” or equal system consisting of sixteen (16) inch sleeve and removable wedge.
D. Pipe and post clamp castings and miscellaneous fasteners shall be verified by manufacturer’s certifications stating that the material meets all applicable requirements.
E. Interior signage shall either use fasteners or bound adhesive to fasten sign to the wall.
F. Exterior signage and plaque shall have studs on back of signage and use either cement or bonding agent.

2.4 FACE MATERIALS

A. All materials are to be certified by lot or shipment that material supplied meets requirements listed in this Specifications. Material shall also

comply with ASTM D4956 and TxDOT DMS 8300.

B. Sign face materials shall be processed, applied and stored according to the manufacturer's recommendations. Sign face materials shall perform for a minimum of ten (10) years.

C. The Project Manager shall reject any sign and/or face material for the following reasons:
   1. Cracks discernible with the unaided eye from the driver's position while in an outside lane at a distance of fifty (50) feet or greater from the sign;
   2. Peeling in excess of one-quarter (1/4) inch;
   3. Shrinkage in excess of one-eighth (1/8) inch total per forty-eight (48) inches of sheeting width
   4. Fading or loss of color to the extent that color fails to meet the requirements of ASTM D 4956 or TxDOT DMS 8300;
   5. In non-construction zone – loss of reflectivity to a level eighty (80) percent of the minimum values as specified in ASTM D 4956;
   6. In construction zone – loss of reflectivity to a level sixty (60) percent of the minimum values as specified in ASTM D 4956; or
   7. Consist of pressure activated material of diamond or prismatic vinyl.

D. Any sign face that does not conform to this Section shall be rejected, and the Contractor shall replace it with no additional cost to the City.

2.5 INTERIOR BUIILDING SIGNAGE

A. All interior signs shall be made of intergraded photo-etched plastic, with letters either raised or etched. All interior signage shall be ADA compliant and shall include at the bottom of the sign Grade 2 Braille raised one-thirty-seconds (1/32) inch.

2.6 EXTERIOR BUILDING SIGNAGE

A. Raised lettering and numbers on the exterior of buildings shall be of the type and size shown in the Drawings and approved by the Project Manager.

B. Acceptable sign materials shall be one (1) of the following:
   1. Anodized Aluminum, satin finish.
      a. Color shall be either clear satin or;
      b. Medium Bronze or;
      c. Dark Bronze
   2. Bronze finish
      a. Color shall be either natural satin or;
      b. Oxidized Bronze or;
      c. Dark Oxidized
   3. Plastic or Acrylic
      a. Color shall compliment the building finish and to be selected by the City.

2.7 PROJECT SIGN

A. Projects signs shall use materials as stated in paragraphs 2.1 and 2.4. Signs using non-reflective facing shall be in conformance with the City's Sign Ordinance. Sign post shall be painted non-reflective white.

B. Project sign shall have the following information:
   1. City of Friendswood Seal
   2. Words "City of Friendswood"
   3. Project Name
   4. Design Professional Name and address
   5. Contractor Name, address and phone number
   6. Name of Mayor, City Council and City Manager
   7. City contact information

C. Proof shall be approved by the Project Manager before sign is made. If the Contractor has the sign made without the approval of the Project Manager, the Contractor shall replace at no additional cost to the City. See Figure 4.1 of this Section for typical project sign.

2.8 COMMEMORATIVE PLAQUE

A. Commemorative plaques shall be made of either brass or bronze. Finish shall be either dark oxidized or light oxidized. Lettering shall have satin finish.

B. Commemorative plaque shall be either eighteen (18) inches wide by twenty-four (24) inches tall, or twenty-four (24) inches wide by eighteen (18) inches tall.

C. Commemorative plaque shall have the following information:
   1. City of Friendswood Seal
   2. Words "City of Friendswood"
   3. Project Name
   4. Name of Mayor, City Council and City Manager at the time that the Project was funded and approved for construction.
   5. Year the construction was completed.
   6. Optional emblem of Sponsor Department.

2.9 TEMPORARY SIGN POSTS

A. Sign posts shall be either:

1. Four (4) inch by four (4) inch Pressure Treated Lumber. Sign posts shall be painted non-reflective white. Timber post shall be used for temporary construction and temporary projects signs only, no exceptions.
2. One and seven-eighths square galvanized metal tubing (SGMT), with seven-sixteenths (7/16) holes punched on one (1) inch centers. SGMT and mounting shall conform to the TxDOT Construction Work Zone Traffic Control Devices (CWTZTD). This sign post shall be used for temporary construction signs only, no exceptions.

B. Posts shall be installed as specified in Paragraph 3.2.A.2.a or other method approved by the Project Manager.

PART III: EXECUTION

3.1 GENERAL

A. Installation of signs shall be in compliance with current City of Friendswood Sign Ordinance.

B. All signs shall be installed at the locations directed by the Project Manager.

3.2 TRAFFIC SIGNS

A. All traffic signs, whether permanent or temporary, and their installation shall be accordance with the latest edition of the “Texas Manual on Construction Traffic Control Devices” (TMUTCD), and “Construction Work Zone Traffic Control Devices” (CWZTCD).

1. Permanent Signs
   a. Permanent traffic sign posts mounting device shall be set a minimum of two (2) foot – six (6) inches in depth in a twelve (12) inch diameter hole filled with Class C concrete to within three (3) inches below finished grade.
   b. Mounting wedge shall extend two (2) inches above natural grade.
   c. Bottom of sign shall be a minimum of seven (7) feet above natural or finished grade or above top of curb/edge of pavement, whichever is higher.
   d. Side of sign closest to traffic shall be a minimum of two (2) feet from either back of curb or edge of pavement.
2. Temporary Traffic Sign
   a. Temporary construction posts shall be set a minimum of three (3) feet in depth in a twelve (12) inch diameter hole filled with either sand or natural ground which shall be compacted to ninety-five (95) percent density.
   b. Bottom of sign shall be a minimum of seven (7) feet above natural or finished grade or above top of curb/edge of pavement, whichever is higher.
   c. Side of sign closest to traffic shall be a minimum of two (2) feet from either back of curb or edge of pavement.
   d. Signs shall be maintained, cleaned and repaired as needed during the construction of the project.
   e. Signs shall be permitted and installed on the right-of-way where designated by the Project Manager or Traffic Control Plan.
   f. The signs shall become the property of the Contractor and shall be removed at the completion of the project.

3.3 PROJECT SIGN

A. project sign posts shall be set a minimum of three (3) feet in depth in a twelve (12) inch diameter hole filled with either sand or natural ground which shall be compacted to ninety-five (95) percent density.

B. Project signs shall be mounted so that the top of the sign does not exceed eight (8) feet above natural ground.

C. There shall be two (2) signs for street, drainage and utility improvements or one (1) sign for public facility projects.

D. Signs shall be maintained, cleaned and repaired as needed during the construction of the project.

E. Signs shall be permitted and installed on the right-of-way or the project site where designated by the Project Manager or Traffic Control Plan.

F. The signs shall become the property of the Contractor and shall be removed at the completion of the project.

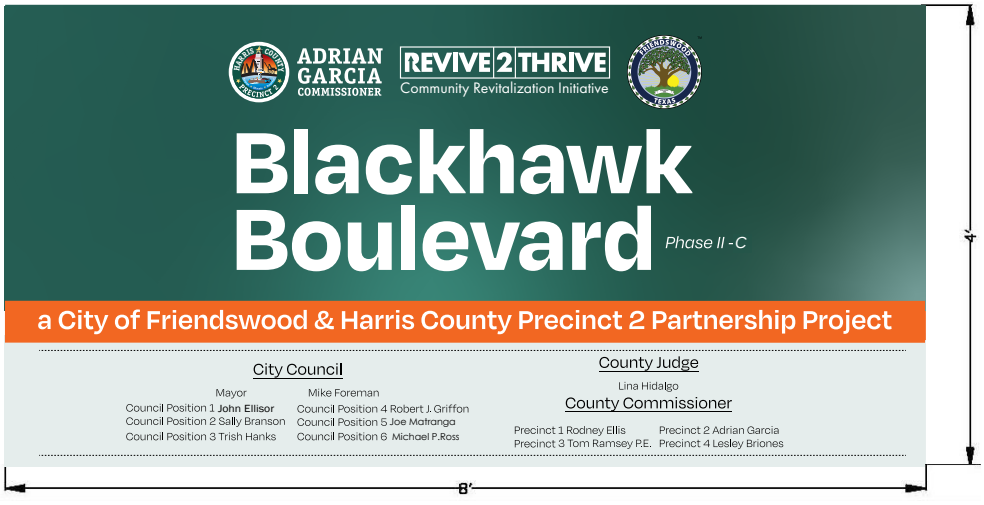
3.4 INTERIOR AND EXTERIOR SIGNS AND COMMEMORATIVE PLAQUE.

A. Interior and exterior signs and Commemorative Plaque shall be installed in conformance with all specifications in this Section.

B. All protective coatings or materials shall remain in place until facility is accepted.

PART IV: FIGURES

4.1 TYPICAL PROJECT SIGN (CITY COUNCIL MEMBERS AND COUNTY COMMISIONER NAMES TO BE UPDATED DURING SUBMITTAL)



END OF SECTION

UTILITY IDENTIFICATION MARKINGS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Markings that identify utilities during construction.
- B. Markings that identify water, sanitary sewer, and storm manholes, valves, meters and cleanouts.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for marking utilities during and after new construction or repair under this Section.

1.3 REFERENCES
- A. APWA – American Public Works Association.
  1. APWA – Recommended Marking Guidelines for Underground Utilities.

1.4 SUBMITTALS
- A. Submit manufacturer's product data concerning following materials for approval on type of marking paint being used.

PART II: PRODUCTS

2.1 PAINT FOR UTILITY IDENTIFICATION FOR EXCAVATIONS
- A. Krylon Industrial Quik-Mark Solvent Based Inverted Marking Paint complying with APWA Recommendations or approved equal.

2.2. Markings for identification of newly installed utilities.
- A. Krylon Industrial Quik-Mark Solvent-Based Inverted Marking Paint complying with APWA Recommendations or approved equal. The following colors shall be used for potable water and sanitary sewer:
  1. Potable Water: Krylon Industrial Quik-Mark Solvent-Based Inverted Marking Paint SO3903 or equivalent approved by the City's Project Manager.
  2. Sanitary Sewer: Krylon Industrial Quik-Mark Solvent-Base Inverted Marking Paint SO3904 or equivalent approved by the City's Project Manager.
- B. Storm Sewer Manhole markings shall use Krylon Industrial Quik-Mark Solvent Based Paint or equivalent approved by the City's Project Manager.

PART III: EXECUTION

3.1 PREPARATION

A. Accurately locate and install approved markers to conform to classes and colors indicated in this Section.

B. Clean and repair surfaces to receive markings. Remove loose material, dust and contaminants such as oil, curing membrane or polished aggregates.

3.2 INSTALLATION

A. Utility markings for excavation purposes shall be single line and have symbols approved by the APWA.

B. See City of Friendswood Standard Marking Details for examples of new utility markings.

C. Saw-cut curb or edge of pavement so that the saw-cut length matches the length as specified below. Saw-cut shall be a minimum of four inches (4 In) in length by one-quarter inch (1/4 In) in width by one-eighth inch (1/8 In) in depth.

D. Markings for newly installed utilities shall comply with the following:

1. Water Valves shall be marked by a nine inch (9 In) long by six inch (6 In) wide blue marker, using Krylon SO3903 marking paint and shall be perpendicular to the centerline of the road.
2. Water Meters shall be marked by a nine inch (9 In) long by three inch (3 In) wide blue marker, using Krylon SO3903 marking paint and shall be perpendicular to the centerline of the road.
3. Sanitary Sewer Manholes shall be marked by a nine inch (9 In) long by six inch (6 In) wide green marker, using Krylon SO3904 marking paint and shall be perpendicular to the centerline of the road.
4. Sanitary Sewer Clean-outs shall be marked by a nine inch (9 In) long by three inch (3 In) wide green marker, using Krylon SO3904 marking paint and shall be perpendicular to the centerline of the road.
5. Storm Sewer Manholes shall be marked by a nine inch (9 In) long by three inch (3 In) wide black marker, using Krylon SO3550 marking paint and shall be parallel to the centerline of the road.

3.4 WARRANTY

A. Warrant material and labor for period of twelve months (12 Mos) from date of installation of markings.

END OF SECTION

TEMPORARY FACILITIES AND CONTROLS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Temporary facilities and necessary controls for the Project, including utilities, telephone, sanitary facilities, storage sheds and building, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, pest and rodent control and disposal of trash, debris and excavated material.

B. Facilities and controls specified in this Section are considered minimum for the Project. Provide additional facilities and controls for proper execution of the Work and to meet the Contractor's responsibilities for protection of persons and property.

1.2 CONTRACTOR'S RESPONSIBILITY

A. Comply with applicable requirements specified in other sections of the Technical Specifications.
   1. Maintain and operate temporary facilities and systems to assure continuous service.
   2. Modify and extend systems as the Work progress requires.
   3. Completely remove temporary materials and equipment when no longer required.
   4. Restore existing facilities used for temporary services to specified or original condition.

1.3 REFERENCES

A. CFCO – City of Friendswood Code of Ordinances.
   1. Chapter 54, Article IV – Noise.

B. CFR – Code of Federal Regulations.
   1. CFR 29 Part 1926 – Safety and Health Regulations for Construction.

D. TOSA – Texas Occupational Safety Act.
   1. Texas Occupational Safety Act Article 51 82a, V.C.S.

PART II: PRODUCTS – NOT USED.

PART III: EXECUTION

3.1 TEMPORARY UTILITIES

A. Obtaining Temporary Service:
   1. Make arrangements with utility service companies for temporary services.
   2. Abide by rules and regulations of the utility service companies or authorities having jurisdiction.

3. Be responsible for utility service costs until Date of Substantial Completion. Included are fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of the Work.

B. Water:
   1. Provide water required for and in connection with work to be performed and for specified tests of piping, equipment, devices, or for other use as required for proper completion of the Work.
   2. Water to be drawn from public fire hydrants. Obtain transit meter from City of Friendswood, Department of Public Works. Pay required deposit.
   3. Provide and maintain an adequate supply of potable water for domestic consumption by the Contractor's personnel, the Project Manager and representatives of the City.

C. Electricity and Lighting:
   1. Provide electric power service required for the Work including required testing, lighting, operation of equipment, and other Contractor use.
   2. Electric power service includes temporary power or generators required to maintain plant operations during scheduled shutdowns.
   3. Minimum lighting level shall be ten foot-candles (10 fc) for open areas; twenty foot-candles (20 fc) for stairs and shops. Provide a minimum of one (1) – three hundred watt (300w) lamp for each two hundred square feet (200 Sf) of work area.

D. Temporary Heat and Ventilation:
   1. Provide temporary heat necessary for protection or completion of the Work.
   2. Provide temporary heat and ventilation to assure safe working conditions; maintain enclosed areas at a minimum of fifty degrees Fahrenheit (50° F).

E. Telephone:
   1. Provide emergency telephone service at the Project site for use by the Contractor's personnel and others performing work or furnishing services at the site.
   2. Provide Houston-Metro lines, allowing unlimited calls, without charge in Greater Houston Metropolitan area with "call waiting" and "call forwarding" options. Provide one (1) telephone answering machine with beeperless remote message retrieval capability.

F. Sanitary Facilities:
   1. Provide and maintain sanitary facilities for persons on the site; comply with regulations of State and local departments of health.
   2. Enforce use of sanitary facilities by construction personnel at site. Enclose sanitary facilities. Pit-type toilets are not permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause nuisance or health

problems. Haul sewage and waste off-site and properly dispose in accordance with applicable regulations. Sewage shall not be disposed of on-site, buried or introduced into the Storm Water System.

3. Locate portable toilets near the Work site and secluded from view insofar as possible. Portable toilets shall be installed on level ground, twenty feet (20 Ft) away from nearest downslope stormdrain inlet and shall be a minimum of eleven feet (11 Ft) behind curbs or top slopes of open ditch streets.
4. Portable toilets shall have a secondary containment system, either a containment pan or berm with ten (10) mil polyethylene. Portable toilets shall be secured to the ground so as not to tip over during windstorms. All spillage shall be pumped out immediately.
5. Keep portable toilets clean and supplied throughout the course of the Work. Portable toilets shall be transported to and from site, maintained and sewage hauled by a Contractor licensed by the State of Texas. All facilities shall be checked weekly and shall have services dates, owner identification and contact information in a prominent place.

3.2 STORAGE SHEDS AND BUILDINGS

A. Provide adequately ventilated, watertight storage facilities with floor above ground level for Products susceptible to weather damage.
B. Storage of Products not susceptible to weather damage may be on blocks off the ground.
C. Store Products in a neat and orderly manner. Place Products to permit easy access for identification, inspection and inventory.
D. Fill and grade site for temporary structures to provide drainage away from temporary and existing buildings.

3.3 SAFETY REQUIREMENTS

A. Submit a safety program at the pre-construction meeting and follow the program in accordance with Section 00500 – General Conditions. Include documented response to trench safety requirements of Section 02280 – Trench Safety System.
B. Conduct operations in strict accordance with applicable Federal, State and local safety codes and statutes and with good construction practice. Establish and maintain procedures for safety of all work, personnel and equipment involved in the Work.
C. Observe and comply with Texas Occupational Safety Act (Art. 51 82a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under Williams-Steiger Occupational Safety and Health Act of 1970, and to other legislation enacted for safety and health of the Contractor employees.

Safety and health standards apply to Subcontractors and Suppliers as well as to the Contractor.

D. Observance of and compliance with safety regulations is the Contractor's responsibility without reliance or superintendence of or direction by the Project Manager. Immediately advise the Project Manager of investigation or inspection by Federal Safety and Health inspectors of the Contractor's or Subcontractor's work or place of work on site under the Contract, and after investigation or inspection, advise the Project Manager of results. Submit one (1) copy of accident reports to Project Manager within ten days (10 D) of occurrence.

E. Protect areas occupied by workmen using the best available devices for detection of lethal and combustible gases. Test devices frequently to assure functional capability. Constantly observe infiltration of liquids into the Work area for visual or odor evidence of contamination, and immediately take appropriate steps to seal off entry of contaminated liquids to the Work area.

F. Implement safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment and other safety equipment specified or detailed on the Drawings.

G. Maintain required coordination with City Police and Fire Departments during entire period covered by the Contract.

H. Include Project safety analysis in safety plan. Itemize major tasks and potential safety hazards. Plan to eliminate hazards or protect workers and public from each hazard.

3.4 FIRST AID EQUIPMENT

A. Provide a first aid kit throughout the construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.

B. Have at least one (1) person thoroughly trained in first aid and CPR procedures present on the site when work is in progress. The Contractor shall conform to protocols and requirements for training and protection against "blood borne pathogens".

3.5 FIRE PROTECTION

A. Conform to specified fire protection and prevention requirements established by Federal, State, or local governmental agencies and as provided in Safety Program.

3.6 SECURITY MEASURES

A. Protect the Work, materials, equipment, and property from loss, theft, damage, or vandalism. Protect the City property used in performance of the Contract.

B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

3.7 PROTECTION OF UTILITIES AND PIPELINES

A. Prevent damage to existing public utilities during construction. Approximate locations of known utilities are shown on the Drawings, but all lines may not be shown. Excavate with caution and repair lines damaged by construction operations.

B. Use the Utility Coordinating Committee One Call System, telephone number, (713) 223-4567, which must be called forty-eight hours (48 Hrs) in advance. The toll free telephone number is 1-800-669-8344, Texas One Call System.

1. City Utilities that need to be located shall be done so after notification of the Project Manager and the Department of Public works at (281) 996-3380.

C. Before excavating, locate underground utilities by appropriate means including the use of metal detection equipment, and probes, or by excavation or surveys. Repair damage caused by investigative work and by failure to locate or to preserve underground utilities.

D. Give utility owners a minimum five days (5 D) notice before commencing excavation to allow time to locate utilities and make adjustments or relocations when they conflict with the Work. Include cost for temporary relocation of water, wastewater, and storm drainage lines, necessary to accommodate construction, in unit prices for utility construction unless otherwise noted. Bypassing of sanitary waste to storm drainage facilities is not allowed.

E. Prior to excavation near pipelines, request a representative of the pipeline company to meet with the Contractor and the Project Manager at the site to discuss procedures to be used. Request pipeline company's representative to locate the pipelines in at least three (3) locations: at each side and at centerline of proposed excavation of proposed utility. Also request representative and the Project Manager to be present to observe the Contractor’s operations when excavation is conducted within fifteen feet (15 Ft) of pipeline.

3.8 PROTECTION OF THE WORK AND PROPERTY

A. Preventive Actions

1. Take necessary precautions and actions to prevent damage, injury, or loss to the Work or public and private property, including:

a. Storage of apparatus, supplies, and Products in an orderly, safe manner to limit interference with progress of the Work or work of other contractors, utility service companies, or the City's operations.

b. Suitable storage for Products subject to damage by exposure to weather, theft, breakage, etc.

c. Limitation of loading pressures imposed upon portions of the Work.

d. Frequent clean up of refuse, scrap materials, and debris from construction operations, necessary to maintain the

site in a safe and orderly condition.

e. Provision of barricades and guard rails to protect pedestrian and traffic around openings, scaffolding, temporary stairs and ramps, excavations, elevated walkways, and other hazardous areas.

2. Protect public and private property adjacent to the site. Obtain written consent before entering or occupying privately-owned land except on easements provided for construction. Restore property damaged by construction operations to condition equal to or better than that existing before the damage.

B. Barricades and Warning Systems

1. Where work is performed on or adjacent to roadways, rights-of-ways, or public land, provide barricades, fences, lights, warning signs, danger signals, and other precautionary measures necessary for protection of persons or property and for protection of the Work.

a. Erect sufficient barricades to keep vehicles and pedestrians from entering the Work. Paint barricades to be visible at night. From sunset to sunrise, provide at least one (1) light at each barricade.

b. Maintain barricades, signs, lights, and provide watchmen until the Project Manager approves removal. Whenever work creates encroachment onto public roadways, station flagmen to manage traffic flow in accordance with approved traffic control plan.

c. Conform to requirements of Section 01555 – Traffic Control and Regulation.

C. PROTECTION OF EXISTING STRUCTURES

1. Underground Facilities

a. Known Underground Facilities are shown on the Drawings but all Facilities may not be shown. Explore sufficiently ahead of trenching and excavation work to locate Underground Facilities in order to prevent damage to them and to prevent interruption of utility services. Restore damage to Underground Facilities to original condition at no additional cost to the City.

b. If necessary to avoid unanticipated Underground Facilities, the Project Manager may make changes in location of the Work.

c. If permanent relocation of an Underground Facility is required and not provided for in the Contract documents, the Project Manager shall direct the Contractor in writing to perform the Work under Modification provisions in Section 00500 – General Conditions.

2. Surface Structures include buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and

other facilities that are visible above the ground level.

3. Protection of Underground Facilities and Surface Structures:
   a. Support in place and protect Underground Facilities and Surface Structures located within or adjacent to the limits of the Work from damage. Install supports as required by the owner of the structure. Satisfy the Project Manager that the owner of the facility or structure has approved methods and procedures before installing structure supports.
   b. Avoid moving or changing public utility or private corporation property without prior written consent of a responsible official of the facility or structure. Allow representatives of utilities to enter the construction site for maintenance and repair purposes or to make necessary changes.
   c. Notify utility and pipeline owners and operators of the nature of construction operations and dates when operations will be performed. When construction operations are required in immediate vicinity of existing structures, pipelines, or utilities, give a minimum of five working days (5 wD) advance notice. Probe and flag location of Underground Facilities prior to commencement of excavation. Keep flags in place until construction operations uncover the facility.
   d. Assume risk for damages and expenses to Underground Facilities and Surface Structures within or adjacent to the Work.

D. Employ a structural engineer to ensure protection measures are adequate for the safety and integrity of structures and facilities.

E. Protection of Installed Products:
   1. Provide protection of Installed Products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of the Work.
   2. Control traffic to prevent damage to Products and surfaces.
   3. Provide coverings to protect Products from damage. Cover projections, wall corners, jambs, sills, and exposed sides of openings in areas used for traffic and passage of materials in subsequent work.

3.9 ROADS AND PARKING

A. Prevent interference with traffic and City operations on existing roads.

B. Designate temporary parking areas to accommodate construction and the City personnel. When site space is not adequate, provide additional off-site Parking. Locate as approved by the Project Manager.

C. Minimize use by construction traffic on existing streets and driveways.

D. Do not allow heavy vehicles or construction equipment in existing parking areas.

3.10 ENVIRONMENTAL CONTROLS

A. Use methods, equipment, and temporary construction necessary for control of environmental conditions at the site and adjacent areas.

B. Comply with statutes, regulations, and ordinances relating to prevention of environmental pollution and preservation of natural resources including National Environmental Policy Act of 1969, PL 91-190, Executive Order 11514.

C. Minimize impact to the surrounding environment. Do not use construction procedures that cause unnecessary excavation and filling of terrain, indiscriminate destruction of vegetation, air or stream pollution, or harassment or destruction of wildlife.

D. Limit disturbed areas to boundaries established by the Contract. Do not pollute on-site streams, sewers, wells, or other water sources.

E. Do not burn rubbish, debris or waste materials.

3.11 POLLUTION CONTROL

A. Provide methods, means, and facilities necessary to prevent contamination of soil, water or the atmosphere by discharge of Pollutants from construction operations.

B. Provide equipment and personnel to perform emergency measures to contain spillage, and to remove contaminated soils or liquids. Excavate and dispose of contaminated earth off-site in accordance with laws and regulations, and replace with suitable compacted fill and topsoil.

C. Provide systems necessary for control of Pollutants.

1. Prevent toxic concentrations of chemicals.
2. Prevent harmful dispersal of Pollutants into the environment.

D. Use equipment that conforms to current Federal, State, and local laws and regulations.

3.12 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.

B. Employ methods and use materials that will not adversely affect conditions at site or on adjoining properties.

3.13 NOISE CONTROL

A. Provide vehicles, equipment, and use construction activities that minimize noise to the greatest degree practicable. Conform to noise levels of Chapter 54, Article IV – Noise, City Code of Ordinances, and latest OSHA standards. Do not permit noise levels to interfere with the Work or create a nuisance to surrounding areas.

B. Conduct construction operations during daylight hours except as approved by the Project Manager as specified in Section 1140 Paragraph 1.13.

C. Select construction equipment that operates with minimum noise and vibration. When directed by the Project Manager, correct objectionable noise or vibration produced by operation of equipment at no additional

cost to the City.

D. Sound Power Level (PWL) of equipment shall not exceed levels as specified in Chapter 54, Article IV, Section 54-95, City Code of Ordinances. Equipment noise requirements are contained in equipment specifications.

3.14 DUST CONTROL

A. Use water or other methods approved by the Project Manager to control amount of dust generated by vehicle and equipment operations.

3.15 WATER RUNOFF AND EROSION CONTROL

A. Comply with requirements of section 01410 -TPDES Requirements.

B. Conduct fill, grading and ditching operations and provide adequate methods necessary to control surface water, runoff, subsurface water, and water from excavations and structures in order to prevent damage to the Work, the site, or adjoining properties.

1. Plan and execute construction and earthwork by methods that control surface drainage from cuts and fills, and from borrow and waste disposal areas.
2. Minimize area of bare soil exposed at one (1) time.
3. Provide temporary control measures, such as berms, dikes, and drains.
4. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
5. Construct fill and waste areas by selective placement of materials to eliminate erosion of surface silts or clays that may erode.
6. Direct water away from excavations, pits, tunnels, and other construction areas to prevent erosion, sedimentation or damage.
7. Maintain existing drainage patterns adjacent to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover.
8. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to the site or adjoining areas, in conformance with environmental requirements.
9. Inspect earthwork periodically to detect any evidence of erosion. Take corrective measures as required to control erosion.

3.16 CONCRETE WASHOUT PITS

A. Temporary concrete washout facilities shall be located a minimum of fifty feet (50 Ft) from storm drain inlets, open drainage facilities and water courses. Each facility shall be located away from construction traffic or access to prevent disturbance or tracking.

B. A sign shall be installed to inform concrete equipment operators, truck drivers and finishers to utilize proper facilities.

C. Temporary washout facilities shall have a temporary pit or bermed area sufficient to completely contain all liquid and waste materials generated

during the washout procedures.

D. Above grade washout area shall have a berm, with a base of straw hay bales staked with two (2) stakes per bale into the ground. The interior shall have a minimum of ten (10) mil polyethylene that shall be free of tears, holes or other defects. The minimum area of containment shall be ten foot by ten foot (10 Ft x 10 Ft) and shall have a minimum of four inches (4 In) of freeboard.

E. Below grade washout area shall be surrounded with sandbags on the inner perimeter and silt filter fabric fence on the exterior perimeter. The pit shall be lined with a minimum of ten (10) mil polyethylene and have a minimum of twelve inches (12 In) of freeboard.

F. All waste material shall be allowed to solidify before it is broken up and hauled off as specified in Section 01580 – Waste Material Disposal.

END OF SECTION

TRAFFIC CONTROL AND REGULATION

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements for signs, signals, control devices, traffic barriers, flares, lights and traffic signals; construction parking control, designated haul routes, and bridging of trenches and excavations.

B. Qualifications and requirements for use of flagmen.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price Contracts:

1. Traffic control and regulation: Payment for traffic control and regulation is on a lump sum basis. Include preparation and submittal of traffic control plan if different than shown on the Drawings, and provision of traffic control devices, equipment, and personnel necessary to protect the Work and the public. Payment will be based on the Contractor's Schedule of Values for traffic control and regulation.
2. Flagmen: Payment for flagmen is on a lump sum basis. Partial payments will be based on the Contractor's Schedule of Values for flagmen.
3. New Portable Concrete Low Profile Traffic Barrier Provided: Payment is on a unit price basis for each linear foot of low profile traffic barrier provided, installed with hardware assemblies and connected together in accordance with the approved traffic control plan.
4. Portable Concrete Low Profile Traffic Barrier Installed: Payment is on a unit price basis for each linear foot of low profile traffic barrier delivered to the project location, installed with hardware assemblies and connected together in accordance with the approved traffic control plan.
5. Portable Concrete Low Profile Traffic Barrier Moved and Reset: Payment is on a unit price basis for each linear foot of low profile traffic barrier disassembled, moved on the project, reset at the new locations and connected together. Include cost to repair roadway in the unit price.
6. Portable Concrete Low Profile Traffic Barrier Removed: Payment is on a unit price basis for each linear foot of low profile traffic barrier removed from the project, including hardware assemblies, and stockpiling at location listed in Section 01110 – Summary of Work. Include cost to repair roadway in the unit price.
7. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price Contracts.

1. Include payment for work under this Section in the Total Stipulated Price.

1.3 REFERENCES

A. TCCP – Texas Code of Criminal Procedure.
   1. Article 2.12, Texas Code of Criminal Procedure.
B. TMUTCD – Texas Manual on Uniform Traffic Control Devices.
C. TVCAS – Texas Vernon's Civil Annotated Statutes.
   1. Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act.

1.4 SUBMITTALS

A. Traffic control plan:
   1. If using traffic control plan contained in the Contract without modification, submit a letter confirming use of the plan.
   2. If using a different traffic control plan, submit the plan for approval. The plan must conform to TMUTCD requirements and be sealed by a Professional Engineer licensed by the State of Texas.
C. Submit records verifying qualifications of Uniformed Peace Officers and Certified Flagmen proposed for use on the Work.

1.5 FLAGMEN

A. Use Uniformed Peace Officers and Certified Flagmen to control movement of vehicular and pedestrian traffic when construction operations encroach on public traffic lanes.
B. Uniformed Peace Officer: Individual employed full-time as a peace officer who receives separate compensation as a privately employed flagman. Private employment may be an employee-employer relationship or on an individual basis. Flagman may not be in the employ of another peace officer nor be a reserve peace officer.
   1. Uniformed Peace Officers may be:
      a. Sheriffs and their deputies;
      b. Constables and deputy constables;
      c. Marshals or police officers of an incorporated city, town or village; or
      d. as otherwise provided by Article 2.12, Code of Criminal Procedure.
   2. The Uniformed Peace Officer must be a full-time peace officer, must work a minimum average of thirty-two (32) paid hours per week, and must be paid a rate not less than the prevailing minimum hourly wage rate set by the federal Wage and Hour Act. The individual must be entitled to vacation, holidays, and insurance and retirement benefits.
C. Certified Flagman: Individual who receives compensation as a flagman and meets the following qualifications:
   1. Formally trained and certified in traffic control procedures.

2. Shall speak English fluently. Ability to speak Spanish is desirable but not required.
3. Paid for flagman duty at an hourly rate not less than the wage rate set by the Davis-Bacon Act.

D. Certified Flagmen must wear a distinctive uniform, bright-colored vest, and be equipped with appropriate flagging and communication devices while at the Work site. They must also have in their possession while on duty, a proof of training identification card issued by the appropriate training institute.

PART II: PRODUCTS

2.1 SIGNS, SIGNALS, AND DEVICES

A. Comply with TMUTCD requirements.

B. Traffic cones and drums, flares and lights: Conform to local jurisdictions' requirements.

2.2 PORTABLE LOW PROFILE CONCRETE BARRIERS

A. The low profile concrete barrier is a patented design. Information concerning this barrier may be obtained from Texas Transportation Institute, Texas A&M University System, College Station, Texas 77843-3135, (409) 845-1712.

PART III: EXECUTION

3.1 PUBLIC ROADS

A. Submit requests forms for lane closure and sidewalk closure to the City's Community Development Department at least three working days (3 wD) prior to need for blocking vehicular lanes or sidewalks. Do not block lanes or sidewalks without approved permits.

B. Follow laws and regulations of governing jurisdictions when using public roads. Pay for and obtain permits from jurisdiction before impeding traffic or closing lanes. Coordinate activities with the Project Manager.

C. Give the Project Manager one week (1 Wk) notice before implementing approved traffic control phases. Inform local businesses of impending traffic control activities.

D. Notify police department, fire department, local schools, churches, and businesses in writing a minimum of five working days (5 wD) prior to beginning work.

E. Maintain ten foot (10 Ft) wide all-weather lanes adjacent to the Work for emergency vehicle use. Keep all-weather lanes free of construction equipment and debris.

F. Do not obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Project Manager.

G. Maintain local driveway access to residential and commercial properties adjacent to work areas at all times. Use all-weather materials approved by the Project Manager to maintain temporary driveway access to commercial and residential driveways.
H. Keep streets entering and leaving job site free of excavated material, debris, and foreign material resulting from construction operations in compliance with applicable ordinances.
I. Remove existing signage and striping that conflict with construction activities or that may cause driver confusion.
J. Provide safe access for pedestrians along major cross streets.
K. Alternate closures of cross streets so that two (2) adjacent cross streets are not closed simultaneously.
L. Do not close more than two (2) consecutive esplanade openings at a time without prior approval from the Project Manager.

3.2 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and the City's operations.
B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.3 FLARES AND LIGHTS

A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.4 HAUL ROUTES

A. Utilize haul routes designated by authorities or shown on the Drawings for construction traffic.
B. Confine construction traffic to designated haul routes.
C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.5 TRAFFIC SIGNS AND SIGNALS

A. Construct necessary traffic control devices for temporary signals required to complete the Work including loop detectors, traffic signal conduits, traffic signal wiring and crosswalk signals.
B. Install and operate traffic control signals to direct and maintain orderly traffic flow in areas under the Contractor's control affected by the Contractor's operations. Post notices, signs and traffic controls before moving into next phase of traffic control.
C. Relocate traffic signs and signals as the Work progresses to maintain effective traffic control.
D. Unless otherwise approved by the Project Manager, provide driveway signs with name of business that can be accessed from each crossover. Use two (2) signs for each crossover.

E. Replace existing traffic control devices in the work area.
F. The Project Manager may direct the Contractor to make minor adjustments to traffic control signage to eliminate driver confusion and maintain orderly traffic flow during construction at no additional cost to the City.

3.6 BRIDGING TRENCHES AND EXCAVATIONS

A. When necessary, construct bridges over trenches and excavation to permit an unobstructed flow of traffic across construction areas and major drives. Use steel plates of sufficient thickness to support H-20 loading and install to operate with minimum noise.
B. Shore trench or excavation to support bridge and traffic.
C. Secure bridging against displacement with adjustable cleats, angles, bolts or other devices when:
    1. bridging is placed over existing bus routes,
    2. more than five percent (5%) of daily traffic is comprised of commercial or truck traffic,
    3. more than two (2) separate plates are used for bridging, and
    4. when bridge is to be used for more than five (5) consecutive days.
D. Extend steel plates used for bridging a minimum of one foot (1 Ft) beyond edges of trench or excavation. Use temporary paving materials such as premix to feather edges of plates to minimize wheel impact on secured bridging.

3.7 REMOVAL

A. Remove equipment and devices when no longer required.
B. Repair damage caused by installation.
C. Remove post settings to a depth of two feet (2 Ft).

3.8 TRAFFIC CONTROL, REGULATION AND DIRECTION

A. Use Flagmen to control, regulate and direct an even flow and movement of vehicular and pedestrian traffic, for periods of time as may be required to provide for public safety and convenience, where:
    1. multi-lane vehicular traffic must be diverted into single lane vehicular traffic,
    2. vehicular traffic must change lanes abruptly,
    3. construction equipment must enter or cross vehicular traffic lanes and walks,
    4. construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks,
    5. traffic regulation is needed due to rerouting of vehicular traffic around the work site, and
    6. where construction activities might affect public safety and convenience.
B. Use of Flagmen to assist in the regulation of traffic flow and movement does not relieve the Contractor of responsibility to take other means

necessary to protect the Work and the public.

C. Flagmen shall use stop/slow signs to regulate traffic around construction areas. Flags shall not be allowed, unless flagmen are trained in the proper use and techniques.

3.9 INSTALLATION STANDARDS

A. Place temporary pavement for single lane closures, in accordance with TMUTCD.

B. Reinstall temporary and permanent pavement markings as approved by the Project Manager. When weather conditions do not allow application according to manufacturer's requirements, alternate markings may be considered. Submit proposed alternate to the Project Manager for approval prior to installation. No additional payment will be made for use of alternate markings.

3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL

A. Submit name, address and telephone number of individual designated to be responsible for maintenance of traffic handling at construction site to the Project Manager. Individual must be accessible at all times to immediately correct deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or pavement markings.

B. Inspect signs, barricades, drums, lamps and temporary pavement markings daily to verify that they are visible, in good working order, and conform with traffic handling plans as approved by the Project Manager. Immediately repair, clean, relocate, realign, or replace equipment or materials that are not in compliance.

C. Keep equipment and materials, signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.

D. Obtain approval of the Project Manager to reuse damaged or vandalized signs, drums, and barricades.

END OF SECTION

SECTION 01075SP

TRAFFIC CONTROL AND REGULATION

The following provisions modify Section 01075 – Traffic Control and Regulation Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.2 and replace with the following:

   "No separate payment will be made for flagmen or uniformed peace officers as required for the project. Flagmen or uniformed peace officers shall be incidental to the Traffic Control and Regulation bid item."

2. Delete paragraphs 1.2.A.3 thru 1.2.A.6.

END OF SPECIAL PROVISION

QUALITY CONTROL TESTING PROCEDURES

PART I: GENERAL

1.1 QUALIFICATION OF LABORATORY

A. Meet laboratory requirements of ASTM E329 and applicable requirements of ASTM C1077, ASTM D3666, and ASTM D3740.

B. Meet ISO/TEC Guide 17025 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual Technical Specification sections.

C. If laboratory subcontracts are part of the testing services, such work shall be placed with a laboratory complying with the requirements of this Section.

D. Testing requiring an Approved Independent Testing Laboratory shall be executed by a laboratory technician that is certified in the test being taken. At no time shall an uncertified technician be allowed to sample or test any material except under direct supervision of a qualified and certified technician. NO EXCEPTIONS.

E. NICET and ACI are recognized certification companies for Laboratory Technicians.

1.2 SELECTION AND PAYMENT

A. The City shall select, employ, and pay for services of an Independent Testing Laboratory to perform inspection and testing identified in Part III of individual Technical Specification sections.

B. The Contractor may employ and pay for services of an independent testing laboratory or laboratories to perform inspection and testing identified in Part II of individual Technical Specification sections.

C. Employment of a testing laboratory by the City shall not relieve the Contractor of its obligation to perform the Work in accordance with requirements of the Contract Documents.

D. There shall be no separate payment of items under this Section. All testing, material, labor and equipment supplied by either the Approved Independent Testing Laboratory or the Contractor is incidental to the Work.

E. Owners of private development projects, even in the event they are installing public infrastructure, shall contract with an Independent Testing Laboratory. The Independent Testing Laboratory shall not have any affiliation with the Owners, Contractors, Engineers or Architects on the project.

1.3 LABORATORY REPORTS

A. Testing laboratory shall provide and distribute copies of laboratory reports to the distribution list the City's Project Manager provides at the pre-construction conference.

B. Laboratory shall notify the material supplier, the Contractor and the City's Project Manager of reports that indicate failing test results by no later than close of business on the working day following test completion and review.

14 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge requirements of the Contract.
B. Laboratory may not approve or accept any portion of the Work.
C. Laboratory may not assume the Contractor duties
D. Laboratory has no authority to stop the Work.

1.5 CONTRACTOR RESPONSIBILITIES

A. Provide safe access to the Work and to manufacturer's facilities for the City's Project Manager and for testing laboratory personnel.
B. Provide testing laboratory with a copy of the Construction Schedule and a copy of each update to Construction Schedule.
C. Notify the City's Project Manager and testing laboratory a minimum of twenty-four hours (24 Hrs) previous to expected time for operations requiring inspection and testing services. When the Contractor fails to make timely prior notification, do not proceed with the operations requiring inspection and testing services.
D. Notify Design Consultant twenty-four hours (24 Hrs) in advance when Technical Specification requires presence of Design Consultant for sampling or testing.
E. Request and monitor testing as required to provide timely results and to avoid delays to the Work. Provide samples to laboratory in sufficient time to allow required test to be performed in accordance with specified test methods before intended use of the Product.
F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested, to obtain and handle samples at site or at source of Products to be tested, and to facilitate tests and inspections including storage and curing of test samples.
G. Make arrangements with laboratory through the City's Project Manager. Payment for additional testing such as:
    1. Re-testing required for failed tests.
    2. Re-testing for nonconforming work.
    3. Additional sampling and tests requested beyond specified requirements.
    4. Insufficient notification of cancellation of scheduled tests of which are not performed.

1.6 REFERENCES
A2LA – The American Association for Laboratory Accreditation.
ASTM – American Society for Testing and Materials.
TCEQ – Texas Commission on Environmental Quality.
TDSHS – Texas Department of State Health Services.
TxDOT – Texas Department of Transportation
ISO/TES – International Organization for Standards.

PART II: PRODUCTS

2.1 The Contractor is to supply all equipment and labor needed to complete any testing.

PART III: EXECUTION

3.1 The Contractor shall notify the City's Project Manager a minimum of forty-eight hours (48 Hrs) in advance of any work which shall require testing. The City's Project Manager is there to observe test and verify compliance of specifications only. The City's Project Manager shall not help or assist in any way.

3.2 All testing requirements stated in this Section are minimal testing requirements. At the discretion of the City's Project Manager, more testing can be authorized. Additional testing may be requested by the Contractor at no additional cost to the City and with the approval of the City's Project Manager.

3.3 CONDUCTING TESTING
A. The City's Project Manager shall be onsite for all testing procedures for the duration of the test and observe all procedures and document the adherence to the testing procedures as stated in this Section.
B. Conform to laboratory sampling and testing methods specified in individual Technical Specification sections to the latest issues of ASTM standards, TxDOT methods, or other recognized test standards as approved by the City's Project Manager.
C. Requirements of this Section shall also apply to those tests for approval of materials, for mix designs, and for quality control of materials as performed by employed testing laboratories.

3.4 BACKFILL
A. Class I, II, and III backfill and Select fill lift placement shall not exceed six inches (6 In) to eight inches (8 In) of loose material. Clumps of material larger than six inches (6 In) in any direction shall not be allowed. Dry Density and Moisture content shall be determined by ASTM D698.
1. Frequency – One (1) test per lift per five hundred linear feet (500

Lf), or fraction thereof if less than five hundred linear feet (500 Lf), of trench or between manholes, whichever is shorter. A minimum of three (3) density tests per lift per day shall be required.

2. Compaction in the ROW – Compaction shall be a minimum of ninety-five percent (95%) of dry density and moisture shall be at optimum plus or minus three percent (± 3%).
3. Compaction outside of the ROW – Compaction shall be a minimum of ninety percent (90%) of dry density and moisture shall be at optimum plus or minus three percent (± 3%).

B. Bank run sand shall be classified using ASTM D2487. Bank run sand lift placement shall not exceed twelve inches (12 In) of loose material.
1. Bank run sand shall have no more than two percent (2%) clay lumps or balls.
2. Bank run sand shall have less than fifteen percent (15%) material passing through a No. 200 sieve as determined by ASTM D1140.
3. Material passing No. 40 and have a Plasticity Index less than seven (7) as determined by ASTM D4318.

C. Cement-Stabilized Sand shall be a minimum of one and one tenth (1.1) sacks of cement per one ton (1 Tn) of sand. Sand shall meet grading requirements for Fine Aggregates of ASTM C33. Cement-stabilized sand lift placement shall not exceed twelve inches (12 In) of loose material.
1. Sampling of cement-stabilized sand shall be either:
   a. Three (3) samples taken from the truck, one (1) from each one-third (1/3) of the truck, beginning third (3rd), middle third (3rd) and last third (3rd), or;
   b. One (1) sample shall be taken per one hundred fifty tons (150 Tn) or one (1 pD) production day, whichever is less.
2. Mold four (4) specimens, per sample taken, in accordance with ASTM D558, Method A.
3. Compaction shall be a minimum of ninety-five percent (95%) and moisture shall be at optimum plus or minus three percent (± 3%), as determined by ASTM D558.
4. Compressive strength of cement-stabilized sand shall be tested in accordance with ASTM D1163.
   a. Two (2) specimens shall be tested at forty-eight hours (48 Hrs) plus or minus two hours (±2 Hrs). Compressive strength shall be average of both specimens and shall be no less than one hundred pounds per square inch (100 psi), with no one (1) specimen compressive strength below seventy pounds per square inch (70 psi).
   b. Two (2) specimens shall be tested at seven days (7 D) plus or minus four hours (±4 Hrs). Compressive strength shall be average of both specimens and shall be equal

to or greater than one hundred pounds per square inch (100 psi), with no one (1) specimen compressive strength below one hundred pounds per square inch (100 psi).

3.5 CONCRETE

A. Concrete mix design.
   1. Each Type of Concrete shall have one (1) mix design and shall be submitted so that the City's Project Manager can send to the Independent Testing Laboratory for review a minimum of seven days (7 D) before start of concrete placement. Concrete mix designs shall conform with requirements of ASTM C94.
   2. Concrete Classification shall conform to TABLE 4.1 CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS in this Section. Coarse aggregate shall conform with ASTM C33 and as specified in TABLE 4.2 COARSE AGGREGATE GRADATION in this Section.
   3. Fine aggregate shall conform with ASTM C33 and as specified in TABLE 4.3 FINE AGGREGATE GRADATION in this Section.
   4. Mineral filler shall only be added with the approval of the Director of Community Development and shall not exceed fifteen percent (15%) of the fine aggregate weight and conforms to TABLE 4.4 MINERAL FILLERS in this Section.
   5. Admixtures shall conform to the following:
      a. Water reducers shall conform to ASTM C494, type A.
      b. Water reducing retarders shall conform to ASTM C494, type D.
      c. High range water reducers (superplasticizers) shall conform to ASTM C494, Types F and G.
   6. Water shall be potable.
   7. Air entrainment shall be in accordance with ASTM C260 and shall be four percent (4%) plus or minus one percent (±1%).

B. Form Inspection.
   1. Concrete Form inspection – the City's Project Manager shall inspect the forms for uniformity and bracing.
   2. All forms shall be cleaned free of all dried concrete, mud or any other deleterious material.
   3. Non-petroleum based form oil may be used to coat the forms that will be in contact with concrete.
   4. Wood forms shall be properly seasoned, of good quality and free of imperfections that may affect its strength or impair the finished surface of the concrete.

C. Reinforcing Bar Inspection.
   1. The City's Project Manager shall inspect all reinforcing bar for conformity to CFTS Section 03200 – Reinforcing Steel.
   2. Reinforcing bars shall be placed according to the Drawings, the

City of Friendswood Standard Details and the City of Friendswood Technical Specifications.

3. The minimum size of reinforcing bar shall be #4 [one-half inch (1/2 In)] and the minimum spacing shall be sixteen inches (16 In) on center unless otherwise approved by the City's Project Manager.
4. Reinforcing bars shall be one hundred percent (100%) tied at all ends, and fifty percent (50%) tied for the interior of the mat.
5. Splices shall have a minimum of twenty-four inches (24 In) overlapping.
6. Chairs are to be installed so that rebar is no closer from the top than one-third (1/3) of the depth of concrete being placed.
7. Chairs shall be placed at every other bar and under the lowest rebar for support and placed in a checkerboard pattern.

D. Placement of Concrete.

1. Independent Testing Laboratory shall be on site at all times. The City's Project Manager shall be on site as long as deemed necessary.
2. Placement of concrete shall not be allowed when ambient temperature is below forty degrees Fahrenheit (40° F) or above ninety-five degrees Fahrenheit (95° F) and conform to TABLE 4.5 TEMPERATURE REQUIREMENTS FOR PLACEMENT in this Section.
3. Materials shall not exceed eight percent (8%) moisture at the plant.
4. Travel time from batch time at plant to dispersal shall not exceed ninety minutes (90 Min) and conforming to TABLE 4.6 TRANSPORTING TIME REQUIREMENTS.
5. Time between trucks, end of last truck placement to beginning of next truck placement shall not exceed sixty minutes (60 Min); otherwise a construction joint shall be installed.
6. Verify the mix design for each truck is the mix design being used.
7. Verify tare weight to actual weights.
   a. Actual weights shall be within plus or minus one percent (±1%) of the tare weight.
   b. Admixtures shall be within plus or minus one gallon (±1 Gal) of tare.
8. Water tank on truck shall be full when arriving on site and shall have a readable and accurate measuring gauge attached to the tank.
9. Minimum drum rotations shall be between fifty (50) and seventy (70) before and during transport.
10. Minimum drum rotation shall be between seventy (70) and one hundred (100) arriving at the site and before discharge of concrete.
11. Slump shall be from three inches (3 In) to five inches (5 In) unless

plasticizers are introduced to concrete and otherwise approved by the City's Project Manager.

12. Concrete temperature shall not drop below fifty degrees Fahrenheit (50° F) or rise above ninety degrees Fahrenheit (90° F). If ice is added to the mixture as part of the water content, then concrete temperature shall be allowed to rise above ninety degrees Fahrenheit (90° F) but no higher than ninety-five (95) degrees F as conforming to TABLE 4.5 TEMPERATURE REQUIREMENTS FOR PLACEMENT and ASTM C1064.
13. Slump tests shall be taken in conformance with ASTM C143 at every fifty cubic yards (50 Cy) of concrete. When ambient temperature is above ninety degrees Fahrenheit (90° F), then slump tests shall be taken on every thirty cubic yards (30 Cy) of concrete.
14. Air entrainment above five percent (5%) and below seven percent (7%), as tested in conformance with ASTM C173 or ASTM C231, may be approved for placement at the discretion of the City's Project Manager, and only accepted after the concrete has passed the twenty-eight day (28 D) compressive strength requirements.
15. Concrete that has air entrainment lower than two percent (2%) or higher than seven percent (7%), as tested in conformance with ASTM C173 or ASTM C231 shall be rejected and shall be remove concrete from site.
16. One (1) set of four (4) concrete cylinders in conformance with ASTM C31 for compressive strength test shall be made for every one hundred cubic yards (100 Cy) or portion there of placed in the day. Concrete placements less than one hundred cubic yards (100 Cy) in a day shall be tested at the discretion of the City's Project Manager.
17. Two (2) cylinders shall be tested in conformance of ASTM C39 at the age of seven days (7 D). The average of the two (2) tests shall be a minimum of seventy percent (70%) of designed twenty-eight day (28 D) strength.
18. Two (2) cylinders shall be tested in conformance of ASTM C39 at the age of twenty-eight days (28 D). The average of the two (2) tests shall equal or exceed the design strength.
19. No more that two gallons of water per cubic yard (2 Gal/Cy) shall be introduced into the truck at the job site. After addition of any water at the site, the truck drum shall make twenty-five (25) revolutions before placement can commence.
20. Water added after sampling for testing shall void air entrainment, slump and compressive strength tests that may have been completed before the addition of water. New sample of concrete shall be taken and testing started over again. NO EXCEPTIONS. If after warning the Contractor the condition

continues to happen, and the practice continues, the Contractor shall be charged for failed tests.

21. The City's Project Manager and the Independent Testing Laboratory Technicians have the authority to reject any concrete load not matching the City of Friendswood Technical Specifications.
22. Load tickets shall be marked rejected, state reason, along with date and time and be signed by the City's Project Manager or Independent Testing Laboratory Technician.

3.6 DETENTION POND

A. Inspect for erosion around inflow/outflow areas and banks.
B. Area surrounding all drainage ditches, retention and detention ponds shall have turf established at a minimum cover of ninety percent (90%) as required by CFTS Section 02900 – Turf Establishment.
C. The drainage areas shall have either Galveston County Consolidated Drainage District (GCCDD) or Harris County Flood Control (HCFC) approval before requesting the City's Project Manager for inspection and approval. These inspection may be done simultaneously.

3.7 SANITARY SEWER MANHOLES

A. Verify that all debris and water is removed from the interior of the manhole being tested and any grout has dried for a minimum of twenty-four hours (24 Hrs).
B. Insert plugs in influent and effluent pipes. Plugs are to be installed a minimum of six inches (6 In) past the exterior wall of the manhole being tested.
C. Inflate plugs to manufacturer's recommended air pressure.
D. Inspect testing head. Verify that a gauge exists on the head and that all openings through the head are open, not sealed, with check ball valves.
E. Install Vacuum testing head on ring of manhole. Testing head shall have a readable gauge that measures inches of mercury by inches.
F. Begin evacuation of air from manhole. Turn pump off when the gauge reads ten inches of mercury (10 InHg).
G. Softly tap gauge to ensure the gauge is not stuck.
H. Hold vacuum for minimal time as required in TABLE 4.7 VACUUM TESTING TIME TABLE in this Section.
I. After minimal time is complete, tap gauge twice. If the loss of mercury is one inch (1 In) or less the manhole is considered to have passed.

3.8 SANITARY SEWER FORCE MAINS

A. Testing for High Density Polyethylene (HDPE) Pipe shall be in accordance with paragraph 3.11 of this Section.
B. Hydrostatic Testing.
    1. Plug both ends of pipe to be tested.
    2. Provide a gauge with a range from zero pounds per square inch

(0 psi) to three hundred pounds per square inch (300 psi), graduated in five pounds per square inch (5 psi) increments and is a minimum of three inches (3 In) in diameter. Provide a water tank and a water meter.

3. Fill pipe with water and pressure to either one hundred fifty (150 psi) or one and one-half (1.5) times the design pressure, whichever is greater.
4. Hold pressure for minimum of four hours (4 Hrs).
5. If pressure has held for four hours (4 Hrs), the pipe has passed.
6. If pressure has lost pressure, calculate the maximum allowed loss of water using the following formula.

$$4L = \frac{(S)(D)(P_{0.5})}{133{,}200}$$

7. Pressure pipe back up to one hundred fifty (150 psi), and record number of gallons required to achieve pressure. If less than or equal to 4L, then pipe is considered to have passed.

C. Pigging Test
1. Pigging test shall be conducted on force mains longer than two hundred feet (200 Ft).
2. Pig shall be open-cell polyurethane with no abrasives or coatings.
3. Pigs shall be capable of passing through reductions of up to sixty-five percent (65%) of nominal cross-section of pipe being tested.
4. Pigs shall be capable of passing through all standard fittings.
5. If pig passes through line being tested, the line is clear of obstructions and is considered to have passed.

3.9 SANITARY SEWER GRAVITY LINES
A. Low Pressure Air Test.
1. Low pressure air test shall conform to ASTM C828, ASTM C924 or ASTM F1417.
2. Clean both ends of pipe free of debris and water.
3. Install and inflate testing balls to manufacturer's recommended air pressure.
4. Pressure gravity sanitary sewer line to five pounds per square inch (5 psi) and hold for the minimum time as specified in TABLE 4.9 TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 PSI TO 4.0 PSI in this Section.
5. For lengths longer than the minimum time multiply additional lengthy by factor as specified in CFTS Section 02525 – Table 4.2 TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 PSI TO 4.0 PSI.

6. If test pressure drops below four pounds per square inch (4 psi) before the minimal testing time has been achieved then the test is considered to have failed. The Contractor shall make repairs as necessary and schedule a retest.

B. TV INSPECTION
   1. One week (1 Wk) prior to mandrel test, sewer lines shall be cleaned and a TV inspection completed on each line, from upstream to downstream end.

C. MANDREL TEST
   1. Mandrel testing shall conform to ASTM D3034.
   2. No mandrel test shall be performed until after the gravity sanitary sewer has been installed for a minimum of thirty days (30 D).
   3. Install mandrel pull string from manhole to manhole. Pull string shall not exceed three-eighths inch (3/8 In) thick nylon rope for pulling the mandrel.
   4. Inspect mandrel size using proving ring provided. Proving ring shall fit snug over the mandrel. Verify that the mandrel is the correct size for the pipe being tested.
   5. Once the mandrel is placed in the upstream pipe, slowly pull mandrel to the next manhole. Mandrel shall be pulled in the manhole by one (1) person. Mechanical equipment shall not be allowed to pull the mandrel through the pipe.
   6. When mandrel reaches next manhole, mandrel shall be lifted and shown to the City's Project Manager. Mandrel shall never be pulled straight through a manhole, no exceptions.
   7. If mandrel gets stuck in the pipe being tested, remove the mandrel and correct defects to the pipe and retest.

D. SMOKE TEST
   1. Smoke test shall only by used on existing sanitary sewers that have been repaired or rehabilitated.
   2. Only test from one (1) manhole to one (1) manhole section at a time.
   3. Residents shall be notified no fewer that two days (2 D) and nor more than seven days (7 D) before smoke testing is scheduled to take place.
   4. Public Works, Police Department, Fire Department and Notification Contacts shall be notified twenty-four hours (24 Hrs) prior to actual smoke testing.
   5. Isolate section gravity sanitary sewer line to be tested at each manhole.
   6. Introduce smoke into one (1) or both manholes. Operate smoke generator for a minimum of five minutes (5 Min).
   7. Inspect all service line connections at the gravity sanitary sewer main for leaks. Repair and retest all leaks.
   8. Visually inspect each house on the line being tested. Look for smoke coming through the plumbing vent stack on each house.

9. Any house that does not have smoke coming through the plumbing vent stack shall be checked for proper connection to the gravity sanitary sewer line being tested. Method of checking for proper connection shall be to introduce dye into the service line system at a point on landowner's property, and visually watch for dye to exit into downstream manhole. If no dye is seen, repair and retest service connection.

3.10 SUBGRADE

A. Lime Determination and Atterberg Limits
   1. Have Independent Testing Laboratory obtain a representative sample of material.
   2. Conform to ASTM D4318 to determine Liquid Limit, Plastic Limit and Plasticity Index.
   3. Conform to ASTM D698 for Lime Determination. Minimum Lime content shall be no less than six percent (6%).
   4. Make Lime Determination for soil to bring soil to a PI of no more than fifteen (15).

B. Lime Solids Test
   1. Lime Solids test shall conform to TxDOT Tex-600-J.
   2. Take sample from back of distributor truck.
   3. Weigh and calculate samples for Dry Solids as specified in TxDOT Tex-600-J.

C. Gradation Test
   1. Immediately after the re-mix of the lime-stabilized subgrade and before lime-stabilized subgrade is compacted, conform to TxDOT Tex-101-E, Part III dry method requirements for testing subgrade using sieve analysis.
   2. Three (3) random samples shall be taken and tested for every six hundred linear foot (600 Lf) of roadway section or portion thereof for day's production.
   3. Locations of the sample areas shall be determined by the City's Project Manager and shall vary from left, center and middle of roadway being tested.
   4. Samples shall be a representative sampling of the lime-stabilized subgrade.
   5. All three (3) samples must pass sieve analysis. If any one sample fails then the Contractor shall rework the roadway section tested and have it retested at no cost to the City.
   6. Immediately after the roadway section has passed the sieve analysis, the Contractor shall commence to compaction of subgrade.

D. Compaction
   1. Notify the City's Project Manager a minimum of forty-eight hours (48 Hrs) before testing for compaction.
   2. The City's Project Manager shall identify the locations for all

density testing.

3. Compaction shall be a minimum of ninety-five (95%) of dry density and moisture shall be at optimum plus or minus three percent (±3%).
4. There shall be only two (2) tests performed in any one (1) hole at one (1) time to achieve density readings. Moving the Nuclear Density Gauge around more that this shall fail the whole work area being tested.
5. Three (3) density tests per lane shall be performed on every two hundred linear feet (200 Lf) of roadway.
6. After one inch (1 In) or more of documented rainfall, subgrade shall be retested and shall conform to 3.9.D.3 and 3.9.D.4.
7. After one inch (1 In) or more of rain, every five hundred feet (500 Ft) per lane of roadway shall be tested.
8. Stipulations in 3.9.D.6 and 3.9.D.7 shall be reinstituted after each additional one inch (1 In) of rainfall until paving has been placed.

E. In-place Depth Test

1. Contractor shall notify the City's Project Manager a minimum of forty-eight hours (48 Hrs) prior to the start of testing.
2. In place depth test for lime-stabilization shall conform to TxDOT Tex-140-E.
3. Tests shall be taken in hand excavated holes only. NO EXCEPTIONS.
4. Three (3) samples shall be taken for each one thousand foot (1000 Ft) section of subgrade place per lane.
5. Depth shall be based on the average of all three (3) samples from the section being tested.
6. Failing sections shall be remixed and recompacted with correct amount of subgrade in place.

3.11 WATER LINES

A. Bacteriological Test (BAC-T)

1. The Contractor shall notify the City's Project Manager at least forty-eight hours (48 Hrs) in advance of testing. All testing shall conform to TCEQ and TDSHS. NO EXCEPTIONS.
2. The City's testing collection times shall be at 10:00 a.m. on Tuesdays and Thursdays only. NO EXCEPTIONS.
3. Water line shall have been thoroughly flushed prior to and at least on the day of the scheduled testing.
4. The City's Public Works Department personnel shall open the valves and collect the samples.
5. There shall be one (1) BAC-T taking for every one thousand linear feet (1000 Lf) of pipe installed. Any linear footage, no matter the amount, over one thousand linear feet (1000 Lf) shall require another BAC-T for that portion.
6. The City's Project Manager shall identify and mark the locations

of the BAC-T's to be taken.

7. Maximum testing length shall be no more than four thousand linear feet (4000 Lf) at one (1) given testing day.
8. Optimum chlorine content for testing shall be from two-tenths parts per million (0.2 ppm) free chlorine or five-tenths parts per million (0.5 ppm) total chlorine and no more than three and nine-tenths parts per million (3.9 ppm) free or total chlorine. Water lines having chlorine levels greater than three and nine-tenths parts per million (3.9 ppm) free or total chlorine shall not be tested and shall be flushed until the chlorine is in the acceptable range.
9. If the water lines have not been isolated for testing purposes, then all tests taken shall come back negative. One (1) positive test on non-isolated lines is a failure of the whole line being tested and BAC-T's for the entire line shall be retaken.
10. After two (2) failed BAC-T's the Contractor shall re-chlorinate and flush the failing water line.
11. The Contractor may, upon the approval of the City's Project Manager, take samples and use an alternate lab provided that the following conditions are met:
    a. Project Manger shall be present at all times during the testing process.
    b. The alternate lab shall be qualified and recognized under TCEQ and TDSHS rules and regulations.
    c. Laboratory shall send a representative of their company to pick up samples. The Contractor shall not transport the samples to the laboratory. Chain of custody shall be maintained by the laboratory's personnel.
    d. Copies of all reports shall be sent immediately from the lab to the City's Project Manager.

B. Testing for High Density Polyethylene (HDPE) Pipe shall be in accordance with paragraph 3.11 of this Section.

C. Hydrostatic Test of Water Lines
1. The Contractor shall notify the Project Manger a minimum of forty-eight hours (48 Hrs) before testing.
2. Hydrostatic Testing shall conform to American Water Works Associations' Manual M-23, latest revision.
3. The Contractor shall supply all pumps, gauges, meters and other equipment necessary to perform the test procedures. Testing gauge shall measure pressure in five pounds per square inch (5 psi) increments.
4. One (1) test shall be taken for every one thousand linear feet (1000 Lf) of water line.
5. Fill the auxiliary tank full of water and using the pressure pump, pressurize the water line to one hundred fifty pounds per square inch (150 psi). [Dedicated Fire Lines shall be pressurized to two

hundred pounds per square inch (200 psi)].

6. After gauge achieves one hundred pounds per square inch (150 psi), close valves and stop pump.
7. Softly tap the glass of the gauge. Start time of the test.
8. Test time shall be no less than a minimum of four hours (4 Hrs). [Dedicated Fire Lines shall be tested for no less than a minimum of two hours (2 Hrs)].
9. At the end of the test period, softly tap pressure gauge, if needle does not move then the line is considered to have passed.
10. Fill line back up with water and use the following water to calculate minimum allowed loss as calculated using the formula below:

$$L = \frac{4NDP^{1/2}}{7400}$$

11. If amount of gallons lost is less than that calculated, then the test is considered to have passed.

3.12 Hydrostatic Testing of High Density Polyethylene (HDPE) Pipe in Pressurized Systems.

A. Restraint.
   1. All valves, tees elbows and dresser couplings shall be restrained with stainless steel all thread.
   2. Test gauge shall be installed at the lowest point in the test section.

B. Pipe filling:
   1. Quantity of liquid needed to fill the internal volume of the pipe test section shall be estimated using the following formula:

$$V_{GAL} = 0.04 \times ID_{IN}^2 \times L_{FT}$$

   where:
      a. V_{GAL} = pipe section volume in U.S. gallons
      b. ID_{IN} = pipe inside diameter in inches
      c. L_{FT} = test section length in feet
   2. An appropriate excess quantity of liquid, up to forty percent (40%), may be needed to account for pipe expansion and possibility of leakage.
   3. Fill test section of pipe slowly, allowing all air to be purged from the pipe.
   4. Allow the test section and the test liquid to equalize in temperature.

C. Initial Expansion Phase.
   1. Expansion Phase can take up to, but shall be no longer than, four hours (4 H).
   2. Slowly pressurize the test section to test pressure, one hundred-fifty pounds per square inch (150 PSI), and maintain for three hours (3 H). During the initial expansion phase the polyethylene pipe will expand slightly. Additional test liquid will be required to

maintain test pressure.

D. Testing Phase
   1. Immediately following the initial expansion phase, monitor the amount of liquid required to maintain test pressure (150 psi) for one hour (1 H).
   2. If the amount of liquid does not exceed the amount listed in TABLE 4.10 MAKE-UP WATER ALLOWANCE, then no leakage is detected and the test section a passing test is indicated.
   3. Should the test fail and retesting become necessary, depressurize test section in accordance with paragraph 3.11.E.
      a. Do not attempt to correct faults or leaks until after test section is completely depressurized.
      b. A minimum relaxation period of eight hours (8 H) shall be observed before re-pressurization. After relaxation period, retest starting with the initial expansion phase.

E. Post Test Procedures.
   1. At the conclusion of the test, test section shall be depressurized by a controlled release of the test fluid. The potential of a pressure surge is avoided by a controlled release.

PART IV: TABLES

4.1 CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS

CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS					
Class of Concrete	***Sacks of Cement per Cubic Yard Minimum***	***Minimum Compressive Strength at 28 Days***	***Maximum Cement to Water Ratio***	***Coarse Aggregate Grade Number***	***Slump***
A	***5.0***	***3000***	***6.25***	***2 – 3***	***3 – 5****
B	***6.0***	***3600***	***6.00***	***1,2,3,4,5***	***4***
C	***4.0***	***2000***	***8.00***	***2,3,4,5,6,7***	***5***
D	***6.0***	***3000***	***6.00***	***2,3,4,5***	***5***
E	***6.0***	***As specified***	***5.50***	***3,4,5,6***	***5***
F	***8.75***	***5500***	***3.6***	***6***	***5***

****When ASTM C494, Type F or Type G admixture is used to increase workability, this range may be 6 to 9.***

4.2 COARSE AGGREGATE GRADATION

COARSE AGGREGATE GRADATION CHART										
Aggregate Grade No.	***Nominal Size Inches***	***Percent Retained on Each Sieve***								
		2-1/2 In.	***2 In.***	***1-1/2 In.***	***1 In.***	***3/4 In.***	***1/2 In.***	***3/8 In.***	***No. 4***	***No. 8***
1	***2***	***0***	***0-20***	***15-50***		***60-80***			***95-100***	
2 (467)*	***1-1/2***		***0***	***0-5***		***30-65***		***70-90***	***95-100***	
3	***1-1/2***		***0***	***0-5***		***10-40***	***40-75***		***95-100***	
4 (57)*	***1***			***0***	***0-5***		***40-75***		***90-100***	***95-100***
5 (67)*	***3/4***				***0***	***0-10***		***45-80***	***90-100***	***95-100***
6 (7)*	***1/2***					***0***	***0-10***	***30-60***	***85-100***	***95-100***
7	***3/8***						***0***	***5-30***	***75-100***	
8	***3/8***						***0***	***0-5***	***35-80***	***90-100***

**** Numbers in parenthesis indicate that the gradations conform to Corresponding ASTM gradation in ASTM C33.***

4.3 FINE AGGREGATE GRADATION

FINE AGGREGATE GRADATION CHART								
Aggregate Grade No.	***Percent Retained on Each Sieve***							
	3/8 In.	***No. 4***	***No. 8***	***No. 16***	***No. 30***	***No. 50***	***No. 100***	***No. 200***
1	***0***	***0-5***	***0-20***	***15-50***	***35-75***	***65-90***	***90-100***	***97-100***

4.4 MINERAL FILLERS

MINERAL FILLER GRADATION CHART		
Percent Retained on Each Sieve		
No. 20	***No. 30***	***No. 100***
0 %	***0 to 5 %***	***0 to 30 %***

4.5 TEMPERATURE REQUIREMENTS FOR PLACEMENT

PLACEMENT TEMPERATURE REQUIREMENTS	
AMBIENT TEMPERATURE[1]	
Minimum temperature to start placing concrete	35° and rising
Minimum temperature to stop placing concrete	40° and falling
Maximum temperature for placing concrete without ice	90°
Maximum temperature for placing concrete with ice	100°
CONCRETE TEMPERATURE	
Minimum concrete temperature	50°
Maximum concrete temperature without ice	90°
Maximum concrete temperature with ice	95°
MINIMUM CURING TIMES WHEN PLACED CONCRETE HASS BEEN EXPOSED TO FREEZING TEMPERATURES	
From 50° to 70°, minimum days	5
70° and above, minimum days	3
[1]Ambient temperature is to be taken as specified in paragraph 3.3.F.1 of this section.	

4.6 TRANSPORTING TIME REQUIREMENTS

TRANSPORTING TIME REQUIREMENTS FOR PLACEMENT		
Ambient Temperature	Maximum Time (No Retarding Agent) in Minutes	Maximum Time (With Retarding Agent) in Minutes[1]
Non-Agitated Concrete		
Above 80° F	15	30
80° F and Below	30	45
Agitated Concrete		
Above 90° F	45	75
75° F to 90° F	60	90
75° F and Below	90	120
NOTE: Time interval shall be from the addition of cement to the batch to start of placement of concrete in the forms. [1]Normal Dosage of retarder.		

4.7 TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 PSI TO 4.0 PSI

Pipe Dia. In.	Min. Time mm:ss	Length for Min. Time	Time for Longer Length	Specification Time for Length (L) shown in MM:SS				
				100’	150’	200’	250’	300’
6	5:40	398	0.8548	5:40	5:40	5:40	5:40	5:40
8	7:33	298	1.5196	7:33	7:33	7:33	7:33	7:36
10	9:27	239	2.3743	9:27	9:27	9:27	9:54	11:52
12	11:20	199	3.4190	11:20	11:20	11:20	14:15	17:06
15	14:10	159	5.3423	14:10	14:10	17:48	22:16	26:43
18	17:00	133	7.6928	17:00	19:14	25:39	32:03	38:28
21	19:50	114	10.4708	19:50	26:11	34:54	43:38	52:21
24	22:40	99	13.6762	22:48	34:11	45:35	56:59	68:23
27	25:30	88	17.3089	28:51	43:16	57:42	72:07	86:33
30	28:20	80	21.3690	35:37	53:25	71:14	89:02	106:51
33	31:10	72	25.8565	43:06	64:38	86:11	107:44	129:17

Pipe Dia. In.	Min. Time mm:ss	Length for Min. Time	Time for Longer Length	Specification Time for Length (L) shown in MM:SS					
				350’	400’	450’	500’	550’	600’
6	5:40	398	0.8548	5:40	5:42	6:25	7:07	7:50	8:33
8	7:33	298	1.5196	8:52	10:08	11:24	12:08	13:56	15:12
10	9:27	239	2.3743	13:51	15:50	17:48	19:47	21:46	23:45
12	11:20	199	3.4190	19:57	22:48	25:39	28:30	31:20	34:11
15	14:10	159	5.3423	31:10	35:37	40:04	44:31	48:58	53:25
18	17:00	133	7.6928	44:52	51:17	57:42	64:06	70:31	76:56
21	19:50	114	10.4708	61:05	69:48	78:32	87:15	95:59	104:42
24	22:40	99	13.6762	79:47	91:10	102:34	113:58	125:22	136:46
27	25:30	88	17.3089	100:58	115:24	129:49	144:14	158:40	173:05
30	28:20	80	21.3690	124:39	142:28	160:16	178:05	195:53	213:41
33	31:10	72	25.8565	150:50	172:23	193:55	215:28	237:01	258:34

4.8 – VACUUM TESTING TIME TABLE

TIME ALLOWED FOR VACUUM LOSS FROM 10.0 Hg TO 9.0 Hg			
	TIME IN SECONDS BY DIAMETER OF MANHOLES		
Manhole Depth in Feet	48” Diameter	60” Diameter	72” Diameter
8’ and less	14	18	23
10	17	23	28
12	21	28	34
14	25	32	40
16	28	37	45
18	23	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

4.9 MINIMUM TESTING TIMES FOR LOW PRESSURE AIR TEST

Pipe Diameter (Inches)	Minimum Time (seconds)	Length of Pipe for Minimum Time (feet)	Time for Longer Length (seconds)
6	340	398	0.855 (L)
8	454	298	1.520 (L)
10	567	239	2.374 (L)
12	680	199	3.419 (L)
15	850	159	5.342 (L)
18	1020	133	7.693 (L)
21	1190	114	10.471 (L)
24	1360	99	13.676 (L)
27	1530	88	17.309 (L)
30	1700	80	21.369 (L)
33	1870	72	258.856 (L)

4.10 MAKE-UP WATER ALLOWANCE

Nominal Pipe Size (Inches)	Allowable Gallons per 100 Feet of Pipe	Nominal Pipe Size (Inches)	Allowable Gallons per 100 Feet of Pipe
1-1/4	0.06	12	1.1
1-1/2	0.07	14	1.4
2	0.07	16	1.7
3	0.10	18	2.0
4	0.13	20	2.8
5	0.21	22	3.5
6	0.3	24	4.5
8	0.5	26	5.0
10	0.8	28	5.5

END OF SECTION

SECTION 01080SP

QUALITY CONTROL TESTING PROCEDURES

The following provisions modify Section 01080 – Quality Control Testing Procedures Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete Table 4.1 and replace with the following:

CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS					
Class of Concrete	Sacks of Cement per Cubic Yard Minimum	Minimum Compressive Strength at 28 Days	Maximum Cement to Water Ratio	Coarse Aggregate Grade Number	Slump
A	5.5	3500	6.25	2 – 3	1 – 5*
B	6.0	3600	6.00	1,2,3,4,5	4
C	4.0	2000	8.00	2,3,4,5,6,7	5
D	6.0	3000	6.00	2,3,4,5	5
E	6.0	As specified	5.50	3,4,5,6	5
F	8.75	5500	3.6	6	5

*When ASTM C494, Type F or Type G admixture is used to increase workability, this range may be 6 to 9.

END OF SPECIAL PROVISION

DIVERSION PUMPING

PART I: GENERAL

1.1 DEFINITIONS

A. Diversion-pumping: Installation and operation of bulkheads, plugs, hoses, piping, and pumps required to maintain sewer flow and prevent backups and overflows.

1.2 SYSTEM DESCRIPTION

A. Provides continuous sewer service to users of sewer systems while maintenance or construction operations are in progress, by diverting flow around construction locations. Maintain sewer flow to prevent backup or overflow onto streets, yards and unpaved areas or into buildings, adjacent ditches, storm sewers, and waterways. Do not divert sewage outside of sanitary sewer system.

B. When pumps are operating, have an experienced operator on site to monitor operation, adjust pumps, make minor repairs to system, and report problems.

1.3 SUBMITTALS

A. For systems that bypass sanitary sewer line segments of forty-two inch (42 In) diameter or larger, submit a Diversion Pumping Plan prior to installation. Show location, number and size of pumps, number, location, size and type of hoses or rigid piping, and location of downstream discharge; and special features where pipes or hoses cross roadways, temporary trenches, support bridges.

1.4 SCHEDULING

A. When the City operates or maintains diversion pumping in construction areas, coordinate construction activities with the Project Manager.

B. Cease operation of diversion pumping when approved by the Project Manager.

1.5 REFERENCES

A. CFCO – City of Friendswood Code of Ordinances.

C. EPA – Environmental Protection Agency.

D. TCEQ – Texas Commission on Environmental Quality.

PART II: PRODUCTS

2.1 MATERIALS

A. Design piping, joints and accessories to withstand at least twice maximum system pressure or fifty pounds per square inch (50 psi), whichever is greater.

B. Use self-priming type or submersible electric pumps, with a working pressure gauge on the discharge. Pumps shall meet requirements of City of Friendswood Noise Ordinance.

PART III: EXECUTION

3.1 FIELD QUALITY CONTROL

A. During diversion pumping, do not allow sewage to leak, dump, or spill into or onto areas outside of existing sanitary sewer systems.

B. In the event of an accidental spill or overflow, immediately stop discharge and take action to clean up and disinfect spill. Promptly notify the Project Manager so required reporting can be made to the Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA).

3.2 CLEANING

A. When diversion-pumping operations are complete, drain sewage within piping into sanitary sewers prior to disassembly.

END OF SECTION

UTILITY DIVISION
VALVE ASSISTANCE PROCEDURES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. The City of Friendswood employees shall operate all existing valves. The Contractor's employees may operate new valves included in the Work prior to acceptance by the City.

1.2 PROCEDURE

A. Perform activities listed in this Section. Utility Division personnel shall also follow these procedures when completing a request, Document 01095 – Utility Division Valve Assistance Request Form, from individual Contractors, through Project Manager, for operation of existing water valves.

1.3 CANCELLATION

A. The Contractor, the Project Manager, or Utilities Division may cancel a scheduled valve assistance appointment at no extra cost or payment to the Contractor. The Contractor shall notify the Project Manager a minimum of twenty-four hours (24 Hrs) in advance of scheduled valve operation. The Project Manager shall notify the Department of Public Works immediately upon receipt of cancellation notice. Cancellation may be caused by bad weather, preparation work taking longer than anticipated or unforeseen delays by one (1) or more of the three (3) parties.

PART II: PRODUCTS – NOT USED.

PART III: EXECUTION

3.1 ROUTINE VALVE ASSISTANCE REQUEST

A. When notified by the Contractor, the Project Manager shall schedule a work order planning meeting by sending Document 01125 – Utility Division Valve Assistance Request Form to the Department of Public Works and providing information shown below. The work order planning meeting shall be conducted a minimum of three days (3 D) prior to the date requested for valve operations; excluding weekends, holidays, inclement weather days, and the day of the call.
   1. Project Name.
   2. Project Number.
   3. Location of the Work requested.
   4. Date and time assistance requested.
   5. Contractor’s Name.

6. Superintendents Name.
7. Superintendents Phone Number.
8. Project Manager's Name.
9. Project Manager's Phone Number.

B. The Department of Public Works shall create a work order for each wet connection, cut and plug, etc.

C. The Department of Public Works shall give the Project Manager the work order number. This work order number must be used as a reference in all communications regarding this request for Valve Assistance.

D. Utility Division personnel must have the work order number on their route sheet. When Utility Division personnel arrive at the job site for the Work Order Planning Meeting between the Project Manager, the Contractor, and Utility Division personnel, they will verify the street intersection and work order number with the Project Manager before beginning Work Order Planning Meeting.

E. During Work Order Planning Meeting, the work to be performed will be outlined and the actual date the work shall be performed will be mutually determined by the Project Manager, the Contractor and City's Utility Division personnel, based upon relevant factors such as preparatory work needed, customer requirements, etc.

F. Utility Division personnel shall perform work specifically outlined in the work order requested. Also, Utility Division personnel shall operate only existing water valves. The Project Manager shall contact the Department of Public Works and request a new work order for additional work.

G. Utility Division personnel will contact the dispatcher and advise when the job is complete. Utility Division personnel will list all appropriate information on the Crew Activity Report.

H. Should Utility Division personnel not be able to keep an appointment to provide valve assistance, Utility Division shall provide notification to appropriate Project Manager by phone at least twenty-four hours prior (24 Hrs), with that fact and rescheduling information, if available.

I. The Project Manager shall notify the Department of Public Works if Utility Division personnel have not arrived at the site within thirty minutes (30 Min) of scheduled appointment. If the Contractor is not ready when Utility Division personnel arrives to provide valve assistance, the City shall charge the Contractor sixty-five dollars ($65.00) per hour, per employee, starting thirty minutes (30 Min) after the scheduled appointment time, minimum one hour (1 Hr) charge.

J. The Contractor shall not be due delay claims or downtime if Utility Division has notified the Project Manager that they will not be able to provide valve assistance as scheduled.

K. Test installed new valves in the presence of the Project Manager and the Utilities Supervisor during the substantial completion inspection. Place new valves in open position on or before the Date of Substantial Completion.

L. The Project Manager shall notify, in writing, the Department of Public

Works one month (1 Mo) before the one year (1 Yr) maintenance bond expires to report any problems they have with new water lines. The Project Manager shall notify the Contractor about these problems.

3.2 EMERGENCY REQUEST FOR VALVE ASSISTANCE PROCEDURE

A. When notified by the Contractor, the Project Manager shall request emergency Valve Assistance due to a broken line/service, etc. by calling the Department of Public Works at (281) 996-3380 and providing the following information:
   1. Project Name.
   2. Project Number.
   3. Location of the Work requested.
   4. Nature of the emergency.
   5. Contractor's Name.
   6. Superintendents Name.
   7. Superintendents Phone Number.
   8. Project Manager's Name.
   9. Project Manager's Phone Number.

B. The Department of Public Works shall create an emergency work order number and describe the work to be performed.

C. The Department of Public Works shall give the Project Manager the emergency work order number. Reference work order number in all communications regarding request for Valve Assistance.

D. The Department of Public Works shall contact Utility Division personnel and assign the emergency work order.

E. Utility Division personnel must have the emergency work order number on the route sheet. When Utility Division personnel arrive at the job site for emergency work, they shall verify the street intersection and emergency work order number with the Project Manager prior to beginning the work requested for operating existing water valves. Utility Division personnel shall coordinate verification of street intersection and work order number with the Project Manager prior to performing work.

3.3 AFTER HOURS EMERGENCY VALVE ASSISTANCE

A. If, after normal working hours, it becomes necessary for valve assistance, the Contractor or the Project Manager shall call the Police Dispatcher at (281) 996-3300 and supply said dispatcher with the following information:
   1. Caller's Name.
   2. Caller's Title.
   3. Caller's Employer.
   4. Nature of the emergency.
   5. Location of the emergency.

B. The Dispatcher shall follow standard procedures and notify the Utility Division Person On-call and relay this information.

C. The Utility Division Person On-call shall notify the Project Manager of the emergency and both shall go to the location and assess the emergency

situation.

D. The Utility Division Person On-call shall determine if other personnel are needed, and procedure to call them in as needed. The Utility Division Person On-call shall document all activities, equipment, personnel and time used, and will send it to the Department of Public Works the following regular business day.

END OF DOCUMENT

UTILITY DIVISION
VALVE ASSISTANCE REQUEST FORM

DATE REQUESTED: {INSERT DATE}

TIME REQUESTED: {INSERT TIME}

Type of Assistance Required:

☐ Valve Operation ☐ Water and Sewer Utilities locate

☐ Bacterial Testing (BAC-T) ☐ Flushing Waterlines

Project Name: Blackhawk Boulevard Reconstruction Phase II – Repackage 'B'

Project Number: {INSERT PROJECT #}

Company Requesting Assistance: {INSERT CONTRACTOR NAME}

Company Contact Name: {INSERT CONTRACTOR CONTACT}

Company Telephone: {INSERT CONTACT PHONE #}

Company Fax: {INSERT CONTRACTOR FAX}

Type of Work: {INSERT CONTRACTOR WORK TYPE}

Location of Work: {INSERT ASSISTANCE LOCATION}

Nearest Cross Street: {INSERT NEAREST CROSS STREET}

Project Manager: {INSERT PROJECT MANAGER}

Project Manager Phone Number: {INSERT PM PHONE #}

DEPARTMENT OF PUBLIC WORKS USE ONLY

Received By: _____

Date Received: _____ Time Received: _____

END OF DOCUMENT

TREE AND PLANT PROTECTION

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Tree and plant protection and maintenance.
B. Planting new trees and relocating and replanting existing trees.
C. Maintenance of planted or replanted trees.

1.2 PROJECT CONDITIONS

A. Preserve and protect existing trees and plants that are to remain; from damage to foliage, branches, trunk, or roots; that could result from construction operations.
B. Do not remove any Tree unless Parks and Recreation Department grants written permission for removal. Prevent following types of damage:
    1. Compaction of root zone by foot, vehicular traffic, or material storage.
    2. Trunk damage from equipment operations, material storage, or from nailing or bolting.
    3. Trunk and branch damage caused by ropes or guy wires.
    4. Root poisoning from spilled solvents, gasoline, paint, and other noxious materials.
    5. Branch damage due to improper pruning or trimming.
    6. Damage from lack of water due to:
        a. Cutting or altering natural water migration patterns near root zones.
        b. Failure to provide adequate watering.
    7. Damage from alteration of soil pH factor caused by depositing lime, concrete, plaster, or other base materials near roots.
    8. Cutting of roots larger than one and one-half inches (1-1/2 In) in diameter.

1.3 DAMAGE ASSESSMENT

A. When a Tree, other than those permitted for removal, are destroyed or badly damaged as result of construction operations, remove and replace with same size, species, and variety. Replace trees larger than eight inches (8 In) in diameter with an eight inch (8 In) diameter tree of same species and variety.
B. Contract Price shall be reduced by the amount determined by Parks and Recreation Department if the tree is not replaced.

1.4 REFERENCES

A. ISA – International Society of Arboriculture.

PART II: PRODUCTS

2.1 MATERIALS

A. Burlap: Suitable for use as tree wrapping.

B. Fertilizer: Liquid containing twenty percent (20%) nitrogen, ten percent (10%) phosphorus and five percent (5%) potash.

C. Obtain the Project Manager's approval of replacement trees.

PART III: EXECUTION

3.1 PROTECTION AND MAINTENANCE OF EXISTING TREES AND SHRUBS

A. Trees within the Project area, except for trees shown on the Drawings or directed by the Project Manager to be removed and relocated, are to remain in place. Protect from damage and maintain trees that are to remain.

B. Perform the following for trees or shrubs that are to remain:

1. Trim trees and shrubs under supervision of a professional tree surgeon or horticulturist.
    a. Prune trees according to International Society of Arboriculture specifications.
    b. Prune trees and shrubs requiring pruning for construction operations for balance and to maintain proper form and branching habit.
    c. Cut limbs at branch collar and remove stubs. Do not gouge outer layer of tree structure or trunk.
    d. Prior to construction, prune all trees to remain of new or recent growth to maintain basic branching form of trees. Base extent of pruning upon proximity of pavement to trunk and size of tree blockouts and requirements of construction adjacent to tree.
    e. Limit pruning of young branches to the maximum extent possible. Maintain older branches that provide basic form of tree. Prune in the presence of the Project Manager.
2. Use extreme care to prevent excessive damage to root systems.
    a. Cut tree roots in construction area smoothly with a trencher before excavating. Do not allow ripping of roots with backhoes or other equipment.
    b. Temporarily cover exposed roots with wet burlap to prevent roots from drying out.
    c. Cover exposed roots with soil as soon as possible.
3. Prevent damage or compaction of root zone (area below drip line) by construction activities.
    a. Do not allow equipment to scar trunks or limbs.
    b. Do not store construction materials, vehicles, or excavated material under drip line of trees.

c. Do not pour liquid materials under drip line.

4. Water and fertilize remaining trees and shrubs to maintain their health during construction period.
   a. Water landscaping during construction operations at least once every seven days (7 D) in cold months and once every four days (4 D) in hotter months.
   b. Saturate soils to at least six inches (6 In) to eight inches (8 In) beneath surface.
5. Water areas currently being served by private sprinkler systems while systems are temporarily taken out of service to maintain health of existing landscapes.
6. With the Project Manager's permission, shrubs to remain may be temporarily transplanted and returned to original positions under supervision of professional horticulturist.

3.2 PROTECTION

A. Protection of Trees or Shrubs in Open Area:
   1. Install steel drive-in fence posts in protective circle, approximately eight feet (8 Ft) on center, not closer than four feet (4 Ft) to trunk of trees or stems of shrubs.
   2. Insert steel drive-in fence posts a minimum of three feet (3 Ft) into ground, leaving a minimum of five feet (5 Ft) above ground.
   3. Mount fluorescent orange construction fence on fence posts.
   4. For trees or shrubs in paved areas, use movable posts consisting of two one-half inch (2-1/2 In) minimum diameter concrete-filled steel pipe mounted in rubber automobile tires filled with concrete.

B. Provide timber wrap protection for trees in close proximity to equipment when work is required within construction fencing.
   1. Wrap trunk with a layer of burlap.
   2. Install vertical five foot (5 Ft) to six foot (6 Ft) long, two inch by four inch (2 In x 4 In) or two inch by five inch (2 In x 5 In) studs, spaced three inches (3 In) to five inches (5 In) apart, around circumference of tree trunk.
   3. Tie burlap in place with twelve (12) gauge to nine (9) gauge steel wire.

3.3 RELOCATING AND PLANTING NEW TREES

A. Employ a qualified Arborist, acceptable to the Project Manager, to plant and to move and relocate trees. Arborist must be normally engaged in the field and have a minimum of five years (5 Yrs) experience.

B. Verify that the trees to be planted are acceptable to the City and listed in Section 01565 – Authorized Tree List.

3.4 MAINTENANCE OF NEWLY PLANTED TREES AND REPLANTED TREES.

A. Provide proof of capability to water trees during dry periods.

B. Maintain newly planted trees, in healthy condition until end of one-year warranty bond.

1. Straighten leaning trees.
2. Replace dead trees or trees that, in the opinion of the Project Manager, have become unhealthy, unsightly or have lost their natural shape as result of additional growth, improper pruning, maintenance or weather conditions, within four weeks (4 Wks) of notice from the Project Manager.
3. When a tree must be replaced, a new warranty period shall commence on date of tree replacement, and the Project Manager's approval. Minimum warranty period shall be one year (1 Yr).
4. Dispose of rejected trees.

END OF SECTION

SECTION 01105SP

TREE AND PLANT PROTECTION

The following Special Provision replaces Section 01105 – Tree and Plant Protection Standard Specification in its entirety.

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Tree and plant protection

B. Minimum qualifications of Arborist

1.02 MEASUREMENT AND PAYMENT

A. Payment for Tree Protection Shall be paid for on a lump sum basis that shall include all items specified in this section unless payment is specified otherwise in this section.

B. Payment for tree removal shall be paid per each tree removed.

C. Payment for Clearance pruning shall be paid for each tree pruned.

D. Payment for Tree Protection Fence shall be paid on a per linear foot installed basis.

E. Payment for Root Pruning Trench shall be paid on a per linear foot installed basis.

F. Payment for Zero Curb Cutback will be on a per linear foot basis.

G. Payment for Checker Plate will be on a square foot basis.

H. Payment for Hand dig water service tap & lead or fittings shall be paid per each excavation pit required to be dug by hand.

1.03 PROJECT CONDITIONS

A. Preserve and protect existing trees and plants to remain from foliage, branch, trunk, or root damage that could result from construction operations.

B. Prevent following types of damage:

1. Compaction of root zone by foot or vehicular traffic, or material storage.

2. Trunk damage from equipment operations, material storage, or from nailing or bolting.
3. Trunk and branch damage caused by ropes or guy wires.
4. Root or soil contamination from spilled solvents, gasoline, paint, lime slurry, and other noxious materials.
5. Branch damage due to improper pruning or trimming.
6. Damage from lack of water due to:

    a. Cutting or altering natural water migration patterns near root zones.
    b. Failure to provide adequate watering.

7. Damage from alteration of soil pH caused by depositing lime, concrete, plaster, or other base materials near root zones.
8. Cutting of roots larger than one inch in diameter not called out to be pruned with root pruning in the Tree Protection Plan.

1.04 DAMAGE ASSESSMENT

A. When trees other than those designated for removal are destroyed or damaged as a result of construction operations, remove and replace with same size, species, and variety up to and including 8 inches in trunk diameter. Trees larger than 8 inches in diameter shall be replaced with an 8 inch diameter tree of the same species and variety and total contract amount will be reduced by an amount determined from the following formula: $0.7854 \times D^2 \times \$125.00$ where D is diameter in inches of tree or shrub trunk measured 12 inches above grade for that portion of the tree which is greater than 8 inches in diameter. A permit must be applied for and approved by the City of Friendswood Forester prior to removal of any tree not scheduled for removal in the tree treatment schedule.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Pruning Paint: Black latex, water based paint, free of all petroleum products.

B. Fertilizer/Root stimulant: Root stimulant shall be a root stimulant that contains at a minimum the following ingredients: Ectomycorrhizal Fungi, VA Mycorrhizal (VAM) Fungi, *Rhizosphere Bacillus spp.*, Kelp Meal, Humic Acid, and Soluble Yucca. Fertilizer shall be Davey ArborGreen.

C. Tree Protection Fencing: Orange, plastic mesh fencing, 4 feet in height with 6 feet high “T” posts installed 10 feet on centers as per drawings.

D. Plastic Root/Soil Protection: Clear polyethylene sheeting, minimum 6 mil. thickness.

E. Sandy Loam Backfill: a loam consisting of less than 7 percent clay, less than 50 percent silt, and between 43 and 50 percent sand

PART 3 – EXECUTION

3.01 PROTECTION OF EXISTING TREES AND SHRUBS

A. Site preparation work and/or construction work shall not begin in any area where tree preservation measures have not been completed and approved by City of Friendswood.

B. Protect exposed roots and root zone areas from contamination from stabilization materials and concrete using plastic root/soil protection (polyethylene).

C. Cover exposed roots within 4 hours to reduce damage caused by desiccation. Roots may be covered with soil, mulch, polyethylene, or wet burlap to help protect them from drying.

D. Designate limited areas as concrete washout areas. Locate concrete washout areas away from root zones.

E. Install root pruning trenching where designated in tree treatment schedule and shown on the tree protection drawings. Trees scheduled for root pruning are called out specifically in the treatment schedule. Trench shall be located 2 ft. from the edge of proposed waterline or sanitary sewer for trees called out for root pruning for water or fittings, or sanitary sewer in the treatment schedule, 2 ft. from edge of proposed storm sewer pipe for trees called out for root pruning for storm in the treatment schedule, 30” back of proposed curb for trees called out for root pruning for street where zero curb cutback is not also called out, at back of proposed curb where zero curb cutback is called out in same location as root pruning, and at edge of sidewalk for trees called out for root pruning for sidewalk. Trench locations shown on tree preservation plan are drawn to scale and should be located in field as drawn on plan. Exact locations shall be approved in the field by the engineer and/or City of Friendswood prior to installation. Trenching depth shall be a minimum of 2 ft. deep and a maximum of 6 inches wide for water, fittings, sanitary sewer, storm, and street. Trenching depth shall be to the anticipated bottom of sidewalk and base material for sidewalk root pruning; roots lower than sidewalk shall not be pruned. All roots shall be cut by trencher, chainsaw, or handsaw to the specified depth. Roots shall be cut cleanly, and not ripped, torn, or chopped. Trench shall be backfilled and compacted immediately after trenching. Trench shall be installed prior to any clearing and grubbing, excavation for underground, or any other site work.

F. Install tree protection fencing around each tree to be preserved as indicated in the tree treatment schedule and on the tree protection plan.

1. Each tree to be preserved shall be protected with a tree protection fence. The fencing shall be continuous between posts, shall be pulled taut prior to securing to posts, and shall be firmly attached to the posts with a minimum of 4 wire ties.
2. All tree protection fencing shall be installed prior to site work or construction activity. The fence shall be placed in a continuous alignment as shown on the tree protection plan. Fences shown on tree protection plan are drawn to scale and shall be installed as drawn, in the field. In general, fences shall be placed 30" back of existing curb or edge of pavement where root pruning or zero curb cutback is not specified, and 6" back of root pruning trench where root pruning is specified and 12" back of curb where zero curb cutback is specified. Exact locations shall be approved by the City of Friendswood and/or engineer in the field. The Fences shall be placed to protect roots, trunks, and foliage. The contractor shall not remove or relocate tree protection fencing and shall not operate within the limits shown without direct approval of the City of Friendswood. No bore pits, peep holes, service taps, or any excavation should occur in the area of the tree protection fencing for trees called out with "bore" in the Tree Treatment Schedule. The "bore" limits shall be the same as the limits of the tree protection fencing.
3. Storage of equipment or materials will not be allowed inside a fence. Entryways and access into a protected area shall not be provided unless approved by the City of Friendswood.
4. Damage to tree fences occurring during the progress of the work shall be repaired immediately at no additional cost to owner. Workmen shall be clearly instructed to exercise caution in performance of work near trees being preserved.
5. Tree protection fencing shall be removed by contractor, at no additional costs, upon completion of all construction activity in each work zone area. Tree protection fencing materials used in the first two work zone areas shall be removed and utilized in subsequent work zone areas. Materials and labor shall be paid for each linear foot of fencing installed in first two work areas. All fencing installed in subsequent work zone areas shall be paid for labor only.

G. Boring/Auguring of water lines or sanitary sewer lines

1. Water line or sanitary sewer line shall be bored/augured/horizontally drilled under critical root zone areas of trees designated with auger or bore in the tree treatment schedule. The entire area protected with tree protection fencing shall be bored. No bore pits, come through holes, peep holes, push pits, or long or short side service taps shall be allowed in the areas protected by tree protection fencing. The tree protection plan takes into consideration the limits of augering equipment, there should be room for adequately spaced bore pits, peep holes, comethrough holes, and push pits. Any

changes to the location of the tree protection fencing shall be authorized by the City of Friendswood and/or Engineer.

H. Hand digging of Service taps and leads, fire hydrants and fittings

1. Trees called out for Hand dig short side service tap are located in very close proximity to existing short side water meters. Excavating the service tap with machinery would significantly impact the tree. These short side service taps shall be excavated with manual labor to expose any roots 1" in diameter and larger. The first 24" of excavation shall be completed manually to expose the roots. Any root 1" in diameter and larger shall remain undamaged, the roots shall not be cut, nor shall the bark and cambium layer be scraped or damaged. Once the roots are exposed, if there is adequate room to utilize a mini-excavator without damaging the roots, the mini-excavator can be utilized to complete the excavation down to the water line. 1" plywood shall be placed on grade to provide root protection in the area of access of the mini-excavator. If roots 1" diameter or larger are cut or damaged, responsible party will be subject to a citation under the Tree Ordinance and may also be required to incur the cost of tree removal and replacement of damaged tree on an inch for inch basis, if required by City of Friendswood.
2. Trees called out for Hand dig short side or long side service lead are located in very close proximity to existing water meters. Excavating the service lead with machinery would significantly impact the tree. Short side leads shall be excavated with manual labor to expose any roots 1" in diameter and larger from the service tap to the meter. Come out holes and excavation required for long side service leads shall be excavated with manual labor to expose roots 1" in diameter and larger, from the come out hole to the meter. In each case, all roots 1" in diameter and larger shall remain undamaged, the roots shall not be cut, nor shall the bark and cambium layer be scraped or damaged. If roots 1" diameter or larger are cut or damaged, responsible party will be subject to a citation under the Tree Ordinance and may also be required to incur the cost of tree removal and replacement of damaged tree on an inch by inch basis, if required by City of Friendswood.
3. Trees called out for Hand dig fire hydrant, tee, or fitting are located in very close proximity to proposed fitting. Excavating the fitting with machinery would significantly impact the tree and be in violation of the Tree Ordinance. Excavation for fire hydrant or fitting shall be completed with manual labor to expose any roots 1" in diameter and larger. In each case, all roots 1" in diameter and larger shall remain undamaged, the roots shall not be cut, nor shall the bark and cambium layer be scraped or damaged. If roots 1" diameter or larger are cut or damaged, responsible party will be subject to a citation under the Tree Ordinance and may also be required to incur the cost of tree removal and replacement of damaged tree on an inch by inch basis, if required by City of Friendswood.

4. Long side service taps shall not be located in an area specified to be bored in the tree treatment schedule. Should it be absolutely necessary to locate a long side service tap in an area specified to be bored, the excavation shall be completed as specified in paragraph 1 of this section-Hand digging short side service taps.
5. All water meters and sanitary service leads called out on P&P drawings and visible in the field have been addressed in the Tree Protection Plan. Should any additional meters or leads be found during construction, or any new meters or leads installed beneath the canopy of any tree, or in the areas fenced for tree protection, the excavation shall be completed as specified in paragraph 1 and/or 2 of this section and paid for at the unit costs for each included in the contract.

I. Pruning of Trees

1. Trees shall be pruned in accordance with the American National Standard for tree pruning, ANSI A300 (Part 1) – 2001 Pruning Revision of ANSI A300-1995 Tree, Shrub and Other Woody Plant Maintenance – Standard Practices. Pruning shall be completed by professional arborists who has received training in proper pruning techniques.
2. Clearance prune designated trees in tree protection plan for public streets, sidewalks, and construction areas. Provide 14 feet of vertical clearance over proposed water lines and proposed street construction, from back of curb on one side to back of curb on the other side. Pruning to be installed prior to any construction activity. Contractor shall notify property owner prior to trimming or pruning any trees with trunks located on private property. Exceptions will be made for trees determined to be arboriculturally significant by City of Friendswood. Pruning of the trees identified will be completed with approval and supervision of City of Friendswood.
3. All cuts should be made sufficiently close to the parent limb or trunk without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions. All lateral cuts shall be made back to a lateral that is at least 1/3 the diameter of the parent limb. Clean cuts shall be made at all times.
4. Trees shall be pruned in a manner that will not destroy or alter the natural shape and character of the tree. Apply black latex paint to all fresh wounds on Oak (Quercus) species immediately after each cut is made.
5. Pruning of trees designated in the tree protection plan shall include removal of dead, diseased, and/or broken limbs larger than 1” in diameter.

J. Tree Removal

1. Trees located in esplanade that can be safely removed with excavator may be removed and paid for as part of clearing & grubbing. Determination will be made during construction process by contractor and City of Friendswood.

2. Trees scheduled for removal shall be sawed down and debris hauled from the site the same day. The stump shall be ground to 6" below grade and excess grindings shall be hauled from the site the same day, so that a pile of grindings is not left where the stump was ground. Enough grindings should be left so that an open hole does not remain.
3. Only those trees called out for removal in the Tree Treatment Schedule shall be removed, or otherwise damaged. Should it be determined that any additional trees must be removed, a permit must be applied for and approved from the City of Friendswood prior to removal.

K. Root Stimulation

1. Deep root stimulate designated trees. Mix fertilizer with wetting agent per label instructions.
2. Stimulate entire root zone area within the dripline of the tree and continue 10 feet beyond the dripline, leaving out areas of anticipated root loss (construction areas) and sidewalks and street pavement.
3. Mixture shall be injected into the top 10 inches of soil under pressure of 150 to 200 psi as soil conditions warrant.
4. Mix in a tank with agitation capability per label instructions. Inject the mixture on a 2.5 ft. square grid at 4 lbs. actual nitrogen per 1,000 sq. ft.

L. Regularly water trees which have received root damage, to eliminate additional stress caused by lack of moisture. Water during periods without adequate rainfall. For example, should 1.0" of rain not be received within a week period, the trees should be thoroughly watered. March through September, water once every two weeks. October through February, water every three weeks. Water thoroughly to saturate the entire root zone area.

M. Chemically treat tree trunks with evidence of borer activity with the appropriate approved insecticide mixed and applied per the manufacturer's product application recommendations. Trees shall be sprayed within 24 hours after observance of borer activity.

N. Grading and filling around trees.

1. Maintain existing grade within the dripline of trees, unless otherwise indicated.
2. Where existing grade around trees is above new finish grade, under supervision of project arborist and City of Friendswood, carefully hand excavate within the dripline to make transition to new finish grade.
3. Where existing grade is below new finish grade, place sandy loam soil in a single layer to make the transition to new grade. Do not compact; hand grade to required elevation. Specifically, to areas where proposed curb is higher than existing and backfill will be required and in areas along the side of roadway where proposed curb is moving farther away from base of tree.

O. Demolition, Forming and Pouring Sidewalks (Sidewalk on Grade)

1. Demolition of existing sidewalks, located in or adjacent to the limits of tree protection fencing, shall be completed without disturbing, cutting, or otherwise damaging tree roots and soil located beneath them.
2. The new sidewalk shall be formed at or above the elevation of the existing sidewalk, without disturbing, cutting or otherwise damaging tree roots. Every effort has been made to address tree root and sidewalk elevation issues with information available in the field and on plan and profile sheets. The elevation of every tree root was not available, if tree roots are found to be in conflict with proposed sidewalk, project engineer, arborist and City of Friendswood shall be consulted as to how to install sidewalks with minimal impacts to adjacent trees.

P. Zero curb cutback & Demolition of existing curbs

1. Disturbance of tree roots or soil behind the existing and/or proposed curb within root zones of trees designated for “zero curb cutback” or “do not disturb soil & roots back of curb” shall be prohibited. If the curb cannot be removed without disturbing soil or damaging roots back of curb when using equipment for demolition, the curb shall be broken using a hand-held jackhammer and removed by hand.
2. The exposed roots and soil shall be covered immediately after demolition with 6 mil polyethylene in order to avoid desiccation, and contamination by the lime used for roadbed stabilization. The polyethylene shall be placed so that it covers the vertical face of soil back of curb and laid back onto the grade 12 inches back of curb. The polyethylene should remain in place, across the entire area specified for zero curb cutback or do not disturb soil & roots, from the time the existing curb is demolished until the time when the new curb is formed and backfilled. The polyethylene can be pulled up from the vertical face while the roadbed is being graded or mixed, to avoid catching the plastic with machinery, but shall be replaced immediately after equipment has completed. The vertical face shall not be exposed for more than 8 hours in any 24 hour period.
3. There shall be no stabilization back of curb in the zero curb cutback areas or forming with steel forms. The existing grade and roots back of existing curb shall not be disturbed. This may require forming of the new street with wooden forms with stakes inside forms, which may require leaving the forms in place after the street is poured. Should wooden forms be utilized, the wood shall be at minimum a 2x6. The new curb may require hand finishing, as a slip curb machine may not have adequate clearance without disturbing the roots that are to be protected with the zero curb cutback.
4. Roots extending into the street, or on top of the existing curb, in areas to be paved shall be cut and removed by hand prior to disturbance or removal with equipment. Roots shall be pruned flush with the proposed back of

curb. Roots one inch in diameter and larger shall be cut in a manner to provide a smooth, clean cut surface. Cuts shall be made with the appropriate pruning shears or pruning saws. Roots shall not be chopped or broken.

5. In areas where proposed curb may be lower than existing top of curb and tree roots 2" diameter or larger are present, the soil and roots shall not be graded or laid back. The existing elevation shall be maintained, and the curb formed to meet elevation or a short elevation difference between roots and top of curb maintained.

Q. Demolition, Forming and Pouring of Driveway Approaches

1. Demolition of existing driveway approaches located beneath the dripline of any tree shall be completed without disturbing, cutting, or otherwise damaging tree roots and soil located beneath them.
2. The new approach shall be formed at or above the elevation of the existing approach where tree roots 2" diameter or larger are present, without disturbing, cutting or otherwise damaging tree roots. Maximum drive slopes may be needed at bottom of apron to allow forming of drive over tree roots at top of drive. As with sidewalks, the elevation of every tree root was not available in design. If tree roots are found to be in conflict with proposed approach, project engineer, arborist and City of Friendswood shall be consulted as to how to install driveway with minimal impacts to adjacent trees.

R. Arborist Qualifications

1. Arborist - Employ qualified arborist acceptable to City's Forester to complete all tree treatments. Arborist shall be normally engaged in the field and have a minimum of 5 years' experience. Qualifications of the selected arborist shall be submitted for review and approval by the project engineer and City of Friendswood Forester.

END OF SPECIAL PROVISION

REFERENCE STANDARDS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. General quality assurance as related to Reference Standards and a list of references.

1.2 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade or Federal Standards, comply with requirement of the standard, except when more rigid requirements are specified or are required by applicable code.

B. Conform to reference standard by date of issue current on the date as stated in the General Conditions.

C. Request clarification from the Project manager before proceeding should specified reference standards conflict with the Contract Documents.

1.3 SCHEDULE OF REFERENCES

AASHTO American Society of State Highway and Transportation Officials
444 North Capitol Street NW, Suite 249
Washington, DC 20001-1512
TEL: (202) 624-5800
FAX: (202) 624-5806
WEB: www.transportation.org

ACI American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331-34396
TEL: (248) 848-3700
FAX: (248) 848-3701
WEB: www.concrete.org

AGC Associated General Contractors of America
2300 Wilson Boulevard, Suite 400
Alexandria, VA 22201-5426
TEL: (703) 548-3118
FAX: (703) 548-3119
WEB: www.acg.org

AI Asphalt Institute
2696 Research Park Drive
P. O. Box 14052
Lexington, KY 40511-8480
TEL: (859) 288-4960
FAX: (859) 288-4999
WEB: www.asphaltinstitute.org

AITC American Institute of Timber Construction
7012 S. Revere Parkway, Suite 140
Englewood, CA 80112-6769
TEL: (303) 792-9559
FAX: (303) 792-0669
WEB: www.aitc-glulam.org

AISC American Institute of Steel Construction
One East Wacker Drive, Suite 700
Chicago, IL 60601-1802
TEL: (312) 670-2400
FAX: (312) 670-5403
WEB: www.aisc.org

AISI American Iron and Steel Institute
1140 Connecticut Avenue NW, Suite 705
Washington, DC 20036-4011
TEL: (202) 452-7100
WEB: www.steel.org

ASME American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990
TEL: (973) 882-1170
FAX: (973) 882-1717
WEB: www.asme.org

ANSI American National Standards Institute
1819 L Street NW
Sixth Floor
Washington, DC 20036-3807
TEL: (202) 293-8020
FAX: (202) 293-9287
WEB: www.ansi.org

APA American Plywood Association
7011 S. 19th Street
Tacoma, WA 98466-5333
TEL: (253) 620-7400
FAX: (253) 565-7265
WEB: www.apawood.org

API American Petroleum Institute
1220 L Street, NW
Washington, DC 20005-4070
TEL: (202) 682-8000
WEB: www.api.org

AREMA American Railway Engineering and Maintenance-of-Way Association
10003 Derekwood Lane, Suite 210
Lanham, MD 20706-4875
TEL: (301) 459-3200
FAX: (301) 459-8077
WEB: www.arema.org

ASTM American Society for Testing and Materials
100 Barr Harbor Drive
West Conshoshocken, PA 19428-2959
TEL: (610) 832-9500
WEB: www.astm.org

AWPA American Wood Protection Association
P.O. Box 361784
Birmingham, AL 35236-1784
TEL: (205) 733-4077
FAX: (205) 733-4075
WEB: www.awpa.com

AWS American Welding Society
550 NW LeJeune Road
Miami, FL 33126-5649
TEL: (305) 443-9353
WEB: www.aws.org

AWWA American Water Works Association
6666 W Quincy Avenue
Denver, CO 80235-3098
TEL: (303) 794-7711
FAX: (303) 794-0804
WEB: www.awwa.org

CFTS City of Friendswood Technical Specifications
City Hall – Community Development Department
910 S. Friendswood Drive
Friendswood, TX 77546-4856
TEL: (281) 996-3201
FAX: (281) 996-3260
WEB: www.ci.friendswood.tx.us

CLFMI Chain Link Fence Manufacturers Institute
10015 Old Columbia Road, Suite B-215
Columbia, MD 21046-1865
TEL: (301) 596-2583
FAX: (301) 596-2594
WEB: www.arcat.com

CRSI Concrete Reinforcing Steel Institute
933 North Plum Grove Road
Schaumburg, IL 60173-4758
TEL: (847) 517-1200
FAX: (847) 517-1206
WEB: www.crsi.org

EJMA Expansion Joint Manufacturers Association
25 North Broadway
Tarrytown, NY 10591-3221
FAX: (914) 332-1541
WEB: www.ejma.org

FS Federal Standardization Documents
General Services Administration
Specifications Unit (WFSIS)
7th and D Streets, Southwest
Washington, DC 20406-0001
WEB: www.gsa.gov

ICEA Insulated Cable Engineer Association
P. O. Box 1568
Carrollton, GA 30112-0030
TEL: (770) 830-0369
WEB: www.icea.net

IEEE Institute of Electrical and Electronics Engineers
445 Hoes Lane
Piscataway, NJ 08854-4141
TEL: (732) 981-0060
WEB: www.ieee.org

ISA International Society of Arboriculture
P. O. Box 3129
Champaign, IL 61826-3129
TEL: (217) 355-9411
WEB: www.isa-arbor.com

MIL Military Specifications
General Services Administration
Specifications Unit (WFSIS)
7th and D Streets, Southwest
Washington, DC 20406-0001
WEB: www.gsa.gov

NACE National Association of Corrosion Engineers
1440 South Creek Drive
Houston, TX 77084-4906
TEL: (281) 228-6200
FAX: (281) 228-6300
WEB: www.nace.org

NEMA National Electrical Manufacturers Association
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209-3806
TEL: (703) 841-3200
FAX: (703) 841-5900
WEB: www.nema.org

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471
TEL: (617) 770-3000
FAX: (617) 770-0700
WEB: www.nfpa.org

NICET National Institute for Certification in Engineering Technologies
1420 King Street
Alexandria, VA 22314-2794
TEL: (888) 476-4238
WEB: www.nicet.org

OSHA Occupational Safety Health Administration
200 Constitution Avenue, NW
Washington, DC 20210-0001
TEL: (800) 321-6742
WEB: www.osha.gov

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077-1053
TEL: (847) 996-6200
FAX: (847) 996-8389
WEB: www.cement.org

PCI Prestressed Concrete Institute
209 W. Jackson Boulevard, Suite 500
Chicago, IL 60606-6938
TEL: (312) 786-0300
WEB: www.pci.org

SDI Steel Deck Institute
P. O. Box 25
Fox River Grove, IL 60021-0025
TEL: (847) 458-4647
FAX: (847) 458-4648
WEB: www.sdi.org

TAC Texas Administrative Code
Secretary of State
P. O. Box 12887
Austin, TX 78711-2887
TEL: (512) 463-0500
WEB: www.sos.state.tx.us

TCEQ Texas Commission on Environmental Quality
P. O. Box 13087
Austin, TX 78711-3087
TEL: (512) 239-1000
WEB: www.tceq.state.tx.us

TxDOT	Texas Department of Transportation 125 East 11th Street Austin, TX 78701-2409 TEL: (512) 305-9500 WEB: www.dot.state.tx.us
UL	Underwriters Laboratories, Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 TEL: (847) 272-8800 FAX: (847) 272-8129 WEB: www.ul.com
UNI-BELL	UNI-BELL Pipe Association 2711 LBJ Freeway, Suite 1000 Dallas, TX 75234-7354 TEL: (972) 243-3902 FAX: (972) 243-3907 WEB: www.uni-bell.org

PART II: PRODUCTS – NOT USED.

PART III: EXECUTION – NOT USED.

END OF SECTION

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 : GENERAL

1.1 GENERAL REQUIREMENTS

A. Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected products.

1.2 UNIT QUANTITIES SPECIFIED

A. Quantity and measurement estimates stated in the Agreement are for contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Project Manager shall determine payment.
B. When actual work requires greater or lesser quantities than those quantities indicated in the Unit Price Forms, provide required quantities as approved by the Project Manager at Unit Prices contracted.

1.3 APPLICATION FOR PROGRESS PAYMENT

A. Progress payments shall be based on the Project Manager's observations and evaluations of quantities incorporated in the Work multiplied by Unit Price.
B. Interim payments for stored materials shall be made only for materials to be incorporated under items covered in unit prices. Only material that is stored on-site and in quantities verified by the Project Manager shall be allowed for payment.
C. Attach the following to each application in this order:
    1. Contractor Pay Application.
    2. Time Request, if applicable.
        a. All weather request or delays due to acts outside of the Contractor's control shall be submitted on this document with each application for payment. Failure to do so during the period covered by the application shall result in no time being given at all. No Exceptions. Time shall not be accumulated and added at the end of the Contract.
    3. Progress Schedule, updated and current, indicating the

progress through the period covered by the application and scheduled progress through completion of the Work.

D. Payment for Change Orders shall be based the Project Manager's observation after change order work is completed. Any work started or completed on a change order that has not been approved shall not be applicable for payment.

1.4 APPLICATION FOR PAYMENT AFTER SUBSTANTIAL COMPLETION

A. The Contractor shall request an inspection for substantial completion in writing to the Project Manager.

B. The Project Manager and other appropriate entities shall, on a date set by the Project Manager, review the Work. If all are in agreement that the Work is substantially complete, the Project Manager shall issue Certificate of Substantial Completion and Punch List.

C. After the Contractor has received the Substantial Completion certificate, the Contractor shall submit application for payment with the following requirements:

3. Reduction in retainage as allowed by Section 00500 - General Conditions.

1.5 APPLICATION FOR FINAL PAYMENT

A. The Project Manager and the Contractor shall review all items listed on Document 00785 – Punch List and verify that all items are complete before executing the following steps for Final Application.

B. Submit Document 00940 – Contractor Pay Application and Document 00945 – Contractor Pay Request with the following attached:

1. Document 00790 – Contractors Certification of Final Completion.
2. Document 00775 – Certification of Payment to Subcontractors and Suppliers.
3. Document 00800 – One-Year Maintenance Bond.
4. Document 00805 – Extended Warranty Maintenance Bond, if required.
5. Final Balancing Change Order for any unused items.
6. All Operation and Maintenance Manuals.
7. All Project Record Documents as required by Section 01785 – Project Record Documents.
8. As-built Drawings.

C. The Project Manager, upon receipt of all documents in paragraph 1.5.B of this Section, shall schedule Final Acceptance at the next

regular City Council meeting.

D. Once the City Council has accepted the project, the Project Manager shall send the Contractor Document 00795 – Notice of Final Completion and release the Final Payment to the Contractor.

1.6 NONCONFORMANCE ASSESMENT

A. Remove and replace work, or portions of the Work, not conforming to the Contract Documents.

B. When not practical to remove or replace work, Director of Engineering shall direct one of the following remedies:
   1. Nonconforming work shall remain as is, but Unit Price shall be adjusted lower at the discretion of the Director of Engineering.
   2. Nonconforming work shall be modified as directed by the Director of Engineering and the Unit Price shall be adjusted lower at the discretion of the Director of Engineering, when modified work is deemed less suitable than that originally specified.

C. Specification sections may modify the above remedies or may identify a specific formula or percentage of price reduction.

D. Authority of Director of Engineering to assess nonconforming work and identify payment adjustment is final.

1.7 NONPAYMENT FOR REJECTED PRODUCTS

A. Payment shall not be made for any of the following:
   1. Products wasted or disposed of in an unacceptable manner.
   2. Products determined as nonconforming before, during or after placement.
   3. Products not completely unloaded from transporting vehicles.
   4. Products placed beyond lines and levels of required work.
   5. Products remaining on hand after completion of the Work, unless specified otherwise.
   6. Loading, hauling and disposing of rejected Products.
   7. Products, either new or existing, that were damaged by the Contractor or one (1) of the Contractors subs.

PART II: PRODUCTS – NOT USED.

PART III: EXECUTION – NOT USED.

PART IV: UNIT PRICES

PAVING ITEMS:

4.1 MOBILIZATION

A. Contractor shall follow City of Friendswood City Standard Specification. Payment includes mobilization and demobilization and is to be paid as a lump sum quantity. This also includes mobilization for the proposed 24-inch transmission water main.

4.2 TRAFFIC CONTROL AND REGULATION

A. Contractor shall install all necessary temporary and permanent traffic control compliant with the latest MUTCD and shall follow City of Friendswood Standard Specifications Section 01075 including any Special Provisions.

B. Measurement and Payment is on a lump sum basis for traffic control and regulation. The amount invoiced shall be determined based on the approved Schedule of Values for traffic control and regulation.

C. Payment includes coordinating and obtaining approvals by governing authorities, preparation and submittal of traffic control plan if the Contractor intends to employ a different sequence than shown on the plan drawings, and subsequent approval from City and any other entity prior to commencing work in their right-of-way, provision of traffic control devices, barrels, barricades, control panels, message boards, signage including arrow boards, temporary striping and raised markers, temporary relocation of existing traffic signs and mailboxes and reinstalling mailboxes beyond the proposed pavement, maintaining drainage, and provision of equipment and personnel as necessary to protect the work and the public in accordance with the Texas Manual of Uniform Traffic Control Devices (TxMUTCD). This item shall also cover the cost of any additional traffic control measures of which the Contractor may feel is necessary.

D. It is the Contractor’s responsibility to provide an all-weather access in areas between the existing and proposed pavement. This shall be at the median openings on side streets and other areas so that traffic and residential access can be maintained. This shall be included in the traffic control pay item.

E. It is the Contractor’s responsibility to provide approved notification letters or door hangers to residents or business owners 72 hours in advance of

the work.

F. This item shall include providing and installing temporary mailboxes per the United States Postal Service (USPS) requirements. The Contractor shall coordinate with the Postmaster for the type of temporary mailboxes required, including foundation. The Contractor shall install temporary blocks of mailboxes on certain side streets at locations designated by the Postmaster. This will allow the residents to pick up their mail at these locations. Upon completion of construction, the Contractor shall remove the temporary blocks of mailboxes and place the existing mailboxes beyond the proposed pavement per USPS requirements. Mailboxes damaged by construction shall be replaced to match existing at Contractor's cost.

G. No separate payment will be made for flagmen or uniformed peace officers as required for the project. Flagmen or uniformed officers shall be considered incidental to the traffic control and regulation bid item.

4.3 PREPATORY WORK FOR SAMPLING AND ANALYSIS IN SCA AND PPCA IMPACTED AREA

A. Preparatory work for sampling and analysis in Chlorinated solvent (SCA) and Potentially Petroleum Contaminated Area (PPCAs) impacted area is on a lumpsum basis.
B. Contractor to perform sampling and analysis for SCA and PPCAs per sampling limits shown in construction plans set at FM 2351 and FM 528 intersections only.
C. Contractor to refer to Section 02105 in the specification for chemical sampling and analysis.

4.4 TEMPORARY TRAFFIC SIGNALS

A. Contractor shall follow TxDOT Standard Specifications Item 681 including any Special Provisions for temporary signals at FM 2351 and FM 528 intersection. A signalized intersection is a group of signals operated by a single controller. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Temporary Traffic Signals." This price is full compensation for picking up and returning materials furnished by the City; installation, operation, maintenance, reconfiguration, and removal of the temporary traffic signal consisting of traffic signal pole assemblies, vehicle and pedestrian signal heads, vehicle loop detectors, pedestrian detectors, traffic signals, flasher controllers, and associated equipment, signs, luminaires, ground boxes, conduit, traffic

signal cables, conductors, wire strand, and electrical services; installation and removal of foundations; and materials, equipment, labor, tools, and incidentals.

4.5 IMPLEMENTATION OF STORMWATER POLLUTION PREVENTION PLAN

A. Measurement and payment for implementation of stormwater pollution prevention plan including maintenance, permitting, inspections, and reporting for all Pollution prevention measures as shown on plans, including concrete wash areas will be paid on a lump sum basis.

B. This item shall include the documentation to be prepared and signed by Contractor before conducting construction operation, in accordance with the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit Number TXR 150000 issued March 5, 2023. This project is considered a Large Construction Activity.

4.6 REMOVE AND DISPOSE OF EXISTING PAVEMENT

A. Contractor shall follow City of Friendswood Standard Specifications Section 02105 including any Special Provisions.

B. Measurement and Payment for removal and disposal of reinforced concrete pavement and base material, regardless of thickness encountered, with or without asphaltic overlay, including concrete curb and gutter, esplanade curbs, sawcutting and paving headers, is on a square yard basis measured from back to back of curbs.

C. No payment will be made for work outside maximum payment limits indicated on Drawings, or in areas removed for Contractor's convenience.

D. Payment for removing and disposing of concrete sidewalks and driveways, regardless of thickness encountered, shall be on a square yard basis.

4.7 REINFORCED CONCRETE PAVEMENT

A. Contractor shall follow the plan drawings and City of Friendswood Standard Specifications Section 02805 including any Special Provisions.

B. Measurement and Payment for reinforced concrete pavement is on a square yard basis measured from back to back of curbs at the thickness indicated in the Unit Price Bid Form, including reinforcement, joints, joint sealant, excavation, embankment, grading, curing, and connecting to

existing pavement joints. No additional payment shall be made for pavement thickness installed over the specified thickness. Any repairs from damage to existing or proposed pavement resulting from construction operations shall be repaired by the Contractor at no additional cost to the Project.

C. Additional reinforcing at zero-curb-cutback locations as designated and detailed in the Tree Protection Plan shall be paid for by linear foot along the curb per the zero-curb-cutback bid item.

4.8 LIME STABILIZED SUBGRADE

A. Contractor shall follow City of Friendswood Standard Specifications Section 02720 including any Special Provisions.

B. Measurement and Payment for lime stabilized subgrade is on a square yard basis, measured to 2-feet beyond back of curbs at locations shown on plans and as per details, at the thickness indicated in the Unit Price Bid Form. Payment shall include required grading, mixing, compacting and curing per the pertinent specification and detail.

4.9 LIME FOR STABILIZED SUBGRADE

A. Contractor shall follow City of Friendswood Standard Specifications Section 02720 including any Special Provisions.

B. Measurement for lime shall be by the ton (minimum 8% lime by dry weight). The Contractor shall provide the site inspector trip tickets on a daily basis for payment. The Contractor shall coordinate with the testing laboratory to verify the actual percentage of lime required prior to construction.

C. Payment for lime will be paid for at the unit price bid for lime and shall include full compensation for materials, delivery, equipment, labor, tools and incidentals.

4.10 6” CONCRETE DRIVEWAYS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02830 including any Special Provisions.

B. Measurement and Payment for proposed 6” thick concrete driveway is on a square yard basis and includes placement of driveway per detail, driveway curb returns, compacted stabilized subgrade, sawcutting and all

reinforcing and dowels.

C. Sidewalk areas across driveways shall be constructed at a minimum 6" thickness and reinforced per the driveway details and shall be paid for by the square yard as part of the driveway.

D. Existing driveways with unique designs shall be replaced with like materials and will be paid by square yards per this bid item. Contractor shall document unique driveways as part of the pre-construction photos.

E. Removal and disposal of existing concrete driveway, regardless of thickness encountered, including sawcutting, will be paid by square yards per separate bid item.

4.11 ADDITIONAL COST FOR DECORATIVE DRIVEWAYS TREATMENT

A. The additional cost for decorative driveway treatment shall be paid on a square yard basis.

4.12 2-INCH HMAC TYPE D ASPHALT SURFACE OVERLAY

A. Measurement and Payment for HMAC Type D asphalt surface overlay is on a square yard basis installed in place in the areas as shown on the plan drawings for pavement and driveway replacement and transitions. This shall include placement and compaction of a 3" minimum surface overlay, including sawcutting and tack coat.

B. No additional payment shall be made for pavement thickness installed over the specified thickness. This shall also include all required level up that the Contractor deems necessary to provide for an acceptable riding surface. Any repairs from damage to existing or proposed pavement resulting from construction operations shall be repaired by the Contractor at no additional cost to the Project. The Contractor shall provide the site inspector material tickets.

C. All cleaning by brushing and other methods required to prepare the base course for tack coat application is considered incidental and costs should be included in the appropriate bid item.

4.13 6-INCH TYPE B HMAC BLACKBASE COURSE

A. Measurement and Payment for black base course is on a square yard basis for each thickness as identified in the Bid Proposal installed in place in the areas as shown on the plan drawings and per details. This shall include placement and compaction of an 6" (street transitions and

driveway areas) black base material installed in 3" lifts (maximum) and prime coat. No additional payment shall be made for thickness of black base installed over the specified thickness. Any repairs from damage to existing or proposed pavement resulting from construction operations shall be repaired by the Contractor at no additional cost to the Project. The Contractor shall provide the site inspector material tickets.

4.14 8-INCH CEMENT STABILIZED SUBGRADE

A. Measurement and Payment for cement stabilized subgrade is on a square yard basis, at locations shown on plans and as per detail, at the thickness indicated in the Bid Proposal. Payment shall include required grading, mixing with existing base and cross-section, compacting, and curing. No payment will be made for cement stabilization deeper than what is specified.

4.15 PAVEMENT HEADERS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02815 including any Special Provisions.

B. Measurement and Payment for concrete paving headers is on linear foot basis measured between back of curbs adjacent to concrete pavement or between lips of gutters adjacent to concrete base. This item shall only apply to connections to existing pavement as shown on plan drawings.

4.16 4-1/2" CONCRETE SIDEWALKS / WHEELCHAIR RAMPS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02820 and 02825 including any Special Provisions.

B. Measurement and Payment for 4-1/2" thick reinforced concrete sidewalk is on a square foot basis for the area of proposed sidewalk including the landing or private walkway constructed. This shall include sawcutting, bank sand subgrade (95% compaction), reinforcement and joints, dowels and construction of steps if the existing sidewalk consists of steps. Sidewalks shall be ADA compliant.

C. Measurement and Payment for wheelchair ramps is paid by the square foot of proposed wheelchair ramp constructed per the details in the plan drawings. This shall include sawcutting, subgrade (95% compaction), reinforcement and joints, truncated domes extending the full width of the

ramp, and colored and scored ramp areas per City of Friendswood details. The ramp area includes the area from the gutter line to the top of the colored and scored ramp. Ramps shall be in conformance to latest ADA requirements.

D. Existing walkways with unique designs shall be replaced with like materials and will be paid by square foot per this bid item. Contractor shall document unique sidewalks as part of the pre-construction photos.

E. All sidewalks and wheelchair ramps shall meet criteria of the Texas Accessibility Standards and the Federal Design Guidelines, i.e. slopes, texture and coloring. The Texas Department of Licensing and Regulation (TDLR) shall inspect the site and rule on compliance. Any item found out of compliance shall be remedied at the expense of the Contractor.

4.17 REMOVE AND DISPOSE OF EXISTING CONCRETE SIDEWALK / WHEELCHAIR RAMPS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02820 including any Special Provisions.

B. Measurement and Payment for removal and disposal of sidewalk and wheelchair ramps is paid by the square foot of existing sidewalk and wheelchair ramp needed to be removed .

4.18 CONCRETE CURB FOR ROADWAY (STANDARD 6” CURB)

A. Contractor shall follow City of Friendswood Standard Specifications Section 02815 including any Special Provisions.

B. Measurement and Payment for proposed reinforced concrete curb for roadway (standard 6” curb) is on a linear foot basis measured along face of curb and shall include sawcutting, reinforcement, joints, curing, doweling, construction of curb drain openings, and thickened section for gutter depression at inlets. No separate payment shall be made for removing existing curb tapers and dowelling new curb onto existing curb or pavement. Additional fill behind proposed curb required to provide positive drainage to the street shall be considered incidental and should be included in the unit price of curb. Curb returns installed with driveways or curb ramps shall NOT be paid for under this item.

4.19 CONCRETE CURB ON SIDEWALKS / WHEELCHAIR RAMPS (0" TO 12")

A. Contractor shall follow City of Friendswood Standard Specifications Section 02815 including any Special Provisions.

B. Measurement and Payment for proposed reinforced concrete curb for sidewalk is on a linear foot basis measured along face of curb and shall include sawcutting, reinforcement, joints, curing, and doweling. Additional fill behind proposed curb required to provide positive drainage to the street shall be considered incidental and should be included in the unit price of curb. Curb returns installed with driveways or curb ramps shall NOT be paid for under this item.

4.20 RETAINING WALL

A. Retaining Wall (greater than 12" to 24") is on a linear footage basis and shall include sawcutting, reinforcement, joints, and weepholes.

4.21 CONCRETE RIP RAP ON ESPLANADE NOSE

A. Measurement and Payment for proposed concrete riprap on esplanade nose is on a square yard basis and shall include sawcutting, reinforcement, and joints.

4.22 VEHICLE LOOP DETECTORS

A. Payment for vehicle loop detector shall include sawcut containing loop wire (per TxDOT detail) for complete operation. Vehicle loop detector shall be paid for on each basis for each set of loop detectors.

B. Contractor to verify if replacement is required prior to removal and replacement.

4.23 TEMPORARY DRIVEWAY

A. It is the Contractor's responsibility to provide access to residents as much as possible. There may be residents who have special needs who needs temporary access to their driveways. There are also residents who needs access to their garage to charge their electric vehicles. These locations will be defined and coordinated during construction. In those circumstances and approved by City, Contractor to provide an all-weather vehicle access to the affected properties during construction. Vehicle access is defined as the ability to park in the driveway.

B. Temporary driveways consisting of 6 to 8 inches of crushed concrete, rock, or temporary asphalt and to be installed to maintain vehicular access to the property after the existing driveway has been removed. Payment can include the crushed concrete, rock, temporary asphalt, or select fill, if needed, installation, maintenance, and removal throughout the construction process. Temporary driveways can consist of steel plates.

C. Payment will include maintaining access to the driveway no matter how many times the temporary driveway needs to be removed and replaced to facilitate the construction effort. Temporary driveways will be paid by each.

DRAINAGE ITEMS:

4.24 REMOVE EXISTING STORM PIPE, MANHOLE / JUNCTION BOX, OR INLET

A. Contractor shall follow City of Friendswood Standard Specifications Section 02105 including any Special Provisions.

B. Payment for removing and disposing of existing storm sewer and driveway culverts is on a linear foot basis, regardless of material types, depth, round and arch size pipe, including excavation, backfilling with select fill (compacted to 95% standard proctor) and surface restoration. Measurement shall be taken along the centerline of the pipe from end to end of manhole/inlet or driveway culverts to limits identified on plans.

C. Measurement and Payment for removing and disposing of existing storm sewer manholes, including junction boxes and inlets is on a unit price basis for each manhole/junction box or inlet removed, regardless of depth, including excavation, backfilling with select fill (compacted to 95% standard proctor), salvaging ring and cover or frame and grate to a location identified by the City and all surface restoration. No additional payment shall be made if the manhole or inlet is enclosed in stabilized sand or concrete.

D. No separate payment will be made for installation of temporary storm drainage which may be necessary as existing drainage systems are being removed and new drainage systems are being installed, including any diversion pumping to maintain drainage during the construction. Include temporary drainage of adequate capacity in the unit price for related storm sewer installation item.

4.25 STORM SEWER BRICK PLUGS

A. Measurement and Payment for plugging existing or proposed storm sewer is on a unit price basis for each permanent plug installed, regardless of depth at the pipe diameter range indicated in the Unit Price Form.

B. Contractor shall follow storm sewer plug Detail provided in the plans.

4.26 REPLACE YARD DRAIN PIPING THROUGH CURB

A. Payment for removing and replacing yard drains is by each location identified on the plans. Limits of yard drain replacement shall be verified in the field.

B. Regardless of existing material and size, proposed yard drains shall be PVC Schedule 40 with sizes installed per the yard drain connection detail in the plans. Costs associated with connections to existing yard drain, bends with Fernco coupling encased in cement stabilized sand per detail, joints, and fittings shall be included in this bid item. If the yard drain is larger than a 4”, then Contractor shall add additional 4” pipes to match the capacity of the existing pipe. In such case, it will be paid per each pipe installed.

4.27 STORM SEWER

A. Contractor shall follow City of Friendswood Standard Specifications Section 02245 and 02600 including any Special Provisions.

B. Payment for storm sewers, including circular, arch, and precast reinforced concrete box culverts is on a linear foot basis for each type and size installed as indicated in the Unit Price Bid Form, including all appurtenances. Measurement for storm sewer will be taken along the centerline of the pipe to centerline of manhole/junction box/inlet cover or from end to end of culverts, regardless of depth.

C. Cost for gaskets, joint material, geotextile fabric, excavation, cement stabilized sand bedding and backfill, all surface restoration, tie-ins to existing or proposed box culverts, storm sewer pipes, junction boxes, manholes or inlets, and all appurtenances are considered incidental, and their cost shall be included in the appropriate bid item.

D. No separate payment will be made for installation of temporary storm drainage which may be necessary as existing drainage systems are being removed and new drainage systems are being installed, including

installation, removal and plugging of any diversion pumping to maintain drainage during the construction. Include temporary drainage at no cost to the project.

4.28 ADJUST EXISTING STORM SEWER MANHOLE RIM AND COVER TO NEW GRADE

A. Adjust existing storm sewer manhole is measured and paid by each. All storm sewer manholes should be adjusted and flushed with the new pavement grade.

4.29 STORM SEWER PRECAST JUNCTION BOX MANHOLES, INLETS, AND MANWAYS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02305 and 02610 including any Special Provisions.

B. Precast storm sewer junction box manholes and manways shall be measured and paid for each manhole or manway installed at the sizes and inside dimension as shown on the plan drawings and indicated in the Unit Price Bid Form, regardless of the depth. This shall be full compensation for providing labor, materials, tools, equipment, and incidentals necessary to operations. Work includes but is not limited to: excavation, installation of precast or cast-in-place concrete foundation, manhole construction, manhole box top slab to be cast-in-place because of shallow depth, grouting or gasketing joints, cones, adjusting rings, cast iron frame, cover and grates, concrete invert construction, stubbing, connections of existing and/or proposed pipe, concrete collar, compacted cement stabilized sand bedding and backfill, work to adjust top of manhole to final grade and fit into adjacent construction, all surface restoration and all appurtenances as per detail included in plan drawings.

C. Measurement and Payment for precast inlets is on an each basis for each type of inlet installed as indicated in the Unit Price Bid Form, regardless of depth, and includes but not limited to foundation, bedding, backfill, frames and grates as indicated in the plan drawings, and all appurtenances and surface restoration.

D. Payment for the above items includes but is not limited to connection of existing and proposed lines, furnishing and installing frames, grates, rings and covers, inverts, surface restoration and all appurtenances.

4.30 TRENCH PROTECTION

A. Contractor shall follow City of Friendswood Standard Specifications Section 02280 including any Special Provisions.

B. Measurement and Payment for trench safety systems used on trench excavations is on a linear foot basis measured along the centerline of the trench as indicated in the Unit Price Bid Form, including manholes and other line structures. No separate measurement will be made for shoring systems used by the Contractor for protection unless identified as Special Shoring on the Drawings or Solid Sheet Shoring required to be left in place.

C. This shall be full compensation for all work required to comply with the State of Texas Trench Safety Act, including the design of an appropriate system by a registered Engineer in the State of Texas.

D. For depths less than 5-feet the Contractor shall implement all necessary measures to obtain and maintain safe trench conditions. Non-payment for trenches at depths less than 5-feet in no way relieves the Contractor of his obligation to maintain a safe trench system.

E. Depth measurement shall be performed from the highest edge of the trench to the bottom of the trench. The measurement of the trench depth shall be to the closest foot and shall apply to the payment depth range as follows:

(1)	Actual Depth Measurement	Depth Payment Range
(2)	0 to 4.9-feet	No Payment
(3)	5.0-feet and above	As per Unit Price Bid Form

4.31 INLET PROTECTION BARRIER TYPE III

A. Contractor shall follow City of Friendswood Standard Specifications Section 01045 including any Special Provisions.

B. Type III Inlet Protection Barrier (including existing and proposed Stage II inlets) will be measured by each Type III Inlet Protection Barrier installed at the locations shown on the plan drawings.

C. Payment shall include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of this item, complete and in place, including but not limited to furnishing and placing all materials, maintenance requirements, repair and replacement of damaged sections, removal and disposal of sediment deposits, and

removal and disposal of erosion protection and sediment control systems after final stabilization.

STRIPING AND SIGNAGE ITEMS:

4.32 THERMOPLASTIC PAVEMENT MARKINGS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02860 including any Special Provisions.

B. Measurement and payment for white thermoplastic pavement markings is on a linear foot basis for the width of markings, measured in place, as indicated in the Unit Price Bid Form.

C. Measurement and payment for yellow paint along esplanade curb is on a linear foot basis measured along the face of the curb.

D. Measurement and payment for black paint with reflective beads on the concrete esplanade nose area is on a square yard basis.

E. Payment for each word, shape, or symbol is for each word, shape, or symbol installed as indicated in the Unit Price Bid Form.

F. Unit bid price for each item shall include full compensation for furnishing and placing all materials, and for all manipulations, including blast cleaning, site sealing, surface preparation and priming, labor, tools, equipment, and incidentals necessary to complete the Work in accordance with the drawings and specifications.

4.33 RAISED REFLECTIVE PAVEMENT MARKERS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02855 including any Special Provisions.

B. Measurement and payment for Type II raised reflective pavement markers is per each marker installed for each type indicated in the Unit Price Bid Form.

4.34 PROPOSED TRAFFIC SIGNS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02865 including any Special Provisions.

B. This item shall be for each permanent sign installed for each type as

indicated in the Unit Price Bid Form and Drawings. This includes removal of existing sign, removal and disposal of existing foundation and backfilling hole, drilling of proposed sign foundation hole, placement of new foundation and sign pole, and placing existing sign on new pole.

C. This item does not apply to signs utilized by the Contractor for traffic control or existing signs temporarily removed and reinstalled to allow for proposed construction.

4.35 PROJECT IDENTIFICATION SIGN

A. Contractor shall follow City of Friendswood Standard Specifications Section 01060 including any Special Provisions.

B. This item shall be for each sign installed as per specifications, including installation, maintenance and removal. The exact location of the project signs on Blackhawk Blvd. shall be determined in the field prior to installation.

C. Proof shall be approved by the City before sign is made. If the Contractor has the sign made without the approval of the City, the Contractor shall replace at no additional cost to the City.

TREE PROTECTION ITEMS:

4.36 TREE PROTECTION

A. Contractor shall follow City of Friendswood Special Provision Specifications Section 01105SP and Tree Protection Plan. Form sidewalk on grade over roots as shown on the Tree Protection Plans. Demo-form-pour walk without damage to tree roots 1” diameter or larger shall be incidental to the project.

B. Measurement and Payment of tree removal is for each tree to be removed 0 to 11.99”) and 12” to 29.99”, as indicated in the tree protection plans and shall include cost of grinding stump. The Contractor shall obtain approval from City prior to removing the trees designated for removal. The City reserves the right to delete trees designated for removal.

C. Measurement and Payment for clearance pruning shall be for each tree to be clearance pruned, regardless of size. The Contractor is responsible for coordinating with the City and the residents prior to commencing work.

D. Measurement and Payment for tree protection fencing is on linear foot

basis for all fencing to be installed, including maintenance and removal.

E. Measurement and Payment for tree root pruning trench is on linear foot basis for all root pruning to be installed. Payment for protecting roots with polyethylene is incidental.

F. Measurement and Payment for zero curb cutback is on linear foot basis for all zero-curb cutback to be installed.

G. Measurement and Payment for checkerplate sidewalk construction will be on a square foot basis.

H. Measurement and Payment for hand dig water service tap and lead or fitting shall be paid per each excavation pit required to be dug by hand.

SUPPLEMENTAL ITEMS:

All supplemental items must be authorized in writing from the City or Engineer prior to commencing.

4.37 WELL POINTING SYSTEMS FOR STORM SEWER

A. This item shall apply for well pointing systems necessary for installation of storm sewer as per bid item in the Unit Price Bid Form. This item shall also apply for junction manholes.

B. This item will be measured and paid for by the linear foot of trench, dewatered by well point systems regardless of pipe size, depth and trench width as indicated in the Unit Price Bid Form. No separate payment shall be made for pipe installation (including junction manholes) for locations requiring multiple rows of well pointing.

C. This shall be full compensation for labor, materials, tools and operations necessary, including lowering and maintaining ground water level not less than 3-feet below the bottom of the excavation, associated pumps, piping, equipment and disposal of water.

4.38 WET CONDITION BEDDING FOR STORM SEWER

A. This item shall apply for wet condition bedding installation of storm sewer as stated in the Unit Price Bid Form.

B. This item shall be measured and paid for per linear foot of pipe regardless of pipe depth and size.

C. Wet condition bedding shall be utilized when installation of storm sewer in water bearing silts and sands where mechanical dewatering does not provide a firm and stable trench bottom. It is the Contractor's responsibility to notify the Engineer if such conditions exist which may require wet condition bedding and obtain Engineer's concurrence prior to utilizing this item.

D. This bid item includes all work necessary to install the wet condition bedding including all foundation, filter fabrics and other materials.

E. The cost for this bid item will be that cost which is above and beyond that of the standard bedding (full cement stabilized sand envelope) which is incidental to the linear foot cost of the storm sewer.

4.39 WET CONDITION BEDDING FOR STORM SEWER JUNCTION BOXES

A. Wet condition bedding for storm sewer junction boxes will be measured and paid for by each box, regardless of size and depth and shall be utilized for installation of the junction box in water bearing silts and sand where mechanical dewatering does not provide a firm and stable bottom and the subgrade is unstable. It is the Contractor's responsibility to notify the Engineer if such conditions exist which may require wet condition bedding for junction boxes and obtain Engineer's concurrence prior to utilizing this item.

B. This bid item includes all work necessary to install the wet condition bedding including all foundation, filter fabrics and other materials.

4.40 SOLID SHEET SHORING

A. This item shall only be utilized after obtaining concurrence from the Engineer.

B. This item shall be paid for per linear foot of trench, where solid sheet shoring has been ordered left in place regardless of depth.

C. Solid sheet shoring ordered left in place shall be utilized when it is necessary to protect adjacent utilities, significant structures and other facilities. It is the Contractor's responsibility to notify and obtain concurrence with the City if such conditions exist which may require solid sheet shoring left in place.

D. This bid item includes all costs associated with leaving solid sheet shoring in place.

4.41 PIEZOMETERS

A. This item is intended to apply to the payment for a piezometer for the purpose of determining ground water prior to excavation.

B. It will be paid for each piezometer installed when it is determined that well pointing is not necessary. If it is determined that well pointing is necessary, then the cost of the piezometer will be incidental to the well pointing.

C. This bid item includes the cost for all installation, removal and recording and reporting of data associated with the piezometer as necessary.

4.42 INSTALL EXTRA CEMENT STABILIZED SAND BACKFILL

A. This item will be measured by the one unit for each cubic yard complete in place and paid for by the unit price. Includes cement stabilized sand in excess of amount required for normal bedding included originally and requested by City and Engineer.

B. This shall be full compensation for labor, materials, tools, and operations necessary to provide extra cement stabilized sand backfill.

C. Measurement shall be by typical trench section area filled with cement stabilized sand backfill times trench length.

4.43 INSTALL EXTRA BANK SAND BACKFILL

A. This item will be measured by the one unit for each cubic yard complete in place and paid for by unit price. Includes bank sand in excess of amount required for normal bedding included originally and requested by City and Engineer.

B. This shall be full compensation for labor, materials, tools, and operations necessary to provide extra bank sank backfill.

C. Measurement shall be by typical trench section area filled with bank sand backfill times trench length.

4.44 TEMPORARY EXTRA TYPE D ASPHALT PAVEMENT

A. This item will be measured and paid for by the ton complete in place as approved by the City and Engineer.

B. This shall be full compensation for labor, materials, tools, and operations

necessary for the work, including installation, maintenance, and removal.

4.45 EXTRA CRUSHED CONRETE BASE MATERIAL

A. This item will be measured and paid for by the ton complete in place as approved by the City and Engineer.

B. This shall be full compensation for labor, materials, tools, and operations necessary for the work.

4.46 6" OVEREXCAVATION OF TRENCH BOTTOM

A. This item will be measured and paid for the linear feet complete in place as approved by the City and Engineer.

B. This shall be full compensation for labor, materials, tools and operations necessary for the work.

4.47 EXTRA 1.5 SACK OF CEMENT

A. This item will be measured and paid for by the square yard for the extra 1.5 sack of cement per cubic yard added to the concrete pavement or driveways (total of 7.0 sack/cubic yard) at the thickness indicated on the Unit Price Bid Form complete in place as approved by the City and Engineer.

B. This shall be full compensation for labor, materials, tools and operations necessary for the work.

4.48 BRACE, SUPPORT, AND PROTECT UTILITY STRUCTURES

A. This item shall be measured by each utility structure (power poles, telephone structures) braced, supported, and protected as per Utility Company's requirements to facilitate the proposed improvements and shall be paid for as indicated in the Unit Price Bid Form.

B. This shall be full compensation for providing all labor, materials, tools, equipment necessary operations and all coordination with the appropriate utility company as necessary to perform the work.

C. Brace, support, and protection of utility structures shall be utilized when it is necessary, in the opinion of the Contractor, to protect significant structures and other facilities. It is the Contractor's responsibility to notify the City if such conditions exist which may require such effort. The Contractor shall obtain concurrence with the City and utility company prior

to performing such effort.

4.49 DECORATIVE LANDSCAPING

A. Decorative landscaping impacted by construction shall be removed and replaced back with like materials and will be paid by the square foot of landscaping area replaced. Contractor shall document decorative landscaping, including number and type of flowers, plants, bushes, rocks and associated materials as part of the pre-construction photos.

4.50 IRRIGATION SYSTEMS

A. Payment shall be per property for each irrigation system removed and replaced due to conflict during construction to obtain an operational system, including replacement of sprinkler heads to match existing head type and manufacturer, valves and plugging existing system to allow for continued use of system during construction.

4.51 ABANDON EXISTING STORM SEWER MANHOLE

A. This item shall be measured and paid for by each existing storm sewer manhole which is to be abandoned in place per the details in the plans.

4.52 CLEANING AND TELVISING EXISTING STORM SEWER

A. Cleaning and televising existing storm sewer pipe ranging from 24-inch diameter to equal to or less than 30-inch diameter, shall be measured by the linear foot of the pipe to be inspected. It shall include the capturing and proper disposal of pipe debris.

4.53 STORM SEWER POINT REPAIR

A. Proposed point repairs on existing 24” or 30” RCP storm sewer shall be measured and paid by each basis of the pipe section, with a maximum limit of 8 feet. This should include the removal and disposal of existing pipe section, and replacement with new 24” or 30” RCP storm sewer, bedding and backfill per detail and two concrete collars.

B. Additional footage of proposed 24” or 30” RCP storm sewer to Proposed Point Repairs shall be measured and paid by the linear footage.

4.54 CONCRETE COLLAR

A. Concrete Collar for 24” RCP will be paid by each.

4.55 DEVELOPMENT OF HEALTH AND SAFETY, SOIL MANAGEMENT AND GROUNDWATER CONTROL PLAN FOR SCA AND PPCAs

A. Development of a Health & Safety, Soil Management, and Groundwater Control Plan for non-hazardous (Category I) and hazardous (Category II) Chlorinated solvent (SCA) is on a lumpsum basis.

B. Development of a Health & Safety, Soil Management, and Groundwater Control Plan for non-hazardous (Category I) and hazardous (Category II) Potentially Petroleum Contaminated Area (PPCAs) is on a lumpsum basis.

4.56 OFFSITE TRANSPORTATION AND DISPOSAL OF SCA IMPACTED SOIL

A. Offsite transportation and disposal of non-hazardous (Category I) and hazardous (Category II) Chlorinated solvent (SCA) impacted soil is on a cubic yard basis.

B. Contractor to refer to Section 02120 in the specification for off-site transportation and disposal.

4.57 OFFSITE TRANSPORATION PPCAs IMPACTED SOIL

A. Offsite transportation and disposal of non-hazardous (Category I) and hazardous (Category II) Potentially Petroleum Contaminated Area (PPCAs) impacted soil is on a cubic yard basis.

B. Contractor to refer to Section 02120 in the specification for off-site transportation and disposal.

4.58 OFFSITE TRANSPORATION SCA IMPACTED GROUNDWATER

A. Offsite transportation and disposal of non-hazardous (Category I) and hazardous (Category II) Chlorinated solvent (SCA) impacted groundwater is measured in gallons.

B. Contractor to refer to Section 02120 in the specification for off-site transportation and disposal.

4.59 OFFSITE TRANSPORATION PPCAs IMPACTED GROUNDWATER

A. Offsite transportation and disposal of non-hazardous (Category I) and hazardous (Category II) Potentially Petroleum Contaminated Area (PPCAs) impacted groundwater is measured in gallons.

B. Contractor to refer to Section 02120 in the specification for off-site transportation and disposal.

4.60 24 X 8-INCH TAPPING SLEEVE W/ TAPPING VALVE AND VALVE BOX

A. Contractor shall follow City of Friendswood Standard Specifications Section 02420 including any Special Provisions.

B. Payment is on a unit price basis for each tap installed including but not limited to: 24-inch x 8-inch Tapping Sleeve with 8-inch Tapping Valve with and box: including 20 linear feet of 8-inch AWWA C900 DR25 PVC pipe, 8-inch plug w/ blow-off assembly, and any other items required to complete this work in accordance with the Contract Documents that are not paid for under bid items.

CASH ALLOWANCE ITEMS:

4.61 CASH ALLOWANCE FOR STREET LIGHT RELOCATION

A. This allowance will be for street light relocation requested by the City.

B. This allowance is for the Contractor to pay CenterPoint Energy to remove and install streetlights that are in conflict with the proposed improvements. Contractor will need to make a payment to CenterPoint for them to perform this work, and this payment plus 10% for level of effort shall be reimbursed at cost to the Contractor under this cash allowance. Contractor shall coordinate all work associated with the street light relocation with CenterPoint Energy.

C. Contractor shall submit invoices as proof of reimbursable expenses.

UTILITIES ITEMS:

4.62 WATER LINE INSTALLATION BY AUGERED CONSTRUCTION

A. Contractor shall follow City of Friendswood Standard Specifications Section 02400 including any Special Provisions.

B. Water lines shall be measured by the linear foot of pipe installed for all depths and for each size and material type as shown in the Unit Price Bid Form, including augered and service connection pits. Water lines shall be measured horizontally from centerline of fitting to centerline of fitting along the plan view of the drawings. No deduction in length will be made for valves or fittings.

C. The cost of fittings, tees, crosses, thrust blocking, joint restraints, reducers, tracer wire, bends and plugs shall be incidental to the various sizes of pipe to be installed, and no separate pay item shall be allowed, but the cost thereof shall be included in the bid unit price for the various sizes of pipe to be installed.

D. Fittings shall all include concrete thrust blocking. This cost shall be considered incidental and shall be included in the appropriate bid item.

E. Incidental items include all pavement, sidewalk, curb and driveway removal and replacement unless indicated otherwise on the Plans, bedding and backfill including cement stabilized sand backfill where backfill is under pavements, all site restoration, and all testing.

F. The water line installation shall be accomplished by augered construction. In the event the Contractor chooses to install the water line by open cut construction, no separate payment shall be made for surface restoration including but not limited to pavement, sidewalk, driveway and curb removal and replacement, unless shown in plan drawings. The Contractor is responsible for maintaining traffic per the Traffic Control Plan and access to streets and driveways if the Contractor chooses to install water line by open cut construction and when constructing auger pits if he chooses to install by auger.

G. Contractor shall fill annular space around pipe in auger hole with drilling mud at no additional cost to the project.

H. Bedding and Backfill auger pits are to conform to the water line bedding and backfill detail in the Plans.

4.63 GATE VALVES

A. Contractor shall follow City of Friendswood Standard Specifications Section 02410 including any Special Provisions.

B. Gate valves shall be measured by the number of each size installed and will be paid for at the applicable contract unit bid price listed in the Unit Price Bid Form. This includes bedding and backfill and proper adjustments of box heights.

C. The cost of the valve box and concrete pad for gate valves shall not be paid for separately, but the cost thereof shall be included in the bid unit price for the gate valve.

D. Unit price shall include all concrete thrust blocking.

4.64 WET CONNECTIONS

A. Contractor shall follow City of Friendswood Standard Specifications Section 02460 including any Special Provisions.

B. Payment for connection of new water lines to existing water lines is on a unit price basis for each connection made for each size of water line as indicated in the Unit Price Bid Form. New line testing need blowoffs for flushing, sampling and pressure testing.

C. No compensation shall be given for extra work or for damages occurring as result of incomplete shutoff.

D. 2-inch thru 4-inch connection: All fittings, saddles, pipe and tools required to make the connection shall be incidental to the cost of the connection.

E. 6-inch and larger connection: Standard wet connection or connection by use of tee or cross shall be considered one connection.

F. The items above shall include all fittings, couplings, disposal of water in cut line, bedding and backfill and all appurtenances. All existing pipe removed to make connection shall be incidental to the cost of connection. If asbestos cement pipe is encountered, strictly adhere to guidelines as outlined in OSHA Standards. The Contractor is responsible for the proper handling and disposal of the AC pipes.

4.65 6-INCH PLUG WITH 2-INCH THREADED TAP

A. This item shall be measured and paid for by each 6-inch plug with 2-inch threaded tap installed as shown on the plan drawings and Details.

4.66 2-INCH TAP ON 6-INCH PVC WATER LINE

A. This item shall be measured and paid for by each 2-inch tap on 6-inch PVC water line installed as shown on the plan drawings and Details.

4.67 CUT, PLUG, AND ABANDON EXISTING WATER LINE

A. Contractor shall follow City of Friendswood Standard Specifications Section 02445 including any Special Provisions.

B. This item shall be measured and paid for by each water line cut, plugged and abandoned as shown on the plan drawings, regardless of the depth, at the sizes indicated in the Unit Price Bid Form. The Contractor shall transfer all affected services to the proposed mains prior to abandonment

of existing mains and shall obtain City's concurrence prior to performing the abandonment.

C. If asbestos cement pipe is encountered, strictly adhere to guidelines as outlined in OSHA Standards. The Contractor is responsible for the proper handling and disposal of the AC pipes.

D. This shall be full compensation for providing all labor, materials, tools, equipment, necessary operations and all appurtenances to cut, plug and abandon existing water line in place. In the event the cut and plug is adjacent to an existing water line to remain in service, the Contractor shall install a plug and clamp and concrete thrust blocking on the existing water line remaining in service at no additional cost to the project.

4.68 8-INCH TAPPING SLEEVE AND VALVE (TS&V)

A. This item shall be measured and paid for by each as shown on the plan drawings and Details.

4.69 WATER SERVICE RECONNECTION (SHORT AND LONG)

A. Contractor shall follow City of Friendswood Standard Specifications Section 02430 including any Special Provisions.

B. This item shall apply for 1" service line (short and long) tie-ins to newly installed water mains and service line (short and long) tie-ins to water mains not designated for replacement.

C. This item will be paid for each service line installed at the sizes indicated in the Unit Price Bid Form, including meter box, and reconnected at all depths and for all sizes.

D. This shall be full compensation for providing labor, materials, tools, equipment, incidentals and necessary operations. Incidental items include all pavement, sidewalk, curb and driveway removal and replacement unless indicated otherwise on the plans, bedding and backfill including cement stabilized sand backfill where backfill is under pavements, all site and site restoration and all testing. Any hand excavation necessary while working in close proximity to trees, utilities, fences, etc. shall not be paid for separately and shall be included in the unit price bid for related item, unless indicated otherwise in the Unit Price Bid Form.

4.70 FIRE HYDRANT ASSEMBLY

A. Contractor shall follow City of Friendswood Standard Specifications Section 02435 including any Special Provisions.

B. Fire hydrant assembly shall be measured and paid for by each fire hydrant assembly installed.

C. Unit price shall include all concrete blocking, paint, tie rods, drainage medium, fittings, bends, 6” gate valve and box installed, regardless of barrel depth, and barrel (vertical) pipe as necessary to complete the work. Main line tee shall be included in the unit price for water main.

D. The work shall be performed as per the specifications and details shown on the plans.

4.71 FIRE HYDRANT LEAD

A. Contractor shall follow City of Friendswood Standard Specifications Section 02435 including any Special Provisions.

B. Payment for fire hydrant lead (horizontal) pipe is on a linear foot basis by open cut construction for all depths. Measurement shall be taken horizontally from the centerline of the water main to the centerline of the of the barrel (vertical) pipe.

C. The work shall be performed as per the specifications and details shown on the plans.

4.72 REMOVE AND SALVAGE EXISTING FIRE HYDRANT

A. This item consists of the removal of existing fire hydrants as called for in the plans.

B. Removal and salvage of fire hydrant shall be measured and paid for by each fire hydrant delivered to the City of Friendswood and will include all costs for removal (includes removal and disposal of lead pipe and associated appurtenances), storage and delivery of the fire hydrants to requested location.

C. Removal and salvage of valves to fire hydrants shall be incidental and included in the cost for the removal and salvage of the fire hydrants and be removed and delivered to the City of Friendswood.

D. Contractor shall obtain written and signed receipt from the City of

Friendswood verifying delivery of fire hydrant and valve prior to payment.

4.73 ABANDON EXISTING WATER VALVE

A. Abandonment of existing valve shall be measured and paid for by each valve abandoned in place. In-line valves on existing lines being abandoned shall be closed watertight, plugged, thrust blocked and the operating nut on said valve be cut off. All valve boxes on abandoned lines shall be removed, except those in paved areas. Those located in paved areas that are not to be reconstructed as part of this project, shall be poured full of concrete and the cap shall be permanently removed at no additional cost to the project.

4.74 RELOCATE EXISTING METER BOX

A. Relocation of existing water meters shall be measured by the number of each to be relocated and paid for at the contract unit bid price. The work shall be performed as per the specifications and plans.

B. This shall be full compensation for providing all labor, materials, tools, equipment, necessary operations and all appurtenances to relocate existing water meter.

4.75 TRENCH PROTECTION

A. Refer to Item No.4.30 of Drainage Items.

4.76 ADJUST EXISTING SANIATRY MANHOLE RIM AND COVER TO NEW GRADE

A. Adjust existing sanitary manhole is measured and paid by each. All sanitary manholes should be adjusted and flushed with the new pavement grade.

4.77 WELL POINTING SYSTEMS FOR WATER LINE

A. This item shall apply for well pointing systems necessary for installation of water line as per bid item in the Unit Price Bid Form.

B. This item will be measured and paid for by the linear foot of trench, dewatered by well point systems regardless of pipe size, depth and trench width as indicated in the Unit Price Bid Form. No separate payment shall

be made for pipe installation for locations requiring multiple rows of well pointing.

C. This shall be full compensation for labor, materials, tools and operations necessary, including lowering and maintaining ground water level not less than 3-feet below the bottom of the excavation, associated pumps, piping, equipment and disposal of water.

4.78 WET CONDITION BEDDING FOR WATER LINE

A. This item shall apply for wet condition bedding installation of pipe as stated in the Unit Price Bid Form.

B. This item shall be measured and paid for per linear foot of pipe regardless of the depth and size as stated in the Unit Price Bid Form.

C. Wet condition bedding shall be utilized when installation of water line in water bearing silts and sands where mechanical dewatering does not provide a firm and stable trench bottom. It is the Contractor's responsibility to notify the Engineer if such conditions exist which may require wet condition bedding and obtain Engineer's concurrence prior to utilizing this item.

D. This bid item includes all work necessary to install the wet condition bedding including all foundation, filter fabrics and other materials.

E. The cost for this bid item will be that cost which is above and beyond that of the standard bedding (full cement stabilized sand envelope) which is incidental to the linear foot cost of the pipe.

24" TRANSMISSION MAIN UTILITIES ITEMS:

4.79 24-INCH HDPE (DR, 13.5 DIPS) WATER TRANSMISSION MAIN BY OPEN CUT CONSTRUCTION

A. Contractor shall follow City of Friendswood Standard Specifications Section 02220 – High Density Polyethylene (HDPE) and Section 02400 – Water Lines including any Special Provisions.

B. Water lines shall be measured by the linear foot of pipe installed for all depths and for each size and material type as shown in the Unit Price Bid Form via open cut and all excavation cost shall be included in cost. Water lines shall be measured horizontally from centerline of fitting to centerline of fitting along the plan view of the drawings. No deduction in

length will be made for valves or fittings.

C. The cost of fittings, tees, crosses, thrust blocking, joint restraints, reducers, tracer wire, bends and plugs shall be incidental to the various sizes of pipe to be installed and no separate pay item shall be allowed, but the cost thereof shall be included in the bid unit price per linear foot for the various sizes of pipe to be installed.

D. Incidental items include temporary pavement, sidewalk, curb and driveway removal and replacement unless indicated otherwise on the Plans, bedding and backfill including cement stabilized sand backfill where backfill is under pavements, all site restoration, and all testing. Incidental items shall be subsidiary to the corresponding bid, items and shall not be paid for separately.

4.80 24-INCH HDPE (DR 13.5, DIPS) WATER TRANSMISSION MAIN IN 42-INCH STEEL ENCASEMENT VIA TRENCHLESS CONSTRUCTION

A. Measurement for HDPE and steel casing pipe (as designated on the drawings) is on a unit price per linear foot (horizontal distance) basis for all depths and each size and type of pipe installed. Measurement will be taken along the horizontal centerline of the casing pipe from end to end, installed as shown on the plans. The Contractor shall include in the contract unit price allowance for horizontal deflection, vertical deflection, and all wastage.

B. Payment will be made per linear foot of casing and HDPE pipe installed at the bid unit price shown for the casing and HDPE pipe size and type, and shall be full compensation for the item of work completed, complete in place, including but not limited to shafts, pipe spacers, excavation, bedding, backfill and special backfill, shoring, earthwork, welding, accessories, inspection and testing; locating and protecting existing structures, utilities and property, both public and private, regardless of whether shown on plans or not; surface restoration, cleaning up the site; furnishing all materials, labor, tools and equipment, and all incidental and related work required to complete the installation.

4.81 24-INCH GATE VALVE

A. Contractor shall follow City of Friendswood Standard Specifications Section 02410 including any Special Provisions.

B. Gate valves shall be measured by the number of valves of each size installed and will be paid for at the applicable contract unit bid price listed in the Unit Price Bid Form. This includes excavation, bedding and

backfill, hardware and proper adjustments of box heights.

C. The cost of the valve box and concrete pad for gate valves shall not be paid for separately, but shall be subsidiary to the bid unit price for the gate valve.

D. Unit price shall include all concrete thrust blocking.

4.82 2-INCH AIR RELEASE VALVE AND VAULT

A. Air Release Valve and vault shall be measured by the number of each size installed as shown on the plan drawings and details and will be paid for at the applicable contract unit bid price listed in the Unit Price Bid Form. This includes manhole or vault.

B. The cost of fittings, vent piping, bollards, and appurtenances necessary for complete installation of valve shall be considered incidental and cost thereof shall be included in the bid unit price.

4.83 CONNECTION TO EXISTING 24-INCH WATER LINE

A. Contractor shall follow City of Friendswood Standard Specifications Section 02460 including any Special Provisions.

B. This item shall be measured and paid for by each 24-inch water line connection as shown on the plan drawings and details, including PVC DR 25 pipe segments, transition couplings and all labor and materials required for a complete connection. All pipe-to-fitting connections shall be with restrained mechanical joints.

4.84 REMOVAL AND REPLACEMENT OF EXISTING 10” SANITARY SEWER LINE W/ 10-INCH PVC AWWA C900

A. Sanitary sewer removal and replacement lines shall be measured by the linear foot of pipe removed and replaced for all depths and for each size and material type as shown in the Unit Price Bid Form via open cut.

B. Measurement shall be full compensation for all labor, materials, and equipment required to provide a complete and function system as required by the Contract Documents including but not limited to: excavation, trenching, backfill, bedding, connection to existing system, all materials, labor, removal and disposal of existing sanitary sewer line, post-installation television inspection and testing, and cement stabilized sand shall be included in cost.

4.85 TRENCH SAFETY

A. Contractor shall follow City of Friendswood Standard Specifications Section 02280 including any Special Provisions.

B. This item shall be measured by the linear foot of trench safety systems installed during excavation and trenching operations.

C. Payment will be made at the per linear foot contract price as shown in the Unit Price Bid Form for installing and maintaining trench safety systems in accordance with provisions of OSHA 29CFR.

4.86 CLEAR AND GRUB AT THE TCE FOR 24" TRANSMISSION MAIN

A. Contractor shall follow City of Friendswood Standard Specifications Section 02100 including any Special Provisions.

B. This item shall be measured on a lump sum basis.

C. Payment will be made on a lump sum basis for completing clearing and grubbing and required measures as indicated and specified at the intersection of FM 2351 and Blackhawk intersection. Price shall include all labor, materials, and equipment to clear and grub the site.

4.87 DEWATERING ALONG PROJECT LIMITS

A. This item shall be measured on a lump sum basis.

B. Payment will be made on a lump sum basis for completing dewatering along project limits and required measures as indicated and specified. Price shall include all labor, materials, and equipment to perform and maintain.

4.88 TRANSMISSION MAIN TESTING AND DISINFECTION

A. This item shall be measured on a lump sum basis.

B. Payment will be made on a lump sum basis for completing the transmission main testing and disinfection and required measures as indicated and specified. Price shall include all labor, materials, and equipment to perform and maintain.

END OF SECTION

SECTION 02000
EROSION CONTROL SYSTEMS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Requirements for construction and maintenance of erosion and sedimentation systems control and their components.
- B. Requirements for location and extent of the components of erosion and sedimentation systems.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No payment will be made for erosion control systems under this Section. Include cost in applicable erosion control measures.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.
- B. CFCO – City of Friendswood Code of Ordinances.
- C. EPA – Environmental Protection Agency.
- D. TCEQ – Texas Commission on Environmental Quality.

PART II: PRODUCTS – NOT USED

PART III: EXECUTION

3.1 GENERAL
- A. No clearing and grubbing or rough cutting, other than as specifically directed by the Project Manager to allow soil testing and surveying, shall be permitted until erosion and sedimentation control systems are in place.
- B. All equipment and vehicles used on the construction site shall be prohibited by the Contractor from maneuvering on areas outside of dedicated rights-of-way, easements or areas of construction.
- C. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.
- D. Conduct all construction operation under this Contract in conformance with the erosion control practices described in this Technical Specification.

3.2 EROSION AND SEDIMENTATION CONTROL SYSTEMS REQUIRED FOR CONSTRUCTION OF WATER, SEWER AND DRAINAGE IMPROVEMENTS

A. Storm Sewers
   1. Inlet protection barriers shall be constructed prior to commencing work, using either a non-woven geotextile filter fabric silt fence or a straw bale silt fence.
   2. Inlet protection barriers shall be constructed prior to commencing work immediately around each completed or partially completed storm manhole or inlet.
   3. Contractor shall not leave any storm manhole or inlet unprotected overnight.

B. Sanitary Sewers
   1. Under no circumstances shall unfiltered runoff enter the existing sanitary sewer system during construction.
   2. Water and sediment removed from any parts of a partially constructed or unaccepted sanitary sewer system shall not be discharged directly into the storm sewer system, unprotected swales or unprotected ditches.
   3. Water and sediment shall be discharged into the storm sewer system upstream of inlet protection barriers.

C. Water Distribution System
   1. Water used to blow off the system shall be directed to nearby inlets upstream of inlet protection barriers.
   2. Water used to blow off the system shall not be directed to existing unprotected swales or unprotected ditches.

D. Place silt fences on downstream side of construction site when shown on the Drawings or when directed by the Project Manager.

E. Compact top layer of any stockpiled excavated material that is to be left on site overnight.

F. Trash pumps shall not discharge directly to any unprotected swale, unprotected ditch or unprotected low lying area.

G. Trash pumps shall discharge upstream of inlet protection barriers or silt fences.

H. The Contractor and the Project Manager shall inspect the erosion and sedimentation control system after each rain, daily during periods of prolonged rainfall and at a minimum of once a week regardless of weather.

I. When damage to sediment control system is discovered, the Contractor shall immediately repair and/or replace damaged components of the system.

J. The Contractor shall remove sediment deposits when the sediment has accumulated to one-half (1/2) the height of any area along any silt fence.

K. Cast and spread sediment deposits within the limits of the construction site as directed by the Project Manager.

3.3 EROSION AND SEDIMENTATION CONTROL SYSTEMS REQUIRED FOR CONSTRUCTION OF PAVING IMPROVEMENTS

A. Inlet protection barriers shall either be constructed by the paving contractor, or if inlet protection barriers are already in place, the paving contractor shall accept them for maintenance prior to commencing any other construction activities.
B. Place silt fences on downstream side of construction site when shown on the Drawings or when directed by the Project Manager.
C. Compact top layer of any stockpiled excavated material that is to be left on site overnight.
D. Trash pumps shall not discharge directly to any unprotected swale, unprotected ditch or unprotected low-lying area.
E. Trash pumps shall discharge upstream of inlet protection barriers or silt fences.
F. Before concrete pavement is placed and curb is completed, all previously constructed inlet protection barriers may be adjusted by the paving contractor.
G. Storm manholes and inlets shall not be left overnight without inlet protection barriers before placement of concrete pavement and curb is completed.
H. After placement and curing of the concrete curb, silt fences shall be placed behind the curb.
I. Remove inlet protection barriers only after construction of the silt fences behind the curb or other protective measures are in place.
J. The Contractor shall not leave any portion of any street unprotected overnight.
K. The Contractor and the Project Manager shall inspect the erosion and sedimentation control system after each rain, daily during prolonged periods of rainfall and at a minimum of once a week regardless of the weather.
L. When damage to sediment control system is discovered, the Contractor shall immediately repair and/or replace damaged components of the system.
M. The Contractor shall remove sediment deposits when the sediment has accumulated to one-half (1/2) the height of any area along any silt fence.
N. Cast and spread sediment deposits within the limits of the construction site as directed by the Project Manager.

3.4 MAINTENANCE

A. The following applies only when a Storm Water Pollution Prevention Program (SWPPP) has been implemented by the Contractor:
    1. Unless otherwise directed by the Project Manager, the Contractor shall be responsible for maintenance of the erosion and sedimentation control system until final acceptance of the or until the paving contractor receives notice to proceed.

2. The Project Manager shall walk through the project with the paving contractor and the Design Professional, and together the three (3) parties will observe each component of the erosion and sedimentation control system and agree that either:
   a. Each component in the system is acceptable and the paving contractor shall assume maintenance responsibilities or,
   b. List repairs the Contractor must make to each component that is not acceptable before the paving contractor shall assume maintenance responsibilities.
3. When the paving contractor receives notice to proceed, the Contractor is then responsible for maintaining the existing erosion and sedimentation control system provided that either:
   a. There are no repairs required by the Contractor or,
   b. Repairs to the system have been completed by the Contractor.
4. The paving contractor shall dispose of any component of the system constructed by the Contractor that is not reused in a manner consistent with the purpose of the system.
5. The paving contractor shall continue maintenance of the erosion and sedimentation control system after final acceptance by the City if so directed by the Project Manager and if included in the bid proposal and unit price description.
6. The paving contractor shall dispose of the system the Contractor has constructed, when so directed, by the Project Manager.

B. When a PPP has not been implemented by the WSD (Water, Sewer and/or Drainage) Contractor, the paving Contractor shall be responsible for constructing and maintaining all components required by the PPP.

3.5 DUST CONTROL

A. Control dust dispersed and movement on construction sites and roads to prevent exposure of soil surfaces, to reduce on and offsite damage, to prevent health hazards, and to improve traffic safety.
B. Control dust dispersal and movement by utilizing one or more of the following methods:
   1. Mulches bound with chemical binders such as Curasol, Terratack, or equal.
   2. Temporary vegetative cover.
   3. Spray-on adhesives on mineral soils not under traffic loads.
   4. Tillage to roughen surface and bring clods to the surface.
   5. Sprinkling with water to keep top layer moist.
C. Dust control methods shall be implemented immediately whenever dust can be observed blowing on or off the project site.

END OF SECTION

SECTION 02005
FILTER FABRIC SILT FENCE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Requirements for the installation, maintenance and removal of erosion and sedimentation control filter fabric silt fence utilized during construction and prior to the final development of the site.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for filter fabric silt fence shall be on a unit price basis. Unit price includes cost of filter fabric fence, staking poles, ditching, and reinforcing. Maintenance during construction and removal of fence are incidental to installation and there shall be no separate pay for these items.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permitivity.
- B. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 MATERIALS
- A. Material shall be Non-woven Geotextile Filter Fabric:
  1. Composed of either:
     a. Polypropylene material;
     b. Polyethylene material;
     c. Ethylene material;
     d. or Polyamide material.
  2. Grab strength shall be at least one hundred pounds (100 Lbs) in any principal direction.
  3. Mullen burst strength shall exceed two hundred pounds per square inch (200 psi).
  4. Equivalent opening size shall be between fifty gallons per minute per square foot (50 gpm/Sf) and one hundred forty gallons per minute per square foot (140 gpm/Sf).

5. Water flow rate shall be ten gallons per minute per square foot (10 gpm/Sf) at fifty millimeters (50 mm) constant head as determined by multiplying permitivity (in sec^{-1}) as determined by ASTM D4491 by a conversion factor of seventy-four (74).
6. Ultraviolet ray inhibitors and stabilizers shall provide a maximum of six months (6 Mos) of expected usable life at a temperature range of zero degrees Fahrenheit (0° F) to one hundred twenty degrees Fahrenheit (120° F).
7. Ultraviolet radiation stability shall be ninety percent (90%).
8. Fabric reinforced with support netting shall be reinforced with an industrial polypropylene netting with three-quarter inch (3/4 In) spacing and shall also include a heavy duty nylon top support cord.

B. Fence Supports
1. Two inch by two inch (2 In x 2 In) wooden posts three feet (3 Ft) long or equivalent, and field constructed or;
2. Factory pre-assembled with support netting and heavy duty nylon top support cord.

PART III: EXECUTION

3.1 GENERAL

A. Except as otherwise directed or otherwise shown on the Drawings, provide non-woven geotextile filter fabric silt fences to prevent erosion and control sedimentation.
B. Maintain silt fences until the project is accepted by the City.
C. At the City's option, silt fences may remain in place after acceptance.
D. Maintenance and removal of silt fences shall comply with all requirements as specified in Section 02000 – Erosion Control Systems.

3.2 CONSTRUCTION METHODS

A. Silt fences shall not exceed twenty-four inches (24 In) in height.
B. Wood posts shall be driven at least twelve inches (12 In) into the ground.
C. Maximum spacing of wood posts shall be three feet (3 Ft) for field constructed fences and eight feet (8 Ft) for factory pre-assembled silt fences.
D. Filter fabric shall be stapled using at least one-half inch (1/2 In) staples to the upslope side of the posts.
E. Anchor the filter fabric by spreading at least eight inches (8 In) of the fabric in a four inch by four inch (4 In x 4 In) trench or a four inch (4 In) deep V-trench on the upslope side of the fence.

END OF SECTION

SECTION 02010
STRAW BALE FENCE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Requirements for the installation of erosion and sedimentation control straw bale fences utilized during construction and prior to the final development of the site.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for straw bale fence shall be on a unit price basis. Unit price includes cost of straw bale fence, staking poles, ditching, and reinforcing. Maintenance during construction and removal of fence are incidental to installation and there shall be no separate pay for these items.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 STRAW BALES
- A. Use straw bales bound by either wire, nylon or poly-propylene rope tied across the straw bales.
- B. Do not use straw bales bound with jute, cotton rope or twine.

2.2 ANCHOR STAKES
- A. Bales shall be anchored using three-eighths inch (3/8 In) diameter reinforcing steel bars.
- B. Length of bar shall be thickness of straw bale plus two feet (2 Ft).

PART III: EXECUTION

3.1 GENERAL
- A. Except if otherwise directed or otherwise shown on the Drawings provide straw bale fences to prevent erosion and control sedimentation.
- B. Maintain straw bale fences until the project is accepted by the City.

C. At City's option, straw bale fences may remain in place after acceptance.
D. Maintenance and removal of straw bale fences shall comply with all requirements as specified in Section 02000 – Erosion Control Systems.

3.2 CONSTRUCTION METHODS

A. Excavate four inches (4 In) of material to embed each straw bale in the soil.
B. Anchor bales securely by driving anchor stakes through the bales and at least two feet (2 Ft) into the ground below the bale.
C. The first (1st) stake in each bale shall be angled toward the previously laid bale to force bales together.
D. Fill any gaps between bales with straw to prevent unfiltered runoff from escaping between the bales.
E. Wedge straw in gaps carefully so as not to separate bales.

END OF SECTION

SECTION 02015
GEOTEXTILE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Geotextile, also called filter fabric, in applications including pipe embedment wrap, around exterior of tunnel liner, around foundations of pipeline structures and slope stabilization.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
   1. No separate payment shall be made for work performed under this Section. Include cost of work in unit prices for work requiring geotextile.
   2. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):
   1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES

A. AASHTO – American Association of State Highway and Transportation Officials.
   1. AASHTO M288 – Standard Specification for Geotextile Specification for Highway Applications.

B. ASTM – American Society for Testing and Materials.
   1. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
   2. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
   3. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles (Grab Method).
   4. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of Geotextiles.
   5. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit standard manufacturer's catalog sheets and other pertinent information, for approval, prior to installation.

C. Submit installation methods, as part of work plan for tunneling or for excavation and backfill for utilities. Obtain approval from the Project

Manager for filter fabric material and proposed installation method prior to use of filter fabric.

PART II: PRODUCTS

2.1 GEOTEXTILE

A. Provide geotextile (filter fabric) designed for use in geotechnical applications. Filter fabric shall provide permeable layer or media while retaining soil matrix.

B. Use fabric which meets physical requirements for Class A subsurface drainage installation conditions as defined in AASHTO M288 and as specified in Paragraph 2.2, Properties.

2.2 PROPERTIES

A. Material: Nonwoven, nonbiodegradable, fabric consisting of continuous chain polymer filaments or yarns, at least eighty-five percent (85%) by weight polyolefins, polyesters or polyamide, formed into dimensionally stable network.

B. Chemical Resistance: Inert to commonly encountered chemicals and hydrocarbons over pH range of three (3) to twelve (12).

C. Physical Resistance: Resistant to mildew and rot, ultraviolet light exposure, insects and rodents.

D. Minimum Test Values shall be as specified in TABLE 4.1 – MINIMUM TEST VALUES FOR GEOTEXTILE MATERIAL in this section.

PART III: EXECUTION

3.1 GENERAL

A. Maintain geotextiles until the project is accepted by the City.

B. At City's option, geotextiles may remain in place after acceptance.

C. Maintenance and removal of geotextiles shall comply with all requirements as specified in Section 02000 – Erosion Control Systems.

3.2 LINE WORK

A. Conform use of geotextile to backfill for utilities to Section 02125 – Excavation and Backfill for Utilities.

PART IV: TABLES

4.1 MINIMUM TEST VALUES FOR GEOTEXTILE MATERIAL

PROPERTY	VALUE (MIN.)	TEST METHOD
Grab Strength	180 lbs.	ASTM D4632
Trapezodial Tear Strength	50 lbs.	ASTM D4533
Puncture Strength	80 lbs.	ASTM D4833
Mullen Burst Strength	290 psi.	ASTM D3786
Apparent Opening Size (1)	0.25 mm	ASTM D4751
Permittivity (sec^{-1})	0.2	ASTM D4491

(1) Maximum average roll value.

END OF SECTION

SECTION 02020
STABILIZED CONSRUCTION ACCESS, ROADS, PARKING AND WASH AREAS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Section includes requirements for construction, maintenance and removal of stabilized construction access.

B. Section includes requirements for construction, maintenance and removal of temporary stabilized roads, parking lots and wash areas.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. Payment for stabilized construction access shall be on a unit price basis for each installation.
2. Payment for temporary roads and driveways shall be on a unit basis per installation.
3. No separate measurement and payment shall be made for temporary parking lots or wash areas.
4. No separate measurement and payment shall be made for maintenance or removal or operations listed in this Section.
5. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for Work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES

A. CFTS – City of Friendswood Technical Specifications.

B. EPA – Environmental Protection Agency.

C. TCEQ – Texas Commission on Environmental Quality.

PART II: PRODUCTS

A. Permeable separator shall be a geotextile conforming to Section 02015 – Geotextile.

B. Construction access foundation shall be flexible base, bituminous concrete, cement stabilized base course, portland cement concrete or other material as approved by the Project Manager.

C. When wood construction entrance/exit is specified in the Drawings they shall conform to the following:

1. Cross timbers surface shall be treated six inch by six inch (6 In x 6 In) railroad ties a minimum of twenty foot (20 Ft) in length.

2. Bracing timber planks shall be two inch by ten inch (2 In x 10 In) treated, #2 grade minimum.

PART III: EXECUTION

3.1 GENERAL

A. Provide stabilized access, washing areas and/or parking areas at locations shown on the Drawings or as approved by the Project Manager.

B. Stabilized construction access:
   1. Shall be placed to allow positive drainage from the access to an approved sediment control system.
   2. Shall be a minimum of fifty feet (50 Ft) in length.
   3. Shall have six to one (6:1) approaches on front and back slopes of access containing permeable separator and three inch (3 In) to five inch (5 In) rock with a minimum thickness of eight inches (8 In).

C. Roads and parking areas shall be graded to provide sufficient drainage away from stabilized areas.
   1. Furnish and place geotextile fabric as a permeable separator to prevent mixing of granular fill with underlying soil.
   2. Place one inch (1 In) to five inch (5 In) granular fill to dimensions and depths shown on the Drawings or as directed by the Project Manager. The minimum thickness shall be eight inches (8 In).
   3. Use sandbags, gravel, boards or similar methods to prevent sediment from entering public rights-of-way, storm drains, ditches and watercourses.

D. Wash areas shall be graded to provide sufficient drainage away from stabilized areas.
   1. Furnish and place geotextile fabric as a permeable separator to prevent mixing of granular fill with underlying soil.
   2. Place one inch (1 In) to five inch (5 In) granular fill to dimensions and depths shown on the Drawings or as directed by the Project Manager. The minimum thickness shall be eight inches (8 In).
   3. Use sandbags, gravel, boards or similar methods to prevent sediment from entering public rights-of-way, storm drains, ditches and watercourses.

3.2 MAINTENANCE

A. Inspect and maintain stabilized areas daily. Provide periodic top dressing with additional granular fill as necessary.

B. Repair or replace components of stabilized access areas that become defective from intended use.

C. Maintain stabilized access areas as specified in Section 02000 – Erosion Control Systems until acceptance of the Project or as directed by the Project Manager.

D. Remove stabilized access as specified in Section 02000 – Erosion Control Systems promptly when directed by the Project Manager. Restore areas where stabilized construction access was removed to final project grade in preparation of turf establishment by others.

3.3 DISPOSAL

A. Remove all waste and sediment material from project conforming with requirements specified in Section 01580 – Waste Material Disposal.

END OF SECTION

SECTION 02020SP

STABILIZED CONSTRUCTION ACCESS, ROADS, PARKING AND WASH AREAS

The following provisions modify Section 02020 – Stabilized Construction Access, Roads, Parking and Wash Areas Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.2.

END OF SPECIAL PROVISION

SECTION 02025
WATER-PERMEABLE SEDIMENT FILTRATION

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements for the installation of erosion and sedimentation control such as coir logs, excelsior logs, straw lattles, filter socks, or gravel filter bags. Sandbag barriers are not allowed. This protection shall be utilized prior to the final development of the site and during construction, only to be removed after final completion and punch list items are complete.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
   1. Payment for the chosen protection shall include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, protection of trees, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, and removal of erosion and sedimentation control systems at the end of construction.
   2. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):
   1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES

A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 LOGS, STRAW LATTLES, AND FILTER SOCKS

A. Logs, straw lattles, and filter socks shall be installed as shown on the plans and/or as directed by the Engineer. They shall be placed on contour and staked with 24 inch wood stakes or metal pins, at a maximum spacing of four foot on center. The ends of adjacent rolls shall be overlapped on each other a minimum of 1.0’.

B. Rolls remain on site requiring maintenance by the Contractor throughout the project. Sediment buildup shall be removed when it reaches 1/3 the height of the roll. Any ineffective rolls must be replaced immediately. An ineffective roll is a roll that has flattened out to half its original height. Upon final stabilization it will be the responsibility of the Contractor to remove materials as directed by the Engineer. Disposal shall be the Contractor’s responsibility

2.2 GRAVEL BAGS

A. Materials: Bags shall consist of geotextile fabric (filter fabric) made of longchain synthetic polymers composed of at least 95 percent byweight of polyolefins in a woven fabric. The geotextile fabric shall meet or exceed the following specifications shown in table below:

SILT FENCE GEOTEXTILE FABRIC PROPERTIES			REQUIREMENTS UNSUPPORTED SILT FENCE	
	Units	Supported Silt Fence	Geotextile Elongation ≥50%	Geotextile Elongation <50%
Grab Strength				
Machine Direction	lbs.	90	123	123
X-Machine Direction	lbs.	90	100	100
Permittivity	sec^{-1}	0.05	0.05	0.05
Apparent Opening Size (Max. Average Roll Value)	mm/sieve	0.6/30	0.6/30	0.6/30
Ultraviolet Stability (Retained Tensile Strength)	%	70 after 500 hrs exposure	70 after 500 hrs exposure	70 after 500 hrs exposure

NOTES:
1. Table 1 adapted from AASHTO M 288 *Geotextile Specification for Highway Applications* Table 6. Temporary Silt Fence Property Requirements.
2. All numeric values in Table 1 except Apparent Opening Size (AOS) represent minimum average roll values (MARV). Values for AOS represent maximum average roll values.

B. Geotextile fabric shall contain stabilizers and/or inhibitors to make the fabric resistant to deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, and insects. Geotextile fabric shall be free of defects or flaws that affect its physical and/or filtering properties. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period. The bag size shall be as follows:

Length:	18 to 24 inches
Width:	12 to 18 inches
Thickness:	6 to 8 inches

C. The bag shall be filled with open-graded gravel and weigh 50 to 75 pounds. The gravel shall be free from adherent coatings, salt, alkali, dirt, clay, or organic and injurious matter. Nylon rope shall be used to secure the closure of the gravel filled bag

D. Torn or punctured bags shall be replaced immediately.

PART III: EXECUTION

3.1 GENERAL

A. Maintain protection until the project is accepted by the City.

B. Maintenance and removal of protection shall comply with all requirements as specified in Section 02000 – Erosion Control Systems.

3.2 CONSTRUCTION METHODS

A. Provide protection barriers at locations specified on the Drawings. The protection shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Inspect protection barrier systems after each rainfall, daily during periods of prolonged rainfall and at a minimum once a week regardless of weather. Repair or replace damaged section immediately to restore the requirements of this Item. Remove sediment deposits when silt reaches one-third of the height of the protection in depth.

END OF SECTION

SECTION 02105
REMOVING EXISTING PAVEMENTS AND STRUCTURES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Removing concrete paving, asphaltic concrete pavement, brick pavement and base courses.
B. Removing concrete curbs, concrete curbs and gutters, sidewalks and driveways.
C. Removing pipe culverts, sewers and sewer leads.
D. Removing existing inlets and manholes.
E. Removing and disposing of concrete beams, including pre-stressed beams, and drill shafts.
F. Removing miscellaneous structures constructed of concrete or masonry.
G. Removing existing bridges.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
1. Payment for removing and disposing of asphaltic surfacing with or without base, regardless of thickness encountered, shall be on a square yard basis measured between lips of gutters.
2. Payment for removing and disposing of reinforced concrete pavement, with or without asphalt overlay, regardless of thickness encountered, shall be on a square yard basis measured from back-to-back of curbs. Payment includes concrete pavement, esplanade curbs, curbs and gutters and paving headers.
3. Payment for removing and disposing of cement stabilized shell base course, with or without asphaltic surfacing, regardless of thickness encountered, shall be on a square yard basis.
4. Payment for removing and disposing of concrete sidewalks and driveways, regardless of thickness encountered, shall be on a square yard basis.
5. Payment for removing asphaltic surface course, regardless of thickness encountered, shall be on a square yard basis paid under item description "Asphalt Surface Mill." This includes removal of existing surface to pavement base.
6. Payment for removing and disposing of miscellaneous concrete and masonry items shall be on a cubic yard basis of structure in place.
7. Payment for removing and disposing of pipes, culverts, sewers and sewer leads shall be on a linear foot basis for each diameter and each material type of pipe removed.
8. Payment for removing and disposing of existing inlets shall be

on unit a price basis for each inlet removed.

9. Payment for removing and disposing of concrete piles, including pre-stressed piles, and drill shafts shall be on a linear foot basis.
10. Payment for removing and disposing of existing bridges, including piles and abutments to minimum of four feet (4 Ft) below ground level, shall be on a lump sum basis.
11. Payment for removing and disposing of existing manholes shall be on a unit price basis for each manhole removed.
12. No payment for saw cutting of pavement, curbs or curbs and gutters will be made under this section. Include cost of such work in unit prices for items requiring saw cutting which are listed on the Unit Price Form.
13. No payment will be made for work outside maximum payment limits indicated on the Drawings or for pavements, structures or other items removed for the Contractor's convenience.
    a. For utility installations: Actual pavement replaced should match but not be greater than maximum pavement replacement limits shown on the Drawings. Limits of measurement will be as shown on Street Cut Pavement Replacement Rules.
14. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):
    1. If Contract shall be Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REGULATORY REQUIREMENTS
A. Conform to applicable codes for disposal of debris.
B. Coordinate removal work with utility companies.

1.4 REFERENCES
A. CTFS – City of Friendswood Technical Specifications.

PART II: PRODUCTS – Not Used

PART III: EXECUTION

3.1 PREPARATION
A. Obtain advance approval from the Project Manager for dimensions and limits of pavement, structures and other items to be removed.
B. Identify known utilities below grade. Stake and flag locations.

3.2 PROTECTION
A. Protect the following from damage or displacement:
    1. Adjacent public and private property.

2. Trees, plants and other landscape features designated to remain.
3. Utilities designated to remain.
4. Pavement, structures and other items designated to remain.
5. Bench marks, monuments and other items designated to remain.

3.3 REMOVALS

A. Remove pavements, structures and other items by methods that will not damage underground utilities. Do not use drop hammer near existing underground utilities.
B. Minimize amount of earth loaded during removal operations.
C. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut to minimum depth of two inches (2 In).
D. When street and driveway saw cut location is greater than one-half (1/2) of pavement lane width, remove pavement for full lane width or to nearest longitudinal joint as directed by the Project Manager.
E. Remove sidewalks and curbs to nearest existing dummy, expansion or construction joint.
F. Where existing end of pipe culvert or end of sewer is to remain, install eight inch (8 In) thick masonry plug in pipe end prior to backfill in accordance with requirements of Section 02120 – Excavation and Backfill for Structures.

3.4 BACKFILL

A. Backfill of areas excavated during removal operations shall be in accordance with requirements of Section 02120 – Excavation and Backfill for Structures.

3.5 DISPOSAL

A. Inlet frames, grates and plates; and manhole frames and covers may, as directed, remain City property. Disposal shall be in accordance with requirements of Section 01580 – Waste Material Disposal.
B. Remove from site any debris resulting from work under this section in accordance with requirements of Section 01580 – Waste Material Disposal.

END OF SECTION

SECTION 02105SP

REMOVING EXISTING PAVEMENTS AND STRUCTURES

The following provisions modify Section 02105 – Removing Existing Pavements and Structures Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.7 and replace with the following:

   "Payment for removing and disposing of pipes, culverts, sewers and sewer leads shall be on a linear foot basis for all sizes, all depths and all material types of pipe removed and shall include backfilling of trench."

2. Delete paragraph 1.2.A.14 and replace with the following:

   "Refer to Section 01015 – Measurement and Payment for unit price procedures."

END OF SPECIAL PROVISION

SECTION 02110
BORROW

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Soil materials for embankment.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for borrow shall be on a cubic yard basis calculated by theoretical quantities using average end area method based on the Drawings.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials
  1. ASTM D2216 – Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures.
  2. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit location and description of proposed borrow area for approval.
- C. Submit material samples for testing.

PART II: PRODUCTS

2.1 SOIL MATERIAL
- A. Borrow material to be used for embankment shall be free of lumps greater than six inches (6 In), rocks larger than three inches (3 In), organic material, chemical waste or other contamination and debris. Take borrow material from sources approved by the Project Manager.

B. Material shall have a plasticity index not less than twelve (12), nor more than twenty (20) when tested in accordance with ASTM D4318. Maximum liquid limit shall be forty-five (45), unless approved by the Project Manager. Blending of cohesive and granular soils to achieve required plasticity index is not allowed.

PART III: EXECUTION

3.1 PREPARATION

A. Notify the Project Manager and testing laboratory five days (5 D) in advance of opening borrow source to permit obtaining samples for qualification testing. If material does not meet specification requirements, locate another source of borrow.

B. Clear approved source area of trees, stumps, brush, roots, vegetation organic matter and other unacceptable material before excavation.

3.2 TESTS

A. Test and analyze soil materials in accordance with ASTM D4318 and ASTM D2216 under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

3.3 EXCAVATION

A. Provide adequate drainage of surface water so that surface water run off does not enter borrow pit excavation.

3.4 HAULING

A. Use covered trucks to transport material to site of embankment construction. Conform to requirements of Section 01555 – Traffic Control and Regulation.

END OF SECTION

SECTION 02115
EMBANKMENT

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Construction of embankments with qualified excess excavated material and borrow material.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for borrow material and handling under this section. Include payment in unit price for excavation or borrow.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft_3 (600 kN-m/m_3)).
  2. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  3. ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- B. CFTS – City of Friendswood Technical Specifications.
- C. TCEQ – Texas Commission on Environmental Quality.
- D. TDSHS – Texas Department of State Health Services.
- E. TRRC – Texas Railroad Commission.

PART II: PRODUCTS

2.1 MATERIALS
- A. Refer to Section 02135 – Excavation For Roadway, for acceptable excess materials from roadway excavation.
- B. Refer to Section 02125 – Excavation and Backfill For Utilities, for acceptable excess materials from utility excavation and trenching.
- C. Refer to Section 02110 – Borrow, for acceptable borrow materials.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify that borrow and excess excavated materials to be reused are approved.

B. Verify that removal and clearing and grubbing operations have been completed.

3.2 PREPARATION

A. Backfill test pits, stump holes, small swales and other surface irregularities. Backfill and compact in designated lift depths to requirements for embankment compaction.

B. Record location and plug and fill inactive water and oil wells. Conform to Texas Department of State Health Services (TDSHS), Texas Commission on Environmental Quality (TCEQ) and Texas Railroad Commission (TRRC) requirements. Notify the Project Manager prior to plugging wells.

C. Excavate and dispose of unsuitable soil and other unsuitable materials which will not consolidate. Backfill and compact to requirements for embankment. Unsuitable soil is defined in Section 02120 – Excavation and Backfill for Structures and Section 02140 – Utility Backfill Materials.

D. Backfill new utilities below future grade. Conform to requirements of Sections 02125 – Excavation and Backfill For Utilities, 02400 – Water Lines, 02500 – Gravity Sanitary Sewers and 02510 – Sanitary Sewer Force Mains.

3.3 PROTECTION

A. Protect trees, shrubs, lawns, existing structures and other features outside of embankment limits.

B. Protect utilities above and below grade, which are to remain.

C. Conform to protection requirements of Section 02135 – Excavation For Roadway.

3.4 PLACING EMBANKMENT

A. Do not conduct placement operations during inclement weather or when existing ground or fill materials exceed three percent (3%) above optimum moisture content. The Contractor may manipulate wet material to facilitate drying by disking or windrowing.

B. Do not place embankment fill until density and moisture content of previously placed material complies with specified requirements.

C. Scarify areas to be filled to minimum depth of four inches (4 In) to bond existing and new materials. Mix with first (1st) fill layer.

D. Spread fill material evenly, from dumped piles or windrows, into horizontal layers approximately parallel to finished grade. Place proper thickness to meet specified compacted thickness. Break clods and lumps and mix materials by blading, harrowing, disking or other approved method. Extend each layer across full width of fill.
E. Each layer shall be homogeneous and contain uniform moisture content before compaction. Mix dissimilar abutting materials to prevent abrupt changes in composition of fill.
F. Layers shall not exceed the following compacted thickness:
    1. Areas indicated to be under future paving or shoulders, to be constructed within six months (6 Mos): six inches (6 In) when compacted with pneumatic rollers or eight inches (8 In) when compacted with other rollers.
    2. Other areas: Twelve inches (12 In).
G. For steep slopes, cut benches into slope and scarify before placing fill. Place increasingly wider horizontal layers of specified depth to level of each bench.
H. Build embankment layers on back slopes, adjacent to existing roadbeds, to level of old roadbed. Scarify top of old roadbed to minimum depth of four inches (4 In) and recompact with next fill layer.
I. Construct to lines and grades shown on the Drawings.
J. Remove unsuitable material and excess soil not being used for embankment from site in accordance with requirements of Section 01580 – Waste Material Disposal.
K. Maintain moisture content of embankment materials to attain required density.
L. Compact to following minimum densities at moisture content of optimum to three percent (3%) above optimum as determined by ASTM D698, unless otherwise indicated on the Drawings:
    1. Areas under future paving and shoulders: Minimum density of ninety-five percent (95%) of maximum dry density.
    2. Other areas: Minimum density of ninety percent (90%) of maximum dry density.

3.6 TOLERANCES
A. Top of compacted surface: Plus or minus one-half inch (±1/2 In) in cross section or in sixteen feet (16 Ft) longitudinally.

3.7 FIELD QUALITY CONTROL
A. Compaction Testing shall be performed in accordance with ASTM D698 or ASTM D2922 and ASTM D3017 under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. A minimum of three (3) tests shall be taken for each one thousand linear feet (1000 Lf) per lane of roadway or five hundred square yards (500 Sy) of embankment per lift at random locations determined by the Project Manager.

C. If tests indicate work does not meet specified compaction requirements, recondition, recompact and retest at no cost to the City.

END OF SECTION

SECTION 02115SP

EMBANKMENT

The following provisions modify Section 02115 – Embankment Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and replace with the following:

   "No separate payment will be made for embankment. Include cost in the unit price for work in related item."

END OF SPECIAL PROVISION

SECTION 02120
EXCAVATION AND BACKFILL FOR STRUCTURES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Excavation, backfilling and compaction of backfill for structures

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for structural excavation and backfill under this Section. Include payment in unit price or lump sum for construction of structures.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 DEFINITIONS
- A. Unsuitable Material
  1. Unsuitable soil materials are the following:
    a. Materials that are classified as ML, CL-ML, MH, PT, OH and OL according to ASTM D2487.
    b. Materials that cannot be compacted to required density due to gradation, plasticity or moisture content.
    c. Materials that contain large clods, aggregates, stones greater than four inches (4 In) in any dimension, debris, vegetation, waste or any other deleterious materials.
    d. Materials that are contaminated with hydrocarbons or other chemical contaminants.
- B. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement shall be considered suitable, unless otherwise indicated.
- C. Select Material: Material as defined in Section 02140 – Utility Backfill Materials.
- D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.
- E. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.

F. Foundation Base: For foundation base material, use crushed stone aggregate with filter fabric as required, cement-stabilized sand or concrete seal slab. Foundation base provides smooth, level working surface for construction of concrete foundation.

G. Foundation Subgrade: Foundation subgrade is surface of natural soil which has been excavated and prepared to support foundation base or foundation backfill, where needed.

H. Ground Water Control Systems: Installations external to excavation such as well points, eductors or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of excavation and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 01585 – Control of Ground and Surface Water.

I. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from excavation. Remove rain water and surface water which accidentally enters excavation as part of excavation drainage.

J. Excavation Drainage: Removal of surface and seepage water in excavation by sump pumping and using French drains surrounding foundation to intercept water.

K. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below foundation as shown on the Drawings and backfilled with foundation backfill material.

L. Shoring System: Structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.4 REFERENCES

A. ASTM – American Society for Testing and Materials.
   1. ASTM D698 – Standard Test Methods for Laboratory Compaction of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600kN-m/m3)).
   2. ASTM D1556 – Standard Test Method for Density of Soil in Place by Sand-Cone Method.
   3. ASTM D2922 – Standard Test Methods for Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   4. ASTM D3017 – Standard Test Method for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
   5. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

B. CFTS – City of Friendswood Technical Specifications.

C. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-101-E – Preparing Soil and Flexible Base Materials for Testing.
   2. TxDOT Tex-110-E – Particle Size Analysis of Soils.

D. OSHA – Occupational Safety and Health Administration.
   1. Federal Regulations, 29 CFR, Part 1926, Standards – Excavation, Occupational Safety and Health Administration (OSHA).

1.5 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit work plan for excavation and backfill for each structure with complete written description which identifies details of proposed method of construction and sequence of operations for construction relative to excavation and backfill activities. Use descriptions, with supporting illustrations, sufficiently detailed to demonstrate to the Project Manager that procedures meet requirements of the Technical Specifications and the Drawings.
C. Submit excavation safety system plan.
   1. Submit excavation safety system plan in accordance with applicable OSHA requirements for excavations.
   2. Submit excavation safety system plan in accordance with requirements of Section 02280 – Trench Safety Systems, for excavations that fall under State and Federal trench safety laws.
D. Submit ground and surface water control plan in accordance with requirements in this Section and Section 01585 – Control of Ground and Surface Water.
E. Submit backfill material sources and product quality information in accordance with requirements of Section 02140 – Utility Backfill Materials.
F. Submit project record documents under provisions of Section 01785 – Project Record Documents. Record location of utilities, as installed, referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.6 TESTS
A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by the City in accordance with requirements of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures and as specified in this Section.
B. Perform embedment and backfill material source qualification testing in accordance with requirements of Section 02140 – Utility Backfill Materials.

PART II: PRODUCTS

2.1 EQUIPMENT

A. Perform excavation with equipment suitable for achieving requirements of this Specification.

B. Use equipment which will produce degree of compaction specified. Compact backfill within three feet (3 Ft) of walls with hand operated equipment. Do not use equipment weighing more than ten thousand pounds (10000) closer to walls than a horizontal distance equal to depth of fill at that time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.2 MATERIAL CLASSIFICATIONS

A. Use backfill materials conforming to classifications and product descriptions of Section 02140 – Utility Backfill Materials. Use classification or product description for backfill applications as shown on the Drawings and as specified.

PART III: EXECUTION

3.1 PREPARATION

A. Conduct an inspection to determine condition of existing structures and other permanent installations.

B. Set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. Conform to requirements of Section 01555 – Traffic Control and Regulation. Maintain barricades and warning devices at all times for streets and intersections where work is in progress or where affected by the Work and such is considered hazardous to traffic movements.

C. Perform work in accordance with OSHA standards. Employ an excavation safety system as specified in Section 02280 – Trench Safety Systems.

D. Remove existing pavements and structures, including sidewalks and driveways, in accordance with requirements of Section 02105 – Removing Existing Pavements and Structures.

E. Install and operate necessary dewatering and surface water control measures in accordance with requirements of Section 01585 – Control of Ground and Surface Water.

3.2 PROTECTION

A. Protect trees, shrubs, lawns, existing structures and other permanent objects outside of grading limits and within grading limits as designated on the Drawings and in accordance with requirements of Section 01560 – Tree and Plant Protection.

B. Protect and support above-grade and below-grade utilities which are to remain.
C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on the Drawings.
D. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.
E. Maintain excavation and backfill areas until start of subsequent work. Repair and recompact slides, washouts, settlements or areas with loss of density at no additional cost to the City.

3.3 EXCAVATION

A. Perform excavation work so that underground structures can be installed to depths and alignments shown on the Drawings. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to the absolute minimum necessary. No additional payment will be made for excess excavation not authorized by the Project Manager.
B. Upon discovery of unknown utilities, badly deteriorated utilities, utilities not designated for removal or concealed conditions, discontinue work at that location. Notify the Project Manager and obtain instructions before proceeding in such areas.
C. Immediately notify agency or company owning any line which is damaged, broken or disturbed. Obtain approval from the Project Manager and agency for any repairs or relocations, whether temporary or permanent.
D. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering or other construction methods.
E. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.
F. Conduct hauling operations so that trucks and other vehicles do not create dirt nuisance in streets. Verify that truck beds are sufficiently tight and loaded in such a manner such that objectionable materials will not spill onto streets. Promptly clear away any dirt, mud or other materials that spill onto streets or are deposited onto streets by vehicle tires.
G. Maintain permanent benchmarks, monumentation and other reference points. Unless otherwise directed, replace those which are damaged or destroyed by the Work.
H. Provide sheeting, shoring and bracing where required to safely complete the Work, to prevent excavation from extending beyond limits indicated on the Drawings and to protect the Work and adjacent structures or improvements. Use sheeting, shoring and bracing to protect workmen and the general public, and which conforms to requirements of Section 02280 – Trench Safety Systems.

I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, cement-stabilized sand or other material approved by the Project Manager and compact to ninety-five percent (95%) standard density.

J. After completion of the structure, remove sheeting, shoring and bracing unless shown on the Drawings to remain in place or directed by the Project Manager in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to maintain safety during backfilling operations and to prevent damage to the Work and adjacent structures or improvements.

K. Immediately fill and compact voids left or caused by removal of sheeting with cement-stabilized sand or other material approved by the Project Manager and compact to ninety-five percent (95%) standard density.

3.4 HANDLING EXCAVATED MATERIALS

A. Classify excavated materials: Place material which is suitable for use as backfill in orderly piles at sufficient distance from excavation to prevent slides or cave-ins.

B. Provide additional backfill material in accordance with requirements of Section 02110 – Borrow, if adequate quantities of suitable material are not available from excavation and trenching operations at site.

3.5 DEWATERING

A. Provide ground water control per Section 01585 – Control of Ground and Surface Water.

B. Keep ground water surface elevation minimum of two feet (2 Ft) below bottom of foundation base.

C. Maintain ground water control as directed by Section 01585 – Control of Ground and Surface Water and until structure is sufficiently complete to provide required weight to resist hydrostatic uplift with minimum safety factor of one and two tenths (1.2).

3.6 FOUNDATION EXCAVATION

A. Notify the Project Manager at least forty-eight hours (48 Hrs) prior to planned completion of foundation excavations. Do not place foundation base until excavation is accepted by the Project Manager.

B. Excavate to elevations shown on the Drawings to provide space for foundation base, forming a level undisturbed surface free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or material as directed by the Project Manager. Prior to placing material over it, recompact subgrade where indicated on the Drawings, scarifying as needed, to ninety-five percent (95%) of maximum Standard Dry Density according to ASTM D698. If specified level of compaction cannot be achieved, moisture condition subgrade and recompact until ninety-five percent (95%) is achieved, over-excavate to provide minimum layer of twenty-four inches (24 In) of

foundation backfill material or other means acceptable to the Project Manager.

C. Fill unauthorized excessive excavation with foundation backfill material or other suitable material as directed by the Project Manager.

D. Protect open excavations from rainfall, runoff, freezing groundwater or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.

E. Remove soils which become unsuitable due to inadequate dewatering, or other causes, after initial excavation to required subgrade and replace with foundation backfill material, as directed by the Project Manager, at no additional cost to the City.

F. Place foundation base or foundation backfill material over subgrade where needed, on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with seal slab or cement-stabilized sand.

G. Use filter fabric as specified in Section 02015 – Geotextile to separate crushed aggregate and other free draining Class I materials from native soils or select material backfill. Overlap fabric minimum of twelve inches (12 In) beyond where another material stops contact with soil.

H. Place crushed aggregate and other Class I materials in uniform layers of eight inch (8 In) maximum thickness. Perform compaction by means of at least two (2) passes of vibratory compactor.

3.7 FOUNDATION BASE.

A. Place foundation base after subgrade is properly prepared, including placement of foundation backfill where needed. Use foundation base consisting of twelve inch (12 In) layer of crushed stone aggregate or cement-stabilized sand. Alternately, seal slab with minimum thickness of four inches (4 In) may be placed. Extend foundation base minimum of twelve inches (12 In) beyond edge of structure foundation, unless shown otherwise on the Drawings.

B. Where foundation base and foundation backfill are of same material, both can be placed in one (1) operation.

3.8 BACKFILL

A. Complete backfill to surface of natural ground or to lines and grades shown on the Drawings. Remove forms, lumber, trash and debris from structures. Use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on the Drawings. Deposit backfill in uniform layers and compact each layer as specified.

B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that concrete has reached minimum of eighty-five percent (85%) of specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill

operations until slab or intermediate walls have been placed and concrete has attained sufficient strength.

C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.

D. Maintain backfill material at plus or minus three percent (±3%) of optimum moisture content, unless otherwise approved by the Project Manager. Place fill material in uniform eight inch (8 In) maximum loose layers. Compact fill to at least ninety-five percent (95%) of maximum Standard Proctor Density according to ASTM D698 below paved areas. Compact fill to at least ninety-five percent (95%) around structures below unpaved areas.

E. Where backfill is placed against sloped excavation surface, run compaction equipment across boundary of cut slope and backfill to form compacted slope surface for placement of next layer of backfill.

F. Place backfill using cement-stabilized sand in accordance with Section 02145 – Cement-Stabilized Sand.

G. Hydraulic or pneumatic equipment shall be used for all backfill operations. At no time shall the lift exceed the specifications above, even when using heavy construction equipment as a compact device.

3.9 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. Tests shall be performed initially on minimum of one (1) different sample of each material type for plasticity characteristics, in accordance with ASTM D4318 and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.

C. In-place density tests of compacted subgrade and backfill shall be performed according to ASTM D1556 or ASTM D2922 and ASTM D3017 and at following frequencies and conditions:

1. Minimum of one (1) test for each lift of bedding and backfill material at intervals of five hundred feet (500 Ft) measured along the trench centerline or between every manhole, whichever results in greatest number of density tests, as determined by the Project Manager.
2. A minimum of three (3) density tests for each full work shift.
3. Density tests shall be performed in all placement areas.
4. Number of tests shall be increased when inspection determines that soil types or moisture contents are not uniform or when compacting effort is variable and not considered sufficient to attain uniform density.
5. Identify elevation of test with respect to natural ground.
6. Record approximate depth of lift tested.

D. At least one (1) test for moisture-density relationships shall be initially performed for each type of backfill material in accordance with ASTM

D698. Perform additional moisture-density relationship test once a month or whenever there is noticeable change in material gradation or plasticity.

E. When tests indicate work does not meet specified compaction requirements, recondition, recompact and retest at Contractor's expense.

3.10 DISPOSAL OF EXCESS MATERIAL

A. Excess material shall be the property of the Contractor and shall be disposed of properly with no cost to the City. Dispose of excess materials in accordance with requirements of Section 01580 – Waste Material Disposal.

END OF SECTION

SECTION 02125
EXCAVATION AND BACKFILL FOR UTILITIES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Excavation, trenching, foundation, embedment and backfill for installation of utilities, including manholes and other related structures.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
   1. No separate payment will be made for trench excavation, embedment and backfill under this Section. Include cost in unit price for installed underground piping, sewer, conduit or duct work.
   2. When the Project Manager directs the Contractor to over-excavate trench bottom, the Contractor shall be paid by the unit price bid per linear foot under Bid Item – Six inches (6 In) over-excavation of Trench Bottom.
      a. No payment shall be paid if the Project Manager does not direct the Contractor to over-excavate trench bottom.
      b. No over excavation shall be measured or paid when unsuitable conditions result from dewatering system not in conformance with Section 01585 – Control of Ground and Surface Water.
   3. No separate payment shall be made for performing Critical Location exploratory excavation. Include cost in the unit price for work requiring critical location.
   4. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):
   1. If Contract is Stipulated Price Contract, payment for Work in this Section shall be included in Total Stipulated Price.

1.3 DEFINITIONS

A. Pipe Foundation: Suitable and stable native soils that are exposed at trench subgrade after excavation to depth of bottom of bedding as shown on the Drawings or foundation backfill material placed and compacted in over-excavations.

B. Pipe Bedding: Portion of trench backfill that extends vertically from top of foundation up to level line at bottom of pipe and horizontally from one (1) trench sidewall to opposite sidewall.

C. Haunching: Material placed on either side of pipe from top of bedding up to springline of pipe and horizontally from one (1) trench sidewall to opposite sidewall.

D. Initial Backfill: Portion of trench backfill that extends vertically from springline of pipe (top of haunching) up to level line twelve inches (12 In) above top of pipe and horizontally from one (1) trench sidewall to opposite sidewall.

E. Pipe Embedment: Portion of trench backfill that consists of bedding, haunching and initial backfill.

F. Trench Zone: Portion of trench backfill that extends vertically from top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement.

G. Unsuitable Material: Unsuitable soil materials are the following:
   1. Materials that are classified as ML, CL-ML, MH, PT, OH and OL according to ASTM D2487.
   2. Materials that cannot be compacted to required density due to gradation, plasticity or moisture content.
   3. Materials that contain large clods, aggregates, stones greater than two inches (2 In) in any dimension, debris, vegetation, waste or any other deleterious materials.
   4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

H. Suitable Material: Suitable soil materials are those meeting specification requirements. Materials mixed with lime or cement that can be compacted to required density and meeting requirements for suitable materials may be considered suitable materials, unless otherwise indicated.

I. Backfill: Suitable material meeting specified quality requirements placed and compacted under controlled conditions.

J. Ground Water Control Systems: Installations external to trench, such as well points, eductors or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of trench excavation and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 01585 – Control of Ground and Surface Water.

K. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from trench excavation. Rain water and surface water accidentally entering trench shall be controlled and removed as part of excavation drainage.

L. Excavation Drainage: Removal of surface and seepage water in trench by sump pumping and using drainage layer, as defined in ASTM D2321, placed on foundation beneath pipe bedding or thickened bedding layer of Class I material.

M. Trench Conditions are defined with regard to stability of trench bottom and trench walls of pipe embedment zone. Maintain trench conditions that provide for effective placement and compaction of embedment material directly on or against undisturbed soils or foundation backfill, except where structural trench support is necessary.
   1. Dry Stable Trench: Stable and substantially dry trench

conditions exist in pipe embedment zone as result of typically dry soils or achieved by ground water control (dewatering or depressurization) for trenches extending below ground water level.

2. Stable Trench with Seepage: Stable trench in which ground water seepage is controlled by excavation drainage.
   a. Stable Trench with Seepage in Clay Soils: Excavation drainage is provided in lieu of or to supplement ground water control systems to control seepage and provide stable trench subgrade in predominately clayey soils prior to bedding placement.
   b. Stable Wet Trench in Sandy Soils: Excavation drainage is provided in embedment zone in combination with ground water control in predominately sandy or silty soils.

N. Unstable Trench: Unstable trench conditions exist in pipe embedment zone if ground water inflow or high water content causes soil disturbances, such as sloughing, sliding, boiling, heaving or loss of density.

O. Sub-trench: Sub-trench is special case of benched excavation. Sub-trench excavation below trench shields or shoring installations may be used to allow placement and compaction of foundation or embedment materials directly against undisturbed soils. Depth of sub-trench depends upon trench stability and safety as determined by Contractor.

P. Trench Dam: Placement of low permeability material in pipe embedment zone or foundation to prohibit ground water flow along trench.

Q. Over-excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below top of foundation as shown on the Drawings and backfilled with foundation backfill material.

R. Foundation Backfill Materials: Natural soil or manufactured aggregate of controlled gradation and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill to provide stable support for bedding. Foundation backfill materials may include concrete seal slabs.

S. Trench Safety Systems include both protective systems and shoring systems as defined in Section 02280 – Trench Safety Systems.

T. Trench Shield (Trench Box): Portable worker safety structure moved along trench as work proceeds, used as protective system and designed to withstand forces imposed on it by cave-in, thereby protecting persons within trench. Trench shields may be stacked if so designed or placed in series depending on depth and length of excavation to be protected.

U. Shoring System: Structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins or to prevent movement of ground affecting adjacent installations or improvements.

V. Special Shoring: Shoring system meeting special shoring as specified in

Paragraph 1.8, Special Shoring Design Requirements, for locations identified on the Drawings.

1.4 REFERENCES

A. ASTM – American Society for Testing and Materials.
   1. ASTM C12 – Standard Practice for Installing Vitrified Clay Pipe Lines.
   2. ASTM D558 – Standard Test Methods for Moisture-Density Relations of Soil Cement Mixtures.
   3. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft).
   4. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
   5. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
   6. ASTM D2487 – Standard Classification of Soils for Engineering Purposes.
   7. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   8. ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   9. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

B. CFTS – City of Friendswood Technical Specifications.

C. OSHA – Occupational Safety and Health Administration.
   1. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).

D. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-101-E – Preparing Soil and Flexible Base Materials for Testing.
   2. TxDOT Tex-110-E – Particle Size Analysis of Soils.

1.5 SCHEDULING

A. Schedule work so that pipe embedment can be completed on same day that acceptable foundation has been achieved for each section of pipe installation, manhole or other related structures.

1.6 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit planned typical method of excavation, backfill placement and compaction including:
   1. Trench widths.
   2. Procedures for foundation and pipe zone bedding placement and trench backfill compaction.
   3. Procedures for assuring compaction against undisturbed soil

when pre-manufactured trench safety systems are proposed.

C. Submit backfill material sources and product quality information in accordance with requirements of Section 02140 – Utility Backfill Materials.
D. Submit trench excavation safety program in accordance with requirements of Section 02280 – Trench Safety Systems. Include designs for special shoring meeting requirements defined in Paragraph 1.8, Special Shoring Design Requirements contained herein.
E. Submit record of location of utilities as installed, referenced to survey control points. Include locations of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts and gradients.
F. Submit eleven inch by seventeen inch (11 In x 17 In) copy of the Drawing with plotted utility or obstruction location titled "Critical Location Report" to the Project Manager.

1.7 TESTING

A. Testing and analysis of backfill materials for soil classification and compaction during construction shall be performed by an independent laboratory in accordance with requirements of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures and as specified in this Section.
B. Perform backfill material source qualification testing in accordance with requirements of Section 02140 – Utility Backfill Materials.

1.8 SPECIAL SHORING DESIGN REQUIREMENTS

A. Have special shoring designed or selected by the Contractor's Professional Engineer to provide support for sides of excavations, including soils and hydrostatic ground water pressures as applicable and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities. Special shoring may be a premanufactured system selected by the Contractor's Professional Engineer licensed by the State of Texas to meet project site requirements based on manufacturer's standard design.

PART II: PRODUCTS

2.1 EQUIPMENT

A. Perform excavation with hydraulic excavator or other equipment suitable for achieving requirements of this Section.
B. Use only hand-operated pneumatic or hydraulic tamping equipment until minimum cover of twelve inches (12 In) is obtained over pipes, conduits and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits or ducts.
C. Use trench shields or other protective systems or shoring systems which are designed and operated to achieve placement and compaction of

backfill directly against undisturbed native soil.

D. Use special shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems or other systems meeting requirements as specified in Paragraph 1.8, Special Shoring Design Requirements.

2.2 MATERIAL CLASSIFICATIONS

A. Embedment and Trench Zone Backfill Materials: Conform to classifications and product descriptions of Section 02140 – Utility Backfill Materials.

B. Concrete Backfill: Conform to requirements for Class A concrete as specified in Section 03300 – Structural Concrete.

C. Geotextile (Filter Fabric): Conform to requirements of Section 02015 – Geotextile.

D. Concrete for Trench Dams: Concrete backfill or three (3) sack premixed (bag) concrete.

E. Timber Shoring Left in Place: Untreated oak.

PART III: EXECUTION

3.1 STANDARD PRACTICE

A. Install flexible pipe, including "semi-rigid" pipe, to conform to standard practice described in ASTM D2321 and as described in this Section. Where an apparent conflict occurs between standard practice and requirements of this Section, this Section governs.

B. Install rigid pipe to conform to standard practice described in ASTM C12 and as described in this Section. Where an apparent conflict occurs between standard practice and requirements of this Section, this Section governs.

C. Classification of material will be determined by the Project Manager.

3.2 PREPARATION

A. Establish traffic control to conform to requirements of Section 01555 – Traffic Control and Regulation. Maintain barricades and warning lights for streets and intersections affected by the Work and are considered hazardous to traffic movements.

B. Perform work to conform to applicable safety standards and regulations. Employ trench safety system as specified in Section 02280 – Trench Safety Systems.

C. Immediately notify agency or company owning any existing utility line which is damaged, broken or disturbed. Obtain approval from the Project Manager and agency for any repairs or relocations, either temporary or permanent.

D. Remove existing pavements and structures, including sidewalks and driveways, to conform to requirements of Section 02105 – Removing

Existing Pavements and Structures, as applicable.

E. Install and operate necessary dewatering and surface-water control measures to conform to Section 01585 – Control of Ground and Surface Water. Provide stable trench to allow installation in accordance with the Technical Specifications.

F. Maintain permanent benchmarks, monumentation and other reference points. Unless otherwise directed in writing, replace those which are damaged or destroyed in accordance with Section 01725 – Field Surveying.

3.3 CRITICAL LOCATION INVESTIGATION

A. Horizontal and vertical location of various underground lines shown on the Drawings, including but not limited to water lines, gas lines, storm sewers, sanitary sewers, telecommunication lines, electric lines or power ducts, pipelines, concrete and debris, are based on best information available but are only approximate locations. **At Critical Locations shown on the Drawings, field verify horizontal and vertical locations of such lines within zone two feet (2 Ft) vertically and four feet (4 Ft) horizontally of the proposed work.**

1. Verify location of existing utilities a minimum of seven working days (7 wD) in advance of pipe laying activities based on daily pipe laying rate. Use extreme caution and care when uncovering these lines.
2. Notify the Project Manager in writing immediately upon identification of obstruction. In event of failure to identify obstruction a minimum of seven days (7 D) in advance, the Contractor shall not be entitled to extra cost for downtime including, but not limited to, payroll, equipment, overhead, demobilization and remobilization, until seven days (7 D) has passed from the time the Project Manager is notified of obstruction.
3. **Verify all locations where there is specified to be a tie-in into existing utilities or infrastructure before the start of excavation, so as to verify all grades and locations.** Failure to do so shall result in the replacement of the installed work at the Contractor's cost for any work installed before finding an error in elevations or locations.

B. Notify involved utility companies of date and time that excavation will occur and request that their respective utility lines be marked in field. Comply with utility or pipeline company requirements that their representative be present during excavation. Provide the Project Manager with at least forty-eight hours (48 Hrs) notice prior to excavation or related work.

C. Survey vertical and horizontal locations of obstructions relative to project baseline and datum and plot results on eleven inch by seventeen inch (11 In x 17 In) copy of the Drawings. For large diameter water lines,

submit to the Project Manager for approval, with horizontal and vertical alignment dimensions for connections to existing lines tied into project baseline, and signed and sealed by Registered Professional Land Surveyor (R.P.L.S.) licensed by the State of Texas.

3.4 PROTECTION

A. Protect trees, shrubs, lawns, existing structures and other permanent objects outside of grading limits and within grading limits as designated on Drawings and in accordance with requirements of Section 01560 – Tree and Plant Protection.

B. Protect and support above-grade and below-grade utilities which are to remain.

C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on the Drawings.

D. Take measures to minimize erosion of trenches. Do not allow water to pond in trenches. Where slides, washouts, settlements or areas with loss of density or pavement failures or potholes occur, repair, recompact and pave those areas at no additional cost to the City.

3.5 EXCAVATION

A. Except as otherwise specified or shown on the Drawings, install underground utilities in open cut trenches with vertical sides.

B. Perform excavation work so that pipe, conduit and ducts can be installed to depths and alignments shown on the Drawings. Avoid disturbing surrounding ground and existing facilities and improvements.

C. Determine trench excavation widths using TABLE 4.1 – TRENCH EXCAVATION WIDTHS as related to pipe outside diameter (O.D.), in this Section.

D. Use sufficient trench width or benches above embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill and other materials.

E. Upon discovery of unknown utilities, badly deteriorated utilities, utilities not designated for removal or concealed conditions, discontinue work at that location. Notify the Project Manager and obtain instructions before proceeding.

F. Shoring of Trench Walls.

1. Install Special Shoring in advance of trench excavation or simultaneously with trench excavation, so that soils within full height of trench excavation walls will remain laterally supported at all times.
2. For all types of shoring, support trench walls in pipe embedment zone throughout installation. Provide trench wall supports

sufficiently tight to prevent washing trench wall soil out from behind trench wall support.

3. Leave sheeting driven into or below pipe embedment zone in place to preclude loss of support of foundation and embedment materials, unless otherwise directed by the Project Manager. Leave rangers, walers and braces in place as long as required to support sheeting, which has been cut off and trench wall in vicinity of pipe zone.
4. Employ special methods for maintaining integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.
5. If sheeting or other shoring is used below top of pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into embedment zone shall be equivalent of one inch (1 In) thick steel plate. As sheeting is removed, fill in voids left with grouting material.

G. Use of Trench Shields: When trench shield (trench box) is used as worker safety device, the following requirements apply:
   1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to trench sidewalls.
   2. Move trench shields so that pipe and backfill materials, after placement and compaction, are not damaged nor disturbed, nor degree of compaction reduced. Re-compact after shield is moved if soil is disturbed.
   3. When required, place, spread and compact pipe foundation and bedding materials beneath shield. For backfill above bedding, lift shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.
   4. Maintain trench shield in position to allow sampling and testing to be performed in safe manner.
   5. Conform to applicable Government regulations.

H. Voids under paving area outside shield caused by the Contractor's work will require removal of pavement, consolidation and replacement of pavement in accordance with the Contract Documents. Repair damage resulting from failure to provide adequate supports.

I. Place sand or soil behind shoring or trench shield to prevent soil outside shoring from collapsing and causing voids under pavement. Immediately pack suitable material in outside voids following excavation to avoid caving of trench walls.

J. Coordinate excavation within fifteen feet (15 Ft) of any products pipeline with company's representative. Support pipeline with methods agreed to by the Pipeline Company’s representative. Use small, rubber tired

excavator such as a backhoe, to do exploratory excavation. Bucket that is used to dig in close proximity to pipelines shall not have teeth or shall have guard installed over teeth to approximate bucket without teeth. Excavate by hand within one foot (1 Ft) of the pipeline. Do not use larger excavation equipment than normally used to dig trench in vicinity of pipeline until pipelines have been uncovered and fully exposed. Do not place large excavation and hauling equipment directly over pipelines unless approved by the Pipeline Company's representative.

K. When, during excavation to uncover pipelines, a screwed collar or an oxyacetylene weld is exposed, immediately notify the Project Manager. Provide supports for collar or welds. Discuss with the Pipeline Company's representative and determine methods of supporting collar or weld during excavation and later backfilling operations. When collar is exposed, request the Pipeline Company to provide welder in a timely manner to weld ends of collar prior to backfilling of excavation.

3.6 HANDLING EXCAVATED MATERIALS

A. Use only excavated materials, which are suitable as defined in this Section and conforming to Section 02140 – Utility Backfill Materials. Place material suitable for backfilling in stockpiles at distance from trench to prevent slides or cave-ins.

B. When required, provide additional backfill material conforming to requirements of Section 02140 – Utility Backfill Materials.

C. Do not place stockpiles of excess excavated materials on streets and adjacent properties. Protect backfill material to be used on site. Maintain site conditions in accordance with Section 01505 – Temporary Facilities and Controls. Excavate trench so that pipe is centered in trench. Do not obstruct sight distance for vehicles utilizing roadway or detours with stockpiled materials.

3.7 TRENCH FOUNDATION

A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.

B. When wet soil is encountered on trench bottom and dewatering system is not required, over excavate an additional six inches (6 In) with approval by the Project Manager. Place non-woven geotextile fabric and then compact twelve inches (12 In) of crushed stone in one lift on top of fabric. Compact crushed stone with four (4) passes of vibratory-type compaction equipment.

C. Perform over-excavation, if directed by the Project Manager, in accordance with Paragraph 3.7.B above. Removal of unstable or unsuitable material may be required if approved by the Project Manager;

1. Even though the Contractor has not determined material to be unsuitable or;
2. If unstable trench bottom is encountered and an adequate

ground water control system is installed and operating according to Section 01585 – Control of Ground and Surface Water.

D. Place trench dams in Class I foundations in line segments longer than one hundred feet (100 Ft) between manholes and not less than one (1) in every five hundred feet (500 Ft) of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than five feet (5 Ft) from manholes.

3.8 PIPE EMBEDMENT, PLACEMENT AND COMPACTION

A. Remove loose, sloughing, caving or otherwise unsuitable soil from bottoms and sidewalls of trenches immediately prior to placement of embedment materials.

B. Place embedment including bedding, haunching and initial backfill as shown on the Drawings.

C. For pipe installation, manually spread embedment materials around pipe to provide uniform bearing and side support when compacted. Protect flexible pipe from damage during placing of pipe zone bedding material. Perform placement and compaction directly against undisturbed soils in trench sidewalls or against sheeting which is to remain in place.

D. Do not place trench shields or shoring within height of embedment zone unless means to maintain density of compacted embedment material are used. If moveable supports are used in embedment zone, lift supports incrementally to allow placement and compaction of material against undisturbed soil.

E. Place geotextile to prevent particle migration from in-situ soil into open-graded (Class I) embedment materials or drainage layers.

F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.

G. Place haunching material manually around pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside pipe with sand bags or other suitable means.

H. Place electrical conduit, if used, directly on foundation without bedding.

I. Shovel in-place and compact embedment material using pneumatic or hydraulic tampers in restricted areas and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of next lift. Water tamping or jetting shall not allowed.

J. For water lines construction embedment, use bank run sand concrete sand gem sand pea gravel or crushed limestone as specified in Section 02140 – Utility Backfill Material. For water lines adhere to the following subparagraph numbers 1 and 2; for utility installation other than water, adhere to numbers 3 and 4 below:

1. Class I, II and III Embedment Materials:
    a. Maximum six inches (6 In) compacted lift thickness.

b. Compact to achieve minimum of ninety-five percent (95%) of maximum dry density as determined according to ASTM D698.
c. Moisture content to be within plus or minus three percent (±3%) of optimum as determined according to ASTM D698, unless otherwise approved by the Project Manager.

2. Cement-Stabilized Sand (where required for special installations):
   a. Maximum six inches (6 In) compacted thickness.
   b. Compact to achieve minimum of ninety-five percent (95%) of maximum dry density as determined according to ASTM D698.
   c. Moisture content to be on dry side of optimum as determined according to ASTM D698 but sufficient for effective hydration.
3. Class I Embedment Materials:
   a. Maximum six inches (6 In) compacted lift thickness.
   b. Systematic compaction by at least two (2) passes of vibrating equipment. Increase compaction effort as necessary to effectively embed pipe to meet deflection test criteria.
   c. Moisture content as determined by the Contractor for effective compaction without softening soil of trench bottom, foundation or trench walls.
4. Class II Embedment and Cement-Stabilized Sand:
   a. Maximum six inches (6 In) compacted thickness.
   b. Compaction by methods determined by the Contractor to achieve minimum of ninety-five percent (95%) of maximum dry density as determined according to ASTM D698 for Class II materials and according to ASTM D558 for Cement-Stabilized materials.
   c. Moisture content of Class II materials within three percent (±3%) of optimum as determined according to ASTM D698. Moisture content of Cement-Stabilized sands on dry side of optimum as determined according to ASTM D558 but sufficient for effective hydration.

K. Place trench dams in Class I embedment in line segments longer than one hundred feet (100 Ft) between manholes and not less than one (1) in every five hundred feet (500 Ft) of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than five feet (5 Ft) from manholes.

3.9 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only minimum length of trench open as necessary for

construction.

B. For water lines, backfill in trench zone, including auger pits, intermediate and site pits, with bank run sand select fill or random backfill material as specified in Section 02140 – Utility Backfill materials.

C. For sewer pipes, use backfill materials described by trench limits. For "trench zone backfill" under pavement and to within one foot (1 Ft) back of curb, use Cement-Stabilized sand for pipes of nominal sizes thirty-six inches (36 In) in diameter and smaller to level twelve inches (12 In) below the pavement. For sewer pipes forty-two inches (42 In) in diameter and larger, under pavement or natural ground, in satisfactory soil conditions, backfill from twelve inches (12 In) above top of pipe to twelve inches (12 In) below pavement with suitable on-site material or select backfill. For sewer pipes forty-two inches (42 In) in diameter and larger, under pavement or natural ground, in unsatisfactory soil conditions, backfill from twelve inches (12 In) above top of pipe to twelve inches (12 In) below pavement with suitable on-site material or select backfill. Use select backfill for rigid pavements or flexible base material for asphalt pavements for twelve (12) inch backfill directly under pavement. For backfill materials reference Section 02140 – Utility Backfill Materials.

D. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave sheeting in place. Cut off sheeting one and one-half feet (1-1/2 Ft) or more above crown of pipe. Remove trench supports within five feet (5 Ft) from ground surface.

E. When shown on Drawings, random backfill of suitable material may be used in trench zone for trench excavations outside pavements.

F. Place trench zone backfill in lifts and compact. Fully compact each lift before placement of next lift.

1. Class I, II, III or IV or combination thereof (Random Backfill):
    a. Maximum eight inches (8 In) compacted lift thickness.
    b. Compact by vibratory equipment to minimum of ninety-five percent (95%) of maximum dry density determined according to ASTM D698.
    c. Moisture content within plus or minus three percent (±3%) of optimum determined according to ASTM D698, unless otherwise approved by the Project Manager.
2. Cement-Stabilized Sand:
    a. Maximum lift thickness determined by the Contractor to achieve uniform placement and required compaction, but not to exceed twelve inches (12 In).
    b. Compact by vibratory equipment to minimum of ninety-five percent (95%) of maximum dry density determined according to ASTM D558.
    c. Moisture content on dry side of optimum determined according to ASTM D558 but sufficient for cement hydration.
3. Select Backfill:

a. Place in maximum eight inch (8 In) loose layers.
b. Compaction by equipment providing tamping or kneading impact to minimum of ninety-five percent (95%) of maximum dry density determined according to ASTM D698.
c. Moisture content within plus or minus three percent (±3%) above optimum determined according to ASTM D698, unless approved by the Project Manager.

G. Unless otherwise shown on the Drawings, for trench excavations not under pavement or in the right of way, random backfill of suitable material may be used in trench zone as directed by the Project Manager.
1. Fat clays (CH) may be used as trench zone backfill outside paved areas at the Contractor's option. When required density is not achieved, rework, dry out, use lime stabilization or other approved methods to achieve compaction requirements or use different suitable material at no additional cost to the City.
2. Maximum eight inch (8 In) compacted lift thickness for clayey soils and maximum eight inch (8 In) lift thickness for granular soils.
3. Compact to minimum of ninety percent (90%) of maximum dry density determined according to ASTM D698.
4. Moisture content as necessary to achieve density.

H. For electric conduits, remove form work used for construction of conduits before placing trench zone backfill.

I. Water soaking, jetting or compaction by backhoe bucket is not acceptable and shall not be used.

3.10 MANHOLES, JUNCTION BOXES AND OTHER PIPELINE STRUCTURES

A. Meet requirements of adjoining utility installations for backfill of pipeline structures, as shown on the Drawings.

B. Below paved areas, encapsulate manhole with Cement-Stabilized sand; minimum of one foot (1 Ft) below base, minimum one foot (1 Ft) around walls, up to within twelve inches (12 In) of pavement subgrade. Compact in accordance with Paragraph 3.9.F.2 of this Section.

C. In unpaved areas, use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on the Drawings. Deposit backfill in uniform layers and compact each layer as specified. Maintain backfill material at plus or minus three percent (±3%) of optimum moisture content, unless otherwise approved by the Project Manager. Place fill material in uniform eight inch (8 In) maximum loose layers. Compact fill to at least ninety-five percent (95%) of maximum Standard Proctor Density according to ASTM D698.

3.11 FIELD QUALITY CONTROL

A. Test for material source qualifications as defined in Section 02140 – Utility Backfill Materials.

B. Provide excavation and trench safety systems at locations and to depths required for testing and retesting during construction at no additional cost to the City.

C. Tests will be performed on minimum of three (3) different samples of each material type for plasticity characteristics, in accordance with ASTM D4318 and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests shall be performed whenever there is noticeable change in material gradation or plasticity or when requested by the Project Manager.

D. At least three (3) tests for moisture-density relationships shall be performed initially for backfill materials in accordance with ASTM D698 and for cement-stabilized sand in accordance with ASTM D558. Perform additional moisture-density relationship tests once a month or whenever there is noticeable change in material gradation or plasticity.

E. In-place density tests of compacted pipe foundation, embedment and trench zone backfill soil materials shall be performed according to ASTM D1556 or ASTM D2922 and ASTM D3017 and at following frequencies and conditions:

1. For open cut construction projects and auger pits: Unless otherwise approved by the Project Manager, successful compaction to be measured by one (1) test per one hundred linear feet (100 Lf) measured along pipe for compacted embedment and one (1) test per one hundred linear feet (100 Lf) measured along pipe for compacted trench zone backfill material and one (1) test at each auger pit.
2. A minimum of three (3) density tests for each full shift of Work.
3. Density tests shall be distributed among placement areas. Placement areas are: foundation, bedding, haunching, initial backfill and trench zone.
4. The number of tests shall be increased if inspection determines that soil type or moisture content are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density, as specified.
5. Density tests at various depths below fill surface, if required, shall be performed by pit excavation. Material in previously placed lifts may therefore be subject to acceptance/rejection.
6. Two (2) verification tests shall be performed adjacent to in-place tests showing density less than acceptance criteria. Placement will be rejected unless both verification tests show acceptable results.
7. Recompacted placement shall be retested at same frequency as first test series, including verification tests.
8. Identify elevation of test with respect to natural ground or pavement.

F. Recondition, recompact and retest at the Contractor's expense if tests indicate the Work does not meet specified compaction requirements. For

hardened soil cement with nonconforming density, core and test for compressive strength at the Contractor's expense.

G. Acceptability of crushed rock compaction will be determined by inspection.

3.12 DISPOSAL OF EXCESS MATERIAL

A. Excess material shall be the property of the Contractor and shall be disposed of properly with no cost to the City. Dispose of excess materials in accordance with requirements of Section 01580 – Waste Material Disposal.

PART IV: TABLES

4.1 TABLE EXCAVATION WIDTHS

Nominal Pipe Size, inches	Minimum Trench Width, inches
Less than 18”	O.D. + 18”
18” to 30”	O.D. + 24”
36” to 42”	O.D. + 36”
Greater than 42”	O.D. + 48”

END OF SECTION

SECTION 02135
EXCAVATION FOR ROADWAY

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Excavation and compaction of materials for roadways.
- B. Excavation and compaction of materials for roadside ditches.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for roadway excavation shall be on a cubic yard basis.
  2. No payment will be made for material excavated under the following conditions:
     - a. More than two feet (2 Ft) outside of vertical planes behind back of curbs.
     - b. For portion within limits of trench for utilities twenty-four inch (24 In) and greater constructed by open-cut methods.
     - c. As indicated otherwise on the Drawings.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12.44 ft-lbf/ft^3).
  2. ASTM D2216 – Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
  3. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  4. ASTM D3017 – Standard Test Method for Water content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  5. ASTM D4318 – Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TCEQ – Texas Commission on Environmental Quality.
- D. TDH – Texas Department of Health.
- E. RRC – Railroad Commission of Texas.

PART II: PRODUCTS

2.1 MATERIALS

A. Provide topsoil conforming to requirements of Section 02905 – Topsoil.

B. Provide backfill which is excavated material, graded free of roots, lumps greater than six inches (6 In), rocks larger than three inches (3 In), organic material and debris.

C. Provide structural backfill which is select material meeting following requirements:

1. Plasticity index: Not less than twelve (12) or more than twenty (20).
2. Maximum liquid limit: Forty-five (45).

PART III: EXECUTION

3.1 PREPARATION

A. Identify required lines, levels and datum. Coordinate with Section 01725 – Field Surveying.

B. Identify and flag surface and aerial utilities.

C. Notify utility companies to remove or relocate utilities.

D. Identify, stake and flag known utility locations below grade. Make temporary or permanent relocation of underground pipes, ducts or utilities where indicated on the Drawings.

E. Upon discovery of unknown or badly deteriorated utilities or concealed conditions, discontinue work. Notify the Project Manager and obtain instructions before proceeding in such areas.

F. Obtain approval of top soil quality before excavating and stockpiling.

3.2 PROTECTION

A. Protect following from damage or displacement:

1. Trees, shrubs, lawns, existing structures and other features outside of grading limits.
2. Utilities either above or below grade, which are to remain.

3.3 TOPSOIL REMOVAL

A. Strip off topsoil from area to be excavated to minimum depth of six inches (6 In), unless indicated otherwise on the Drawings.

B. Stockpile topsoil in designated location for reuse. Stockpile topsoil to depth not exceeding eight feet (8 Ft). Cover to protect from erosion.

3.4 SOIL EXCAVATION

A. Excavate to lines and grades shown on the Drawings.

B. Remove unsuitable material not meeting specifications. Backfill with embankment materials and compact to requirements of Section 02115 – Embankment.

C. Record location and plug and fill inactive water and oil wells. Conform to Texas Department of Health, Texas Commission on Environmental Quality and Texas Railroad Commission requirements. Notify the Project Manager prior to plugging wells.
D. At intersections, grade back at minimum slope of one inch per foot (1 In/Ft). Produce smooth riding junction with intersecting street. Maintain proper drainage.
E. When area is inadvertently over-excavated, fill area in accordance with requirements of Section 02115 – Embankment at no additional cost to the City.
F. Remove material not qualified for use and excess soil not being reused from site in accordance with requirements of Section 01580 – Waste Material Disposal.

3.5 COMPACTION
A. Maintain optimum moisture content of subgrade to attain required density.
B. Compact to following minimum densities at moisture content of optimum to plus or minus three percent (±3%) optimum as determined by ASTM D698, unless otherwise indicated on the Drawings:
1. Areas under future paving and shoulders: Minimum density of ninety-five percent (95%) of maximum dry density.
2. Other areas: Minimum density of ninety percent (90%) of maximum dry density.

3.6 TOLERANCES
A. Top of Compacted Surface: Plus or minus one-half inch (±1/2 In) in cross section or in sixteen feet (16 Ft) longitudinally.

3.7 FIELD QUALITY CONTROL
A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.
B. Test and analysis of soil materials shall be performed in accordance with ASTM D4318, ASTM D2216 and ASTM D698.
C. Compaction testing shall be performed in accordance with ASTM D698 or ASTM D2922 and ASTM D3017.
D. A minimum of three (3) tests shall be taken for each one thousand linear feet (1000 Lf) per lane of roadway at random locations as specified by the the Project Manager.
E. When tests indicate work does not meet specified compaction requirements, recondition, recompact and retest at no additional cost to the City.

3.8 PROTECTION

A. Prevent erosion at all times. Maintain ditches and cut temporary swales to allow natural drainage in order to avoid damage to roadway. Do not allow water to pond.

B. Distribute construction traffic evenly over compacted areas, where practical, to aid in obtaining uniform compaction. Protect exposed areas having high moisture content from wheel loads that cause rutting.

C. Maintain excavation and embankment areas until start of subsequent work. Repair and recompact slides, washouts, settlements or areas with loss of density.

END OF SECTION

SECTION 02135SP

EXCAVATION FOR ROADWAY

The following provisions modify Section 02135 – Excavation for Roadway Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and replace with the following:

   "No separate payment will be made for excavation of material for roadway under this section for related roadway pavement items. Include payment in the unit price for applicable bid items."

2. Delete paragraph 1.2.A.2.

END OF SPECIAL PROVISION

SECTION 02140
UTILITY BACKFILL MATERIALS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Material Classifications.
- B. Utility Backfill Materials:
  1. Concrete sand.
  2. Gem sand.
  3. Pea gravel.
  4. Crushed stone.
  5. Crushed concrete.
  6. Bank run sand.
  7. Select backfill.
  8. Random backfill.
- C. Material Handling and Quality Control Requirements.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for backfill material. Include payment in unit price for applicable utility installation.
  2. Payment for backfill material, when included as separate pay item or when directed by the Project Manager, shall be on a cubic yard basis for material placed and compacted within theoretical trench width limits and thickness of material according to the Drawings or as directed by the Project Manager.
  3. Payment for backfill of authorized over-excavation is in accordance with Section 02130 – Extra Unit Price Work for Excavation and Backfill.
  4. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 DEFINITIONS
- A. Unsuitable Material:
  1. Materials classified as ML, CL-ML, MH, PT, OH and OL according to ASTM D2487.
  2. Materials that cannot be compacted to required density due to gradation, plasticity or moisture content.
  3. Materials containing large clods, aggregates or stones greater than four inches (4 In) in any dimension; debris, vegetation or waste; or any other deleterious materials.

4. Materials contaminated with hydrocarbons or other chemical contaminants.

B. Suitable Material:
   1. Materials meeting specification requirements.
   2. Unsuitable materials meeting specification requirements for suitable soils after treatment with lime or cement.

C. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material shall be placed and compacted as backfill where needed to provide stable support for structure foundation base. Foundation backfill materials may include concrete fill and seal slabs as directed by the Project Manager.

D. Foundation Base: Crushed stone aggregate with filter fabric as required, cement-stabilized sand or concrete seal slab. Foundation base provides smooth, level working surface for construction of concrete foundation.

E. Backfill Material: Classified soil material meeting specified quality requirements for designated application as embedment or trench zone backfill.

F. Embedment Material: Soil material placed under controlled conditions within embedment zone extending vertically upward from top of foundation to an elevation twelve inches (12 In) above top of pipe and including pipe bedding, haunching and initial backfill.

G. Trench Zone Backfill: Classified soil material meeting specified quality requirements and placed under controlled conditions in trench zone from top of embedment zone to base course in paved areas or to surface grading material in unpaved areas.

H. Foundation: Either suitable soil of trench bottom or material placed as backfill of over-excavation for removal and replacement of unsuitable or otherwise unstable soils.

I. Source: Source selected by the Contractor for supply of embedment or trench zone backfill material. Selected source may be project excavation, off-site borrow pits, commercial borrow pits or sand and aggregate production or manufacturing plants, subject to approval by the Project Manager.

J. Refer to Section 02125 – Excavation and Backfill for Utilities for other definitions regarding utility installation by trench construction.

1.4 REFERENCES

A. ASTM – American Society for Testing and Materials.
   1. ASTM C33 – Standard Specification for Concrete Aggregate.
   2. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
   3. ASTM C123 – Standard Test Method for Lightweight Particles in Aggregate.
   4. ASTM C131 – Standard Test Method for Resistance to

Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in Los Angeles Machine.

5. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
6. ASTM C142 – Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
7. ASTM D1140 – Standard Test Method for Amount of Material in Soils Finer Than No. 200 Sieve.
8. ASTM D2487 – Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
9. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
10. ASTM D4643 – Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Method.

B. CFTS – City of Friendswood Technical Specifications.

C. TxDOT – Texas Department of Transportation.

1. TxDOT Tex-110-E – Determining Particle Size Analysis of Soils.
2. TxDOT Tex-460-A – Material Finer Than 75 Fm (No.200) Sieve In Mineral Aggregates (Decantation Test for Concrete Aggregates).

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit description of source, material classification and product description, production method and application of backfill materials.

C. Submit test results for samples of off-site backfill materials. Comply with Paragraph 2.3, Material Testing.

D. Before stockpiling materials, submit copy of approval from landowner for stockpiling backfill material on a private property.

E. Provide delivery ticket which includes source location for each delivery of material that is obtained from off-site sources or is being paid as a specific bid item.

1.6 TESTS

A. Perform tests of sources for backfill material in accordance with Paragraph 2.3.B.

B. Verification tests of backfill materials shall be performed by the City in accordance with Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures and in accordance with Paragraph 3.3.

1.7 EMBEDEMENT

A. Gravity Sanitary Sewers and Storm sewers shall use Cement-Stabilized Sand for bedding, haunching and initial backfill.

B. Water lines and Force Main Sewers shall use Bank run sand for bedding, haunching and initial backfill.

PART II: PRODUCTS

2.1 MATERIAL CLASSIFICATIONS

A. Classify materials for backfill for purpose of quality control in accordance with Unified Soil Classification Symbols as defined in ASTM D2487. Material use and application is defined in utility installation specifications and the Drawings either by class, as described in Paragraph 2.1.B or by product descriptions, as given in Paragraph 2.2.

B. Class Designations Based on Laboratory Testing:

1. Class I: Well-graded gravels and sands, gravel-sand mixtures, crushed well-graded rock, little or no fines (GW, SW):
   a. Plasticity index: Non-plastic.
   b. Gradation: D_{60}/D_{10} – greater than four percent (4%); amount passing No. 200 sieve – less than or equal to five percent (5%).
2. Class II: Poorly graded gravels and sands, silty gravels and sands, little to moderate fines (GM, GP, SP, SM):
   a. Plasticity index: Non-plastic to four (4).
   b. Gradations:
      1) Gradation (GP, SP): amount passing No. 200 sieve – less than five percent (5%).
      2) Gradation (GM, SM): amount passing No. 200 sieve – between twelve percent (12%) and fifty percent (50%).
      3) Borderline gradations with dual classifications (e.g., SP-SM): amount passing No. 200 sieve – between five percent (5%) and twelve percent (12%).
3. Class III: Clayey gravels and sands, poorly graded mixtures of gravel, sand, silt and clay (GC, SC and dual classifications, e.g., SP-SC):
   a. Plasticity index: Greater than seven (7).
   b. Gradation: Amount passing No. 200 sieve – between twelve percent (12%) and fifty percent (50%).
4. Class IVA: Lean clays (CL).
   a. Plasticity Indexes:
      1) Plasticity index: Greater than seven (7) and above A line.
      2) Borderline plasticity with dual classifications (CL-ML): PI between four (4) and seven (7).
   b. Liquid limit: Less than fifty (50).
   c. Gradation: Amount passing No. 200 sieve – greater than fifty percent (50%).
   d. Inorganic.
5. Class IVB: Fat clays (CH).

a. Plasticity index: Above A line.
b. Liquid limit: Fifty (50) or greater.
c. Gradation: Amount passing No. 200 sieve – greater than fifty percent (50%).
d. Inorganic.

6. Use soils with dual class designation according to ASTM D2487 and which are not defined above, according to more restrictive class.

2.2 PRODUCT DESCRIPTIONS

A. Soils classified as silt (ML) silty clay (CL-ML with PI of four (4) to seven (7), elastic silt (MH), organic clay and organic silt (OL, OH) and organic matter (PT) are not acceptable as backfill materials. These soils may be used for site grading and restoration in unimproved areas as approved by the Project Manager. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by applicable backfill installation specification. Refer to Section 02120 – Excavation and Backfill for Structures and Section 02125 – Excavation and Backfill for Utilities.

B. Provide backfill material that is free of stones greater than six inches (6 In), free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to following limits for deleterious materials:
1. Clay lumps: Less than one-half percent (1/2%) for Class I and less than two percent (2%) for Class II, when tested in accordance with ASTM C142.
2. Lightweight pieces: Less than five percent (5%) when tested in accordance with ASTM C123.
3. Organic impurities: No color darker than standard color when tested in accordance with ASTM C40.

C. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in product specification and as approved by the Project Manager, provided that physical property criteria are determined to be satisfactory by testing.

D. Bank Run Sand: Durable bank run sand classified as SP, SW or SM by Unified Soil Classification System (ASTM D2487) meeting following requirements:
1. Less than fifteen percent (15%) passing No. 200 sieve when tested in accordance with ASTM D1140. Amount of clay lumps or balls may not exceed two percent (2%).
2. Material passing No. 40 sieve shall meet the following requirements when tested in accordance with ASTM D4318: Plasticity index: not exceeding seven (7).

E. Concrete Sand: Natural sand, manufactured sand or combination of natural and manufactured sand conforming to requirements of ASTM C33 and graded within limits specified in Table 4.1 – SIEVE ANALYSIS REQUIREMENTS FOR CONCRETE SAND in this section, when tested

in accordance with ASTM C136.

F. Gem Sand: Sand conforming to requirements of ASTM C33 for course aggregates specified for No. 8 size and graded within the limits specified in Table 4.2 – SIEVE ANALYSIS REQUIREMENTS FOR GEM SAND in this section, when tested in accordance with ASTM C136.

G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the limits specified in Table 4.3 – SIEVE ANALYSIS REQUIREMENTS FOR PEA GRAVEL in this section, when tested in accordance with ASTM C136.

H. Crushed Aggregates: Crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:
   1. Materials of one (1) product delivered for same construction activity from single source, unless otherwise approved by the Project Manager.
   2. Non-plastic fines.
   3. Los Angeles abrasion test wear not exceeding forty-five percent (45%) when tested in accordance with ASTM C131.
   4. Crushed aggregate shall have minimum of ninety percent (90%) of particles retained on a No. 4 sieve with two (2) or more crushed faces as determined by Tex-460-A, Part I.
   5. Crushed stone: Produced from oversize plant processed stone or gravel, sized by crushing to predominantly angular particles from naturally occurring single source. Uncrushed gravel is not acceptable materials for embedment where crushed stone is shown on applicable utility embedment drawing details.
   6. Crushed Concrete: Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, reinforcing steel fragments, soil, waste gypsum (calcium sulfate) or debris.
   7. Gradations, as determined in Table 4.4 – SIEVE ANALYSIS REQUIREMENTS FOR CRUSHED AGGREGATE in this section, in accordance with Tex-110-E.

I. Select Backfill: Class III clayey gravel or sand or Class IV lean clay with plasticity index between seven (7) and twenty (20) or clayey soils treated with lime in accordance with Section 02845 – Pavement Repair and Resurfacing, to meet plasticity criteria.

J. Random Backfill: Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by applicable backfill installation specification. Refer to Section 02120 – Excavation and Backfill for Structures and Section 02125 – Excavation and Backfill for Utilities.

K. Cement-Stabilized Sand: Conform to requirements of Section 02145 – Cement-Stabilized Sand.

L. Concrete Backfill: Conform to Class A concrete as specified in Section 03300 – Structural Concrete.
M. Flexible Base Course Material: Conform to requirements of applicable portions of Section 02700 – Cement-Stabilized Base Course, Section 02705 – Crushed Concrete Base Course and Section 02715 – Hot-Mix Asphaltic Base Course.

2.3 MATERIAL TESTING
A. Source Qualification: Perform testing to obtain tests by suppliers for selection of material sources and products not from the project site. Test samples of processed materials from current production representing material to be delivered. Use tests to verify that materials meet specification requirements. Repeat qualification test procedures each time source characteristics change or there is planned change in source location or supplier. Include the following qualification tests, as applicable:
1. Gradation: Report complete sieve analyses regardless of specified control sieves from largest particle through No. 200 sieve.
2. Plasticity of material passing No. 40 sieve.
3. Los Angeles abrasion wear of material retained on a No. 4 sieve.
4. Clay lumps.
5. Lightweight pieces.
6. Organic impurities.
B. Production Testing: Provide reports to the Project Manager from an independent testing laboratory that backfill materials to be placed in the Work meet applicable specification requirements.
C. Assist the Project Manager in obtaining material samples for verification testing at source or at production plant.

PART III: EXECUTION

3.1 SOURCES
A. Use of existing material in trench excavations is acceptable, provided applicable Technical Specification requirements are satisfied.
B. Identify off-site sources for backfill materials at least fourteen days (14 D) ahead of intended use so that the Project Manager may obtain samples for verification testing.
C. Materials may be subjected to inspection or additional verification testing after delivery. Materials which do not meet requirements of specifications shall be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials or by contamination. Once material is approved by the Project Manager, expense for sampling and testing required to change to different material shall be arranged and paid for by the Contractor.

D. Bank run sand, select backfill and random backfill, if available in project excavation, may be obtained by selective excavation and acceptance testing. Obtain additional quantities of these materials and other materials required to complete work from off-site sources.
E. The City does not represent or guarantee that any soil found in excavation work will be suitable and acceptable as backfill material.

3.2 MATERIAL HANDLING

A. When backfill material is obtained from either commercial or non-commercial borrow pit, open pit to expose vertical faces of various strata for identification and selection of approved material to be used. Excavate selected material by vertical cuts extending through exposed strata to achieve uniformity in product.
B. Establish temporary stockpile locations for practical material handling, control and verification testing by the Project Manager in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.
C. When stockpiling backfill material near project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering drainage system.
D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

3.3 FIELD QUALITY CONTROL

A. Quality Control.
    1. The Project Manager may sample and test backfill at:
        a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.
        b. On-site stockpiles.
        c. Materials placed in the Work.
    2. The Project Manager may re-sample material at any stage of work or location if changes in characteristics are apparent.
B. Production Verification Testing: A Certified testing laboratory as described in Section 01470 – Testing Laboratory Services, will provide verification testing on backfill materials, as directed by the Project Manager. Samples may be taken at source or at production plant, as applicable.

PART IV: TABLES

4.1 SIEVE ANALYSIS REQUIREMENTS FOR CONCRETE SAND

Sieve	Percent Passing
3/8”	100%
No. 4	95% to 100%
No. 8	80% to 100%
No. 16	50% to 85%
No. 30	25% to 60%
No. 50	10% to 30%
No. 100	2% to 10%

4.2 SIEVE ANALYSIS REQUIREMENTS FOR GEM SAND

Sieve	Percent Passing
3/8”	95% to 100%
No. 4	60% to 80%
No. 8	15% to 40%

4.3 SIEVE ANALYSIS REQUIREMENTS FOR PEA GRAVEL

Sieve	Percent Passing
1/2"	100%
3/8”	85% to 100%
No. 4	10% to 30%
No. 8	0% to 10%
No. 16	0% to 5%

4.4 SIEVE ANALYSIS REQUIREMENTS FOR CRUSHED AGGREGATES

Sieve	**Percent Passing by Weight for Pipe Embedment by Ranges of Nominal Pipe Sizes**		
	>15”	**15” to 8”**	**<8”**
1”	95% to 100%	100%	- -
3/4"	60% to 90%	90% to 100%	100%
1/2"	25% to 60%	- -	90% to 100%
3/8”	- -	20% to 55%	40% to 70%
No. 4	0% to 5%	0% to 10%	0% to 15%
No. 8	- -	0% to 5%	0% to 5%

END OF SECTION

SECTION 02145
CEMENT-STABILIZED SAND

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Cement-stabilized sand.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for work performed under this Section. Include cost of such work in Contract unit prices for items listed in Unit Price Form requiring cement-stabilized sand.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C33 – Standard Specification for Concrete Aggregates (Fine Aggregate).
  2. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
  3. ASTM C42 – Standard Test Methods for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  4. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
  5. ASTM C123 – Standard Test Method for Lightweight Particles in Aggregate.
  6. ASTM C142 – Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
  7. ASTM C150 – Specification for Portland Cement.
  8. ASTM D558 – Standard Test Method for Moisture-Density Relations of Soil Cement-Mixtures.
  9. ASTM D1632 – Standard Practice for Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory.
  10. ASTM D1633 – Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
  11. ASTM D2487 – Standard Test Method for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
  12. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  13. ASTM D3665 – Standard Practice for Random Sampling of

Construction Materials.

14. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

B. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit proposed target cement content and production data for sand-cement mixture in accordance with requirements of Paragraph 2.3, Materials Qualifications.

1.5 DESIGN REQUIREMENTS

A. Use sand-cement mixture producing minimum unconfined compressive strength of one hundred (100 psi) in forty-eight hours (48 Hrs).

1. Design will be based on strength specimens molded in accordance with ASTM D558 at moisture content within three percent (3%) above or below of optimum moisture content and within four hours (4 Hrs) of batching.
2. Determine minimum cement content from production data and statistical history. Provide no less than one and one tenth (1.1) sacks of cement per ton of dry sand.

PART II: PRODUCTS

2.1 MATERIALS

A. Cement: Type I Portland cement conforming to ASTM C150.

B. Sand: Clean, durable sand meeting grading requirements for fine aggregates of ASTM C33 or requirements for bank run sand of Section 02140 – Utility Backfill Materials and the following requirements:

1. Classified as SW, SP, SW-SM, SP-SM or SM by Unified Soil Classification System of ASTM D2487.
2. Deleterious materials:
   a. Clay lumps, ASTM C142 – less than one-half percent (1/2%).
   b. Lightweight pieces, ASTM C123; less than five percent (5%).
   c. Organic impurities, ASTM C40, color no darker than standard color.
3. Plasticity index of four (4) or less when tested in accordance with ASTM D4318.

C. Water: Potable water, free of oils, acids, alkalies, organic matter or other deleterious substances, meeting requirements of ASTM C94.

2.2 MIXING MATERIALS

A. Add required amount of water and mix thoroughly in pugmill-type mixer.

B. Stamp batch ticket at plant with time of loading. Reject material not placed and compacted within four hours (4 Hrs) after mixing.

2.3 MATERIAL QUALIFICATION

A. Determine target cement content of material as follows:
   1. Obtain samples of sand-cement mixtures at production facility representing range of cement content consisting of at least three (3) points.
   2. Complete molding of samples within four hours (4 Hrs) after addition of water.
   3. Perform strength tests [average of two (2) specimens] at forty-eight hours (48 Hrs) and seven days (7 D).
   4. Perform cement content tests on each sample.
   5. Perform moisture content tests on each sample.
   6. Plot average forty-eight hour (48 Hr) strength vs. cement content.
   7. Record scale calibration date, sample date, sample time, molding time, cement feed dial settings and silo pressure (if applicable).

B. Test raw sand for following properties at point of entry into pug-mill:
   1. Gradation.
   2. Plasticity index.
   3. Organic impurities.
   4. Clay lumps and friable particles.
   5. Lightweight pieces.
   6. Moisture content.
   7. Classification.

C. Present data obtained in format similar to that provided in sample data form attached to this Section.

PART III: EXECUTION

3.1 PLACING

A. Place sand-cement mixture in maximum twelve inch (12 In) thick loose lifts and compact to ninety-five percent (95%) of maximum density as determined in accordance with ASTM D558, unless otherwise specified. Refer to related specifications for thickness of lifts in other applications. Target moisture content during compaction is plus or minus three percent (±3%) of optimum moisture content. Perform and complete compaction of sand-cement mixture within four hours (4 Hrs) after addition of water to mix at plant.

B. Do not place or compact sand-cement mixture in standing or free water.

3.2 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. One (1) sample of cement-stabilized sand shall be obtained for each one hundred fifty tons (150 Tn) of material placed per day with no less than one (1) sample per day of production. Random samples of delivered cement-stabilized sand shall be taken in the field at point of delivery in accordance with ASTM D3665. Obtain three (3) individual samples of approximately twelve pounds (12 Lbs.) to fifteen pounds (15 Lbs.) each from the first (1st), middle and last third (3rd) of the truck and composite them into one sample for test purpose.

C. Prepare and mold four (4) specimens (for each sample obtained) in accordance with ASTM D558, Method A, without adjusting moisture content. Samples shall be molded at approximately same time material is being used, but no later than four hours (4 Hrs) after water is added to mix.

D. After molding, specimens shall be removed from molds and cured in accordance with ASTM D1632.

E. Specimens shall be tested for compressive strength in accordance with ASTM D1633, Method A. Two (2) specimens shall be tested at forty-eight hours (48 Hrs) plus or minus two hours (±2 Hrs) and two (2) specimens shall be tested at seven days (7 D) plus or minus four hours (±4 Hrs).

F. A strength test shall be the average of strengths of two (2) specimens molded from the same sample of material and tested at the same age. The average daily strength shall be the average of strengths of all specimens molded during one day's (1 D) production and tested at same the age.

G. Precision and Bias: Test results shall meet recommended guideline for precision in ASTM D1633 Section 9.

H. Reporting: Test reports shall contain, as a minimum, as specified in TABLE 4.1 – CEMENT-STABILIZED SAND REPORT in this section, the following information:

1. Supplier and plant number.
2. Time material was batched.
3. Time material was sampled.
4. Test age (exact hours).
5. Average forty-eight hour (48 Hr) strength.
6. Average seven day (7 D) strength.
7. Technical Specification section number.
8. Indication of compliance / non-compliance.
9. Mixture identification.
10. Truck and ticket numbers.
11. The time of molding.
12. Moisture content at time of molding.
13. Required strength.

14. Test method designations.
15. Compressive strength data as required by ASTM D1633.
16. Supplier mixture identification.
17. Specimen diameter and height, in.
18. Specimen cross-sectional area, sq.in.

3.3 ACCEPTANCE

A. Strength level of material shall be considered satisfactory if:
   1. The average forty-eight hour (48 Hr) strength is greater than one hundred pounds per square inch (100 psi) with no individual strength test below seventy pounds per square inch (70 psi).
   2. All seven day (7 D) individual strength tests [average of two (2) specimens] are greater than or equal to one hundred pounds per square inch (100 psi).

B. The material shall be considered unacceptable and subject to removal and replacement at the Contractor's expense when individual strength test [average of two (2) specimens) has seven day (7 D) strength] less than one hundred pounds per square inch (100 psi).

C. When the moving average of three (3) daily forty-eight hour (48 Hr) averages falls below one hundred pounds per square inch (100 psi), discontinue shipment to project until plant is capable of producing material, which exceeds one hundred pounds per square inch (100 psi) at forty hours (48 Hrs). Five (5) – forty eight hour (48 Hr) strength tests shall be made in this determination with no individual strength tests less than one hundred one hundred pounds per square inch (100 psi).

D. The Testing laboratory shall notify the Contractor, the Project Manager and the material supplier of tests by facsimile indicating results falling below specified strength requirements within twenty-four hours (24 Hrs).

E. If any strength test of laboratory cured specimens falls below the specified strength, the Contractor may, at his own expense, request testing of cores drilled from the area(s) in question in accordance with ASTM C42. In such cases, three (3) cores shall be taken for each strength test that falls below the values given in paragraph 3.3.A.

F. Cement-stabilized sand in an area represented by core tests shall be considered satisfactory if the average of three (3) cores is equal to at least one hundred pounds per square inch (100 psi). Additional testing of cores extracted from locations represented by erratic core strength results shall be permitted.

PART IV: TABLES

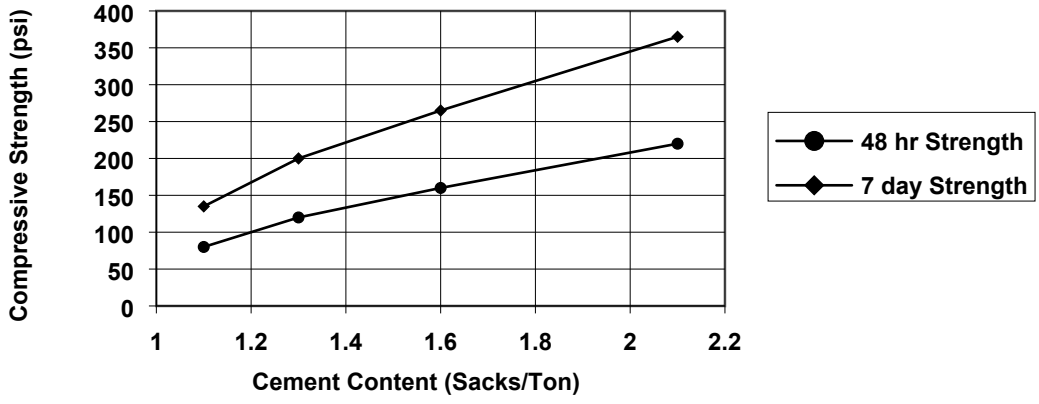
4.1 CEMENT-STABILIZED SAND REPORT

Supplier: Stabilized Sand Co.	**Plant No.:** 3 – Friendswood		**Date of Tests:** June 3, 2005		
Item	Raw Sand	1.1 Sack	100 psi	1.5 Sack	2.0 Sack
Moisture Content	10.9	15.7	14.0	13.8	13.7
Cement Feed Dial Setting	--	2.25	2.5	2.75	3.75
Silo Pressure (psi)	--	4	4	4	4
Batch Time	10:00	10:10	10:15	10:20	10:25
Sample Time	--	10:10	10:15	10:20	10:25
Molding Time	--	12:30	12:45	1:00	1:15
Cement Content (sacks/ton)	--	1.1	1.3	1.6	2.1
Compressive Strength as 48 hrs (avg of 2)	--	80	120	160	220
Compressive Strength at 7 days (avg of 2)	--	135	200	265	365

Sieve Size	**Percent Passing**	**COF Spec. Section 02140**
3/8 Inch	100%	100%
No. 200	30%	30%

Raw Sand Tests	**Result**	**City of Friendswood**
Plasticity Index	Non-Plastic	4 Maximum
Organic Impurities	Passing	No Darker Than
Clay Lumps & Friable Parts (%)	0.0	0.5 % Maximum
Lightweight Pieces (%)	0.0	5.0 % Maximum
Classification	SP – SM	SW, SP, SW-SM, SP-SM, SM

Compressive Strength vs Cement Content



END OF SECTION

SECTION 02205
COPPER TUBING

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Copper tubing for water service lines.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for copper tubing under this Section. Include unit prices for water taps and service lines.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM B88 – Standard Specification for Seamless Copper Water Tube.
- B. AWWA – American Water Works Association.
  1. AWWA C800 – Standard for Underground Service Line Valves and Fittings.
- C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit certified test results of ASTM B88.
- C. Submit manufacturer's testing certification that copper tubing conforms to requirements of ASTM B88. Number of samples for testing of each size of tubing is modified as follows:
  1. For each seven thousand five hundred feet (7500 Ft) of tubing: One (1) sample.
  2. For each set of tubing less than thousand five hundred feet (7500 Ft): One (1) sample

1.5 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that pipe was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 MATERIALS

A. Provide Type K annealed, seamless, copper tubing, one inch (1 In) to two inch (2 In) in diameter conforming to requirements of ASTM B88.
B. Provide one inch (1 In) tubing in coils of minimum sixty feet (60 Ft) in length and one and one-half inch (1-1/2 In) and two inch (2 In) tubing in coils forty feet (40 Ft) in length.
C. Provide tubing manufactured in United States of America. Tubing shall be inspected and tested by laboratory designated by the Project Manager at point of manufacture or locally. Furnish tubing, at no additional cost to designated testing laboratory along with mill compliance certificates.
D. Provide flared or compression-type brass fittings for use with Type K annealed copper tubing in accordance with AWWA C800.

PART III: EXECUTION

3.1 INSTALLATION

A. Conform to installation requirements of Section 02430 – Water Tap and Service Line Installation, except as modified in this Section.

3.2 JOINTS

A. Minimum joint spacing for one inch (1 In) tubing shall be sixty feet (60 Ft), for one and one-half inch (1-1/2 In) and two inch (2 In) tubing shall be forty feet (40 Ft).
B. Cut copper tubing squarely by using cutting tools designed specifically for purpose and avoid procedures that cause pipe to bend or pipe walls to flatten.
C. After tubing has been cut, but before flaring, use reamer to remove inside rolled lip from tubing. Expand flared ends by use of flaring tool using care to avoid splitting, crimping or over stressing metal. Provide at least ten inches (10 In) of straight pipe adjacent to fittings.
D. When compression fittings are used, cut copper tubing squarely prior to insertion into fitting. Assemble in accordance with manufacturer's recommended procedure.

3.3 BENDS

A. Bend tubing by using appropriate sized bending tool. No kinks, dents, flats or crimps shall be permitted. Cut out and replace damaged section. Install no bends with radius smaller than radius of coil of tubing as packaged by manufacturer. Copper tubing shipped in straight lengths conforms to the following:
    1. For two inch (2 In) diameter: Maximum of one (1) – forty-five degree (45°) bend per four foot (4 Ft) section.
    2. For one and one-half inch (1-1/2 In) diameter: Maximum of one (1) – forty-five degree (45°) bend per three foot (3 Ft) section.

END OF SECTION

SECTION 02215
DUCTILE IRON PIPE (DIP) AND FITTINGS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Ductile Iron Pipe (DIP) and fittings for water lines, wastewater force mains, gravity sanitary sewers and storm sewers.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for Ductile Iron Pipe (DIP) and fittings under this Section, with the exception of extra fittings in place. Include cost in unit prices for work as specified in the following Sections, as applicable:
     a. Section 02400 – Water Lines.
     b. Section 02500 – Gravity Sanitary Sewers.
     c. Section 02510 – Sanitary Sewer Force Mains.
     d. Section 02600 – Storm Sewers.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Extra Ductile Iron Pipe (DIP) Compact Fittings in Place shall be for additional fittings required to complete job. This is not to exclude extension of pipe across driveway or intersection for purpose of terminating line in more advantageous position. This determination shall be at discretion of the Project Manager. This bid item includes additional fittings as may be necessary to complete job in conformance with intent of the Drawings.
- C. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHTO – American Association of State Highway and Transportation Officials.
- B. AREMA – American Railway Engineering and Maintenance-of-Way Association.
  1. Manual for Railway Engineering.
- C. ANSI – American National Standards Institute.
  1. ANSI A21.4 (AWWA C104) – Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings, for Water.
  2. ANSI A21.10 (AWWA C110) – Standard for Ductile-Iron and Gray-Iron Fittings, 3-in. through 48-in.
  3. ANSI A21.11 (AWWA C111) – Standard for Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

4. ANSI A21.15 (AWWA C115) – Standard for Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges.
5. ANSI A21.16 (AWWA C116) – Protective Fusion Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile Iron and Grey iron Fittings for Water Supply Service.
6. ANSI A21.50 (AWWA C150) – Standard for Thickness Design of Ductile-Iron Pipe.
7. ANSI A21.51 (AWWA C151) – Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water and Other Liquids.
8. ANSI A21.53 (AWWA C153) – Standard for Ductile Iron Compact Fittings, 3 inches through 24 inches and 54 inches through 64 inches for Water Service.

D. ASME – American Society of Mechanical Engineers.
   1. ASME B16.1 – Cast Iron Pipe Flanges and Flanged Fittings.

E. ASTM – American Society for Testing and Materials.
   1. ASTM D1248 – Standard Specification Polyethylene Plastics Molding and Extrusion Materials for Wire and Cable.
   2. ASTM F477 – Elastomeric Seals (gaskets) for Joining Plastic Pipe.
   3. ASTM G62 – Standard Test Methods for Holiday Detection in Pipeline Coatings.

F. AWWA – American Water Works Association.
   1. AWWA C102 – American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
   2. AWWA C300 – Standard for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type, for Water and other Liquids.
   3. AWWA C600 – Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

G. CFTS – City of Friendswood Technical Specifications.

H. SSPC – Steel Structures Painting Council.
   1. SSPC-SP 6 – Steel Structures Painting Council, Commercial Blast Cleaning.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. For pipes sixteen inches (16 In) and greater submit shop drawings signed and sealed by a Professional Engineer registered in the State of Texas showing the following:
   1. Manufacturer's pipe design calculations
   2. Lay schedule of pictorial nature indicating alignment and grade, laying dimensions, fitting, flange and special details, with plan view of each pipe segment sketched, detailing pipe invert elevations, horizontal bends, restrained joints and other critical features. Indicate station numbers for pipe and fittings corresponding to the Drawings. Do not start production of pipe and fittings prior to review and approval by the Project Manager.

Provide final approved lay schedule on CD-ROM in Adobe portable document format (*.PDF).

3. Calculations and limits of thrust restraint
4. Class and length of joint

C. Submit manufacturer's certifications that Ductile Iron Pipe (DIP) and fittings meet provisions of this Section and have been hydrostatically tested at factory and meet requirements of ANSI A21.51.

D. Submit certifications that pipe joints have been tested and meet requirements of ANSI A21.11.

E. Submit affidavit of compliance in accordance with ANSI A21.16 for fittings with fusion bonded epoxy coatings or linings.

1.5 QUALITY ASSURANCE

A. Provide manufacturer's affidavits that pipe was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 DUCTILE IRON PIPE (DIP)

A. Ductile Iron Pipe (DIP) Barrels: ANSI A21.15, ANSI A21.50 or ANSI A21.51; bear mark of Underwriters' Laboratories approval; minimum thickness Class 51 for water lines and thickness Class 52 for sanitary sewers or as shown on the Drawings. Provide minimum thickness Class 53 for flanged pipe.

B. Provide pipe sections in standard lengths, not less than eighteen feet (18 Ft) long, except for special fittings and closure sections as indicated on shop drawings.

C. Modify pipe for cathodic protection in accordance with Section 02285 – Cathodic Protection. In lieu of furnishing Ductile Iron Pipe (DIP) with cathodic protection system, furnish Ductile Iron Pipe (DIP) with polyethylene encasement, provided the following criteria is met:

1. Provide minimum thickness class
2. Provide polyethylene encasement material and installation in accordance with AWWA C105 and backfill as specified. Minimum of two (2) complete wraps of eight (8) mil thick polyethylene.
3. Use polyethylene encasement for open cut installations only. For augered sections or sections installed inside a casing, provide coating in accordance with paragraph 2.5.D.1.
4. Adhere to other requirements specified herein (e.g., insulation kits, etc.).

D. For use of pressure class pipe for water lines, design pipe and fittings to withstand most critical simultaneous application of external loads and internal pressures. Base design on minimum of AASHTO HS-20 loading, AREMA E-80 loads and depths of bury as indicated on the Drawings.

Design pipes with Marston's earth loads for a transition width trench for zero feet (0 Ft) to sixteen feet (16 Ft) of cover. Use Marston's earth loads for a trench width of O.D. (of pipe) plus four feet (+4 Ft) for pipe greater than sixteen feet (16 Ft) of cover. Use Marston's equations for a trench condition in both open-cut and tunnel applications. Design for most critical groundwater level condition. Pipe design conditions:

1. Working pressure = One hundred pounds per square inch (100 psi).
2. Hydrostatic field test pressure = One hundred fifty pounds per square inch (150 psi).
3. Maximum pressure due to surge = One hundred fifty pounds per square inch (150 psi).
4. Minimum Pressure due to surge = Minus five pounds per square inch (-5 psi).
5. Design tensile stress due to surge or hydrostatic test pressure: No greater than fifty percent (50%) minimum yield.
6. Design bending stress due to combined earth loads and surge or hydrostatic test pressure: No greater than forty-eight thousand pounds per square inch (48,000 psi).
7. Unit weight of fill ≥ One hundred twenty pounds per cubic foot (120 pcf).
8. Deflection lag factor (D_l) = One and two tenths (1.2).
9. Bedding constant (K) = One tenth (0.1).
10. Moment coefficient = Sixteen hundredths (0.16).
11. Fully saturated soil conditions hw=h=depth of cover above top of pipe.

E. Hydrostatic Test of Pipe: AWWA C151, Section 5.2.1, at point of manufacture. Hold test for a minimum two minutes (2 Min) for thorough inspection of pipe. Repair or reject pipe revealing leaks or cracks.

F. Pipe Manufacturer for large diameter water lines: Minimum of five years (5 Yrs) of successful pipe installations in continuous service. Manufacturer must maintain on site or in plant enough fittings to satisfy the requirements as specified in TABLE 4.1 – REQUIRED BENDS in this Section.

Manufacturer or supplier must be capable of delivering bends to job site within twelve hours (12 Hrs) of notification. Use fittings at direction of the Project Manager where unforeseen obstacles are encountered during construction. These fittings are in addition to any fittings called out in construction documents and must be available at all times.

G. Provide flange adapter with insulating kit as required when connecting new piping to existing piping and piping of different materials, unless otherwise approved by the Project Manager.

H. Clearly mark pipe section to show location and thickness/pressure class color coded.

2.2 JOINTS

A. Joint Types: ANSI A21.11 push-on; ANSI A21.11 mechanical joint; or ANSI A21.16 flanged end. Provide push-on joints unless otherwise indicated on the Drawings or required by these specifications. For bolted joints, conform to requirements of AWWA C111; provide minimum 304 stainless steel for restraint joints.
B. Where required by the Drawings, provide approved restrained joints for buried service.
C. Threaded or grooved-type joints which reduce pipe wall thickness below minimum required are not acceptable.
D. Provide for restrained joints designed to meet test pressures required under Section 02450 – Hydrostatic Testing of Waterlines or Section 02510 – Sanitary Sewer Force Mains, as applicable. Provide restrained joints for test pressure or maximum surge pressure as specified, whichever is greater for water lines. Do not use passive resistance of soil in determining minimum restraint lengths.
E. Bond rubber gasketed joints to provide electrical continuity along entire pipeline, except where insulating flanges are required by the Drawings.
F. Make curves and bends by deflecting joints. Do not exceed maximum deflection recommended by pipe manufacturer for pipe joints or restraint joints. Submit details of other methods of providing curves and bends for consideration by the Project Manager. When other methods are deemed satisfactory, install at no additional cost to the City.

2.3 GASKETS

A. Furnish, when no contaminant is identified, plain rubber (SBR) gasket material in accordance with ANSI A21.11 or ASTM F477 (One Bolt only); for flanged joints one-eight inch (1/8 In) thick gasket in accordance with ANSI A21.15.

2.4 FITTINGS

A. Use fittings of same size as pipe. Reducers are not permitted to facilitate an off-size fitting. Reducing bushings are also prohibited. Make reductions in piping size by reducing fittings. Line and coat fittings as specified for pipe they connect to.
B. Push-on Fittings: ANSI A21.10; Ductile Iron Pipe (DIP) ANSI A21.11 joints, gaskets and lubricants; pressure rated at two hundred pounds per square inch (250 psi).
C. Flanged Fittings: ANSI A21.10; Ductile Iron Pipe (DIP) ANSI A21.11 joints, gaskets and lubricants; pressure rated at two hundred fifty pounds per square inch (250 psi).
D. Mechanical Joint Fittings: ANSI A21.11; pressure rated at two hundred fifty pounds per square inch (250 psi).
E. Ductile Iron Pipe (DIP) Compact Fittings for Water lines: ANSI A21.53; four inch (4 In) through twelve inch (12 In) diameter fusion bonded epoxy-lined or cement mortar lining.

2.5 COATINGS AND LININGS

A. Water line Interiors: ANSI A21.4, cement lined with seal coat; ANSI A21.16 fusion bonded epoxy coating for interior; comply with NSF 61.

B. Sanitary Sewer and Force Main Interiors:

1. Preparation: Commercial blast cleaning conforming to SSPC-SP6.
2. Liner thickness: Nominal forty (40) mils, for pipe barrel interior; minimum six (6) mils to ten (10) mils at gasket groove and outside spigot end to six inches (6 In) back from end.
3. Testing: ASTM G62, Method B for voids and holidays; provide written certification.
4. Acceptable Lining Materials:
   a. Provide approved virgin polyethylene conforming to ASTM D1248, with inert fillers and carbon black to resist ultraviolet degradation during storage; heat bonded to interior surface of pipe and fittings.
   b. Ceramic Epoxy – Protecto 401

C. Sanitary Sewer Point Repair Pipe: For pipes which will be lined with high density polyethylene liner pipe or cured-in-place liner, provide cement-lined with seal coat in accordance with ANSI A21.4. For pipes which will not be provided with named liner, provide pipe as specified in Paragraph 2.5.B.4, Sanitary Sewer and Force Main Interiors.

D. Exterior:

1. Water Lines:
   a. Auger Holes: Conform to requirements of Section 02265 – Polyurethane Coatings on Steel or Ductile Iron Pipe.
   b. Above Ground (or Exposed): Conform to requirements of Section 02250 – Steel Pipe and Fittings, Paragraph 2.3.
   c. Tunnel, Casing or Direct Bury: Conform to requirements of Paragraph 2.5.E.
2. Sanitary Sewers: Prime coat and outside asphaltic coating conforming to ANSI A21.10, ANSI A21.15 or ANSI A21.51 for pipe and fittings in open cut excavation and in casings.

E. Polyethylene Wrap: For buried pipes not cathodically protected, provide polyethylene wrap unless otherwise specified or shown. Conform to requirements of Section 02260 – Polyethylene Wrap.

F. For flanged joints in buried service, provide petrolatum wrapping system, Denso or equal, for the complete joint and alloy steel fasteners. Alternatively, provide bolts made of Type 304 stainless steel.

G. Pipe to be installed in potentially contaminated areas shall have coatings and linings recommended by the manufacturer for maximum resistance to the contaminants identified in the Phase II Environmental Site Assessment Report.

H. For water lines cathodically protected, supply Ductile Iron Pipe (DIP) with

either tape coatings or some other bonded dielectric coating as specified in Section 02255 – Steel Pipe and Fittings for Large Diameter Water Lines.

PART III: EXECUTION

3.1 INSTALLATION

A. Conform to installation requirements of Sections 02400 – Water Lines, 02500 – Gravity Sanitary Sewers, 02510 – Sanitary Sewer Force Mains 02600 – Storm Sewers, 02540 – Sanitary Sewer Point Repairs and 02560 – Sanitary Sewer Obstruction Removal, except as modified in this Section.

B. Install in accordance with AWWA C600 and manufacturer's recommendations.

C. Install all Ductile Iron Pipe (DIP) in double polyethylene wrap, unless cathodic protection is provided. Do not use polyethylene wrap with a cathodic protection system.

D. Holiday Testing:

1. Polyurethane: Conform to requirements of Section 02265 – Polyurethane Coatings for Steel or Ductile Iron Pipe.
2. Fusion Bonded Epoxy: Conform to requirements for new fittings in ANSI A 21.16.

3.2 FIELD REPAIR OF COATINGS

A. Polyurethane: Conform to requirements of Section 02265 – Polyurethane Coatings for Steel or Ductile Iron Pipe.

B. Fusion Bonded Epoxy: Conform to requirements for new fittings in ANSI A 21.16.

PART IV: TABLES

4.1 – REQUIRED BENDS

Line Diameter	Required Bends*
20 and 24 inches	Four 45° bends per 5,000 LF of water line
> 24 inches	Four 22.5° bends per 10,000 LF of water line

*Based on total length of contract [minimum of four (4)]. Any combination of bends may be substituted at manufacturer's option [i.e. two (2) – twenty-two and one half degree (22.5°) bends are equivalent to one (1) – forty-five degree (45°) bend] and shall be counted as one (1) fitting.

END OF SECTION

SECTION 02215SP

DUCTILE IRON PIPE (DIP) AND FITTINGS

The following provisions modify Section 02215 – Ductile Iron Pipe (DIP) and Fittings Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete first paragraph 1.2.A.1 and replace with the following:

   "No separate payment will be made for Ductile Iron Pipe (DIP) and Fittings under this Section. Include cost in the unit prices for work as specified in the following Sections, as applicable:"

3. Delete paragraph 1.2.B.

4. Delete paragraph 2.4.B.

END OF SPECIAL PROVISION

SECTION 02220
HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. High density polyethylene (HDPE) pipe for gravity sewers and drains, including fittings.
- B. High density polyethylene (HDPE) pipe for sanitary sewer force mains, including fittings.
- C. High density polyethylene (HDPE) pipe for storm sewers culverts.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for HDPE pipe under this Section. Include cost in unit prices for work, as specified in following sections:
     a. Section 02500 – Gravity Sanitary Sewers.
     b. Section 02510 – Sanitary Sewer Force Mains.
     c. Section 02600 – Storm Sewers.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHTO – American Association of State Highway and Transportation Officials.
  1. AASHTO M294 – Standard Specification for Corrugated Polyethylene Drainage Pipe, 18"- 48" diameter.
  2. AASHTO Section 18 – Soil Thermoplastic Pipe Interaction Systems.
  3. AASHTO Section 30 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity Flow Applications.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM D618 – Standard Practice for Conditioning Plastics for Testing.
  2. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
  3. ASTM D2321 – Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Pipe.
  4. ASTM D2657 – Standard Practice for Heat Fusion Joining Polyolefin Pipe and Fittings.

5. ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
6. ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
7. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
8. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
9. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
10. ASTM F714 – Standard Specification for Polyethylene Plastic (PE) Pipe (SDR-PR) Based on Outside Diameter.
11. ASTM F894 – Standard Specification for Polyethylene (PE) Large-Diameter Profile Wall Sewer and Drain Pipe.

C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit shop drawings showing design of pipe and fittings, laying dimensions, fabrication, fittings, flanges and special details.

1.5 QUALITY CONTROL

A. Provide manufacturer's certificate of conformance to Technical Specifications.
B. Furnish pipe and fittings that are homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Provide pipe as uniform as commercially practical in color, opacity, density and other physical properties.
C. The Project Manager reserves the right to inspect pipes or witness pipe manufacturing. Inspection shall in no way relieve manufacturer of responsibilities to provide products that comply with applicable standards and these Technical Specifications.
    1. Manufacturer's Notification: Should the Project Manager wish to witness manufacture of specific pipes, manufacturer shall provide the Project Manager with a minimum of three weeks (3 Wks) notice of when and where production of those specific pipes will take place.
    2. Failure to Inspect: Approval of products or tests shall not be implied by the Project Manager's decision not to inspect manufacturing, testing or finished pipes.
D. Hydrostatic testing of Force Mains and Water Lines using HDPE Pipe shall use testing procedures as outlined in paragraph 3.11 of Section 01475 – Quality Control Testing Procedures.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products

specified in this section with documented experience of a minimum five years (5 Yrs) of pipe installations that have been in successful, continuous service for same type of service as the proposed Work.

PART II: PRODUCTS

2.1 GENERAL

A. For new construction gravity sanitary sewer pipe provide HDPE pipe as specified in TABLE 4.1 SANITARY SEWER FOR DIRECT BURY in this Section.

B. For rehabilitation of gravity sanitary sewer pipe provide HDPE pipe as follows for new construction as specified in TABLE 4.2 SANITARY SEWER FOR SLIPLINING in this Section.

C. For Residential Driveway Culverts provide HDPE as follows:
   1. N-12 and N-12 HC by Advanced Drainage Systems, Inc. (ADS).
   2. Sure-Lok F477 by Hancor, Inc.

D. Furnish solid wall pipe with plain end construction for heat joining (butt fusion) conforming to ASTM D2657. Utilize controlled temperatures and pressures for joining to produce fused leak-free joint.

E. Furnish profile-wall gravity sewer pipe with bell-and-spigot end construction conforming to ASTM D3212. Joining shall be accomplished with elastomeric gasket in accordance with manufacturer's recommendations. Use integral bell-and-spigot gasketed joint designed so that when assembled, elastomeric gasket, contained in machined groove on pipe spigot, is compressed radially in pipe bell to form positive seal. Design joint to avoid displacement of gasket when installed in accordance with manufacturer's recommendations.

F. Furnish solid wall pipe for sanitary sewer force mains with a minimum working pressure rating of one hundred fifty pounds per square inch (150 psi) and with inside diameter equal to or greater than nominal pipe size indicated on the Drawings.

G. Furnish corrugated polyethylene pipe (CPP) for gravity storm sewer pipe. Joints shall be installed such that connection of pipe sections shall form continuous line free from irregularities in flow line. Suitable joints are:
   1. Integral Bell and Spigot: Bell shall overlap a minimum of two (2) corrugations of spigot end when fully engaged.
   2. Exterior Bell and Spigot: Bell shall be fully welded to exterior of pipe and overlap spigot end so that flow lines and ends match when fully engaged.

H. Jointing:
   1. Gaskets:
      a. Meet requirements of ASTM F477. Use gasket molded into circular form or extruded to proper section and then spliced into circular form. When no contaminant is identified, use gaskets of properly cured, high-grade

elastomeric compound. Basic polymer shall be natural rubber, synthetic elastomer or blend of both.

b. Pipes allowed to be installed in potentially contaminated areas, where free product is found near elevation of proposed sewer, shall have gasket materials for noted contaminant as specified in TABLE 4.3 – GASKET MATERIAL REQUIRED FOR CONTANIMANTS in this Section.

2. Lubricant: Use lubricant for assembly of gasketed joints which has no detrimental effect on gasket or on pipe, in accordance with manufacturer's recommendations.

2.2 MATERIALS FOR SANITARY SEWER

A. Pipe and Fittings: High density, high molecular weight polyethylene pipe material meeting requirements of Type III, Class C, Category 5, Grade P34, as defined in ASTM D1248. Material meeting requirements of cell classification in accordance with ASTM D3350 are also suitable for making pipe products under these specifications.

B. Other Pipe Materials: Materials other than those specified in Paragraph 2.2.A, Pipe and Fittings, may be used as part of profile construction, e.g., as core tube to support shape of profile during processing, provided that these materials are compatible with base polyethylene material and are completely encapsulated in finished product and in no way compromise performance of pipe products in intended use. Examples of suitable material include polyethylene and polypropylene.

2.3 MATERIALS FOR RESIDENTIAL DRIVEWAY CULVERTS

A. Pipe and Fittings: High density, high molecular weight polyethylene HDPE virgin compound material meeting requirements of cell class outlined in AASHTO M294, AASHTO MP7 and ASTM D3350.

B. Types: CPP shall meet one (1) or both of following:

1. Type S: Outer corrugated wall with smooth inner liner.
2. Type D: Inner and outer smooth walls braced circumferentially or spirally with projections or ribs.

C. Lubricant: Use lubricant for assembly of gasketed joints, which has no detrimental effect on gasket or on pipe, in accordance with manufacturer's recommendations.

2.4 TEST METHODS FOR SANITARY SEWER

A. Conditioning: Conditioning of samples prior to and during tests is subject to approval by the Project Manager. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D618 at seventy-three and four-tenths degrees Fahrenheit (73.4°) plus or minus three and six-tenths degrees Fahrenheit (±3.6° F) and fifty percent (50%) relative humidity plus or minus five percent (5%) relative humidity for not less than forty hours (40 Hrs) prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified.

B. Flattening: Flatten three specimens of pipe, prepared in accordance with Paragraph 2.5.A, in suitable press until internal diameter has been reduced to forty percent (40%) of original inside diameter of pipe. Rate of loading shall be uniform and at two inches (2 In) per minute. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking or separation of pipe walls or bracing profiles.

C. Joint Tightness: Test for joint tightness in accordance with ASTM D3212, except replace shear load transfer bars and supports with six inch (6 In) wide support blocks that can be either flat or contoured to conform to pipe's outer contour.

D. Purpose of Tests: Flattening and joint tightness tests are not intended to be routine quality control tests, but rather to qualify pipe to a specified level of performance.

2.5 TEST METHODS FOR RESDENTIAL DRIVEWAY CULVERTS

A. Pipe stiffness at five percent (5%) deflection, when determined in accordance with ASTM D2412, shall be as specified in Section 7.4 of AASHTO M294.

B. Minimum inner wall thickness shall be as specified in Section 7.2.2 of AASHTO M294.

2.6 MARKING

A. Mark each standard and random length of pipe in compliance with these Technical Specifications with following information:
   1. Pipe size.
   2. Pipe class.
   3. Production code.
   4. Material designation.

PART III: EXECUTION

3.1 INSTALLATION

A. Conform to requirements of following Sections:
   1. Section 02500 – Gravity Sanitary Sewers.
   2. Section 02510 – Sanitary Sewage Force Mains.
   3. Section 02525 – Acceptance Testing of Sanitary Sewers.
   4. Section 02600 – Storm Sewers.

B. Install pipe in accordance with the manufacturers recommended installation procedures.

C. HDPE pipe is not approved in applications requiring augering of pipe.

D. Bedding and backfill: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities.

PART IV: TABLES

4.1 SANITARY SEWER FOR DIRECT BURY

INSTALLATION SPEC NO.	GENERIC NAME	TRADE NAME OR MANUFACTURER	ASTM OR AASHTO	SDR (NUMERIC INDEX)	PIPE STIFFNESS (NUMERIC MINIMUM)	SIZE RANGE
02220	Solid Wall Polyethylene (HDPE)	Chevron Plexco Phillips 66 Quail Poly Pipe	ASTM F-714	DR 17 DR 21	115 46	8” – 10” 12” – 48”
02500	Polyethylene Profile Wall	Spirolite	ASTM F-894	n/a	46	18” – 120”

4.2 SANITARY SEWER FOR SLIPLINING

INSTALLATION SPEC NO.	GENERIC NAME	TRADE NAME OR MANUFACTURER	ASTM OR AASHTO	SDR (NUMERIC INDEX)	PIPE STIFFNESS (NUMERIC MINIMUM)	SIZE RANGE
02220	Solid Wall Polyethylene (HDPE)	Chevron Plexco Quail Poly Pipe AmeriFlow (NAPCO) AmeriFlow (KWH)	ASTM F-714	DR 21	46	8” – 48” 3” – 12” 14” – 63”
02500	Polyethylene Profile Wall	Spirolite	ASTM F-894	n/a	46	18” – 120”

4.3 GASKET MATERIAL REQUIRED FOR CONTANIMANTS

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by pipe manufacturer

END OF SECTION

SECTION 02220SP

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

The following supplement modifies Section 02220 HIGH DENSITY POLYETHYLENE (HDPE) PIPE Standard Specification. Where a portion of the of the Specification is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

PART 1 - GENERAL

1.1 GENERAL REQUIREMENT

ADD THE FOLLOWING IN SECTION 1.1 GENERAL REQUIREMENTS.

D. High density polyethylene (HDPE) pipe for transmission mains.

1.2 MEASUREMENT OF PAYMENT

ADD THE FOLLOWING IN SECTION 1.2 MEASUREMENT OF PAYMENT SUB A.

1-d. Section 02400 – Water Lines

PART 2 – PRODUCTS

ADD THE FOLLOWING IN PART 2 – PRODUCTS AFTER 2.3 MATERIALS FOR RESIDENTIAL DRIVEWAY CULVERTS

2.4 MATERIALS FOR TRANSMISSION MAIN

A. Materials used for the manufacturing of polyethylene pipe and fittings shall be PE3408/4710 High Density Polyethylene (HDPE) as specified in ASTM D3350 cell classification of 445474C for PE 4710 and 345434C for PE 3408.

B. High Density Polyethylene Pipe (HDPE) and fittings shall be used as specified in the materials specifications. All additional appurtenances such as tees, gaskets, flange adaptors, etc. shall meet the material specifications. The Contractor shall supply the pipe and fittings and shall include its price in the bid. All pipes installed by guided boring shall be joined by an approved butt fusion or electrofusion technique as specified in the manufacturer's specifications.

C. HDPE pipe shall be produced from resins with a material designation PE3408/4710, and a cell classification of 445474C for PE 4710 and 345434C for PE 3408 as specified within ASTM D3550. Pipe shall be legibly marked at intervals of no more than 5 ft with the manufacturer's name, trademark, pipe size, HDPE cell classification, and appropriate legend such as SDR 11, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin. Pipe NOT marked as specified above shall be rejected.

D. The material used in the production of potable water pipe shall be approved by the National Sanitation Foundation.

E. Pipe Thickness. This material shall have a minimum hydrostatic Desing Basis (HDB) of 1600 psi at 73°F when test as specified in PPI TR-3 and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.

F. Polyethylene pipe shall be manufactured as specified in AWWA C906 for sizes 4 in. – 63 in.

G. Permanent identification of piping service shall be provided by coextruding longitudinal blue stripes into the pipes outside surface. The striping material shall be the same material as the pipe material except for color.

H. Joints:
   1. Butt fusion or Electrofusion welded as specified in ASTM D3261.

I. The HDPE pipe type shall be DR 13.5 Ductile Iron Pipe Size (DIPS).

2.5 -HDPE PIPE FITTINGS

A. Fittings shall have a pressure rating equal to or greater to that of the pipe.

B. Butt fusion fittings, flanged, and mechanical joint adapters shall have manufacturing standard of ASTM D3261.

C. Service connections shall be performed using PE3408/4710 Electrofusion corporation saddles or approved equal. The saddle shall consist of an injection molded fitting base and shall incorporate a Brass 360 Alloy threaded outlet with an O-ring seal that is restrained with a Stainless Steel 304 compression ring. The saddle shall incorporate a constant 40 V fusion coil for the purpose of joining the fitting onto the outer pipe wall of the main.

2.6 - LOCATOR WIRE

A. Install electronically continuous trace wire with access points to be used for locating pipe with an electronic pipe locator after installation.

B. There is no separate payment for the supply and installation of tracer wire on any construction or installation of distribution and transmission lines by the Contractor. The Contractor shall consider the supply and installation of the wire incidental to all construction of distribution and transmission lines.

C. Locator wire shall be fourteen (14) gauge minimum solid copper with thermoplastic insulation recommended for direct burial. Wire connectors to be 3M DBR or approved equal shall be watertight to provide electric.

PART 3 – EXECUTION

3.1 INSTALLATION

ADD THE FOLLOWING IN SECTION 3.1 INSTALLATION

A-5. Section 02400 – Water Lines

A-6. Section 02455 – Disinfection of Water Lines
A-7 Section 0245 – Hydrostatic Testing of Water Lines

END OF SPECIAL PROVISION

SECTION 02220SP

HIGH DENSITY POLYETHYLENE (HDPE) PIPE

The following supplement modifies Section 02220 - HIGH DENSITY POLYETHYLENE (HDPE) PIPE Standard Specification. Where a portion of the of the Specification is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

1. Add the following in Section 1.1 General Requirements

   D. High density polyethylene (HDPE) pipe for transmission mains.

2. Add the following in Section 1.2 Measurement of Payment Sub A.

   1-d. Section 02400 – Water Lines

3. Add the following in after 2.3 Materials for Residential Driveway Culverts

   2.4 MATERIALS FOR TRANSMISSION MAIN

   A. Materials used for the manufacturing of polyethylene pipe and fittings shall be PE3408/4710 High Density Polyethylene (HDPE) as specified in ASTM D3350 cell classification of 445474C for PE 4710 and 345434C for PE 3408.

   B. High Density Polyethylene Pipe (HDPE) and fittings shall be used as specified in the materials specifications. All additional appurtenances such as tees, gaskets, flange adaptors, etc. shall meet the material specifications. The Contractor shall supply the pipe and fittings and shall include its price in the bid. All pipes installed by guided boring shall be joined by an approved butt fusion or electrofusion technique as specified in the manufacturer's specifications.

   C. HDPE pipe shall be produced from resins with a material designation PE3408/4710, and a cell classification of 445474C for PE 4710 and 345434C for PE 3408 as specified within ASTM D3550. Pipe shall be legibly marked at intervals of no more than 5 ft with the manufacturer's name, trademark, pipe size, HDPE cell classification, and appropriate legend such as SDR 11, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin. Pipe NOT marked as specified above shall be rejected.

D. The material used in the production of potable water pipe shall be approved by the National Sanitation Foundation.

E. Pipe Thickness. This material shall have a minimum hydrostatic Desing Basis (HDB) of 1600 psi at 73°F when test as specified in PPI TR-3 and shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.

F. Polyethylene pipe shall be manufactured as specified in AWWA C906 for sizes 4 in. – 63 in.

G. Permanent identification of piping service shall be provided by coextruding longitudinal blue stripes into the pipes outside surface. The striping material shall be the same material as the pipe material except for color.

H. Joints:

1. Butt fusion or Electrofusion welded as specified in ASTM D3261. All butt fusion welds shall be made as described in ASTM F2620**.** Electrofusion welding can be used for making pipe welds. Hot air and extrusion welding are NOT permitted for pipe joining**.**

I. The HDPE pipe type shall be DR 13.5 Ductile Iron Pipe Size (DIPS).

2.5 -HDPE PIPE FITTINGS

A. Fittings shall have a pressure rating equal to or greater to that of the pipe.

B. Butt fusion fittings, flanged, and mechanical joint adapters shall have manufacturing standard of ASTM D3261.

C. Service connections shall be performed using PE3408/4710 Electrofusion corporation saddles or approved equal. The saddle shall consist of an injection molded fitting base and shall incorporate a Brass 360 Alloy threaded outlet with an O-ring seal that is restrained with a Stainless Steel 304 compression ring. The saddle shall incorporate a constant 40 V fusion coil for the purpose of joining the fitting onto the outer pipe wall of the main.

2.6 - LOCATOR WIRE

A. Install electronically continuous trace wire with access points to be used for locating pipe with an electronic pipe locator after installation.

B. There is no separate payment for the supply and installation of tracer wire on any construction or installation of distribution and transmission lines by the Contractor. The Contractor shall consider the supply and installation of the wire incidental to all construction of distribution and transmission lines.

C. Locator wire shall be fourteen (14) gauge minimum solid copper with thermoplastic insulation recommended for direct burial. Wire connectors to be 3M DBR or approved equal shall be watertight to provide electric.

4. Add the following in Section 3.1 Installation

A-5. Section 02400 – Water Lines
A-6. Section 02455 – Disinfection of Water Lines
A-7 Section 0245 – Hydrostatic Testing of Water Lines

END OF SPECIAL PROVISIONS

SECTION 02230
POLYETHYLENE PLASTIC TUBING (PE)

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Polyethylene (PE) tubing for water service lines.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for Polyethylene (PE) tubing under this Section. Include cost in the unit prices for work, as specified in following sections:
     a. Section 02430 – Water Tap and Service Line Installation.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AWWA – American Water Works Association.
  1. AWWA C901 – Standard for Polyethylene (PE) Pressure Pipe and Tubing for Water Service.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM D2737 – Standard Specification for Polyethylene (PE) Tubing.
  2. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit shop drawings showing design of pipe and fittings, laying dimensions, fabrication, fittings, flanges and special details.

1.5 QUALITY CONTROL
- A. Provide manufacturer's certificate of conformance to the Technical Specifications.
- B. Furnish pipe and fittings that are homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Provide pipe as uniform as commercially practical in color, opacity, density and other physical properties.
- C. The Project Manager reserves the right to inspect pipes or witness pipe

manufacturing. Inspection shall in no way relieve manufacturer of responsibilities to provide products that comply with applicable standards and these Technical Specifications.

1. Manufacturer's Notification: Should the Project Manager wish to witness manufacture of specific pipes, manufacturer shall provide the Project Manager with minimum three weeks (3 Wks) notice of when and where production of those specific pipes shall take place.
2. Failure to Inspect: Approval of products or tests shall not be implied by the Project Manager's decision not to inspect manufacturing, testing or finished pipes.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with documented experience of a minimum five years (5 Yrs) of pipe installations that have been in successful, continuous service for same type of service as the proposed Work.

PART II: PRODUCTS

2.1 GENERAL

A. All polyethylene (PE) tubing shall be high density, high molecular weight plastic tubing meeting.
B. Polyethylene (PE) tubing for water services shall be pressure rated at two hundred pounds per square inch (200 psi) working pressure and must bear the National Sanitation Foundation seal of approval.
C. Pipe manufacturers shall be listed on SPL WW-65.
D. Polyethylene (PE) tubing shall be designated PE3408, denoting Grade 34 with hydrostatic design stress of eight hundred pounds per square inch (800 psi).

2.2 MARKING

A. Mark each standard and random length of pipe in compliance with these Technical Specifications with following information:
   1. Nominal tubing size.
   2. Standard PE code designation.
   3. Standard Dimension Ratio (SDR) and pressure rating.
   4. AWWA designation.
   5. Manufacturer Name or Trademark and testing agency name or seal.

PART III: EXECUTION

3.1 INSTALLATION

A. Conform to requirements of following Sections:

1. Section 02125 – Excavation and Backfill for Utilities.
2. Section 02400 – Water Lines.
3. Section 02430 – Water and Tap Service Line Installations.
4. Section 02460 – Wet Connections.
5. Section 02455 – Disinfection of Waterline.

B. Install pipe in accordance with the manufacturers recommended installation procedures.

C. Polyethylene (PE) tubing is not approved in applications requiring augering of pipe.

D. Bedding and backfill: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities.

END OF SECTION

SECTION 02235
POLYVINYL CHLORIDE (PVC) PIPE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Polyvinyl chloride pressure pipe for water distribution, in nominal diameters four inches (4 In) through twenty inches (20 In).

B. Polyvinyl chloride sewer pipe for gravity sewers in nominal diameters four inches (4 In) through forty-eight inches (48 In).

C. Polyvinyl chloride pressure pipe for gravity sewers and force mains in nominal diameters four inches (4 In) through twenty inches (20 In).

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. No separate payment will be made for PVC pipe under this Section. Include unit prices for work included as specified in the following sections:
   a. Section 02400 – Water Lines.
   b. Section 02500 – Gravity Sanitary Sewers.
   c. Section 02510 – Sanitary Sewer Force Mains.
   d. Section 02600 – Storm Sewers.
2. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES

A. ANSI – American National Standards Institute.

1. ANSI A21.16 (AWWA C116) – Protective Fusion Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile Iron and Grey Iron Fittings for Water Supply Service.

B. ASTM – American Society for Testing and Materials.

1. ASTM D1248 – Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
2. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
3. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
4. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
5. ASTM D2444 – Standard Test Method for Determination of the

Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).

6. ASTM D2680 – Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
7. ASTM D3034 – Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
8. ASTM D3139 – Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
9. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
10. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
11. ASTM F679 – Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
12. ASTM F794 – Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
13. ASTM F949 – Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with Smooth Interior and Fittings.

C. AWWA – American Water Works Association.
   1. AWWA C110 – American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 Inches Through 48 Inches for Water.
   2. AWWA C111 – American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   3. AWWA C900 – Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 Inches Through 12 Inches for Water Distribution.
   4. AWWA C905 – Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In., for Water Transmission and Distribution.
   5 AWWA C909 – Standard for Molecularly-Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 Inches through 12 Inches (100mm through 300 mm), for Water Distribution.

D. CTFS – City of Friendswood Technical Specification.

E. PPI – Plastic Pipe Institute.
   1. PPI TR3 – Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.

F. UNI – Uni-Bell Standard.
   1. UNI-B-13 – Recommended Standard Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride Pipe.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit shop drawings showing design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges and special details.

1.5 QUALITY CONTROL

A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C900, AWWA C909 and AWWA C905 for pressure pipe applications or appropriate ASTM standard specified for gravity sewer pipe.

B. Submit manufacturer's certification that PVC pressure pipe for water lines and force mains has been hydrostatically tested at factory in accordance with AWWA C900, AWWA C909 and AWWA C905 and this Section.

C. When foreign manufactured material is proposed for use, have material tested for conformance to applicable ASTM requirements by certified independent testing laboratory located in United States. Certification from other source is not acceptable. Furnish copies of test reports to the Project Manager for review. Cost of testing paid by the Contractor.

PART II: PRODUCTS

2.1 MATERIAL

A. Use PVC compounds in manufacture of pipe that contain no ingredient in amount that has been demonstrated to migrate into water in quantities considered to be toxic.

B. Furnish PVC pressure pipe manufactured from Class 12454-A or Class 12454-B virgin PVC compounds as defined in ASTM D1784. Use compounds qualifying for rating of four thousand pounds per square inch (4000 psi) for water at seventy-three and four tenths degrees Fahrenheit (73.4° F) per requirements of PPI TR3. Provide pipe which is homogeneous throughout, free of voids, cracks, inclusions and other defects, uniform as commercially practical in color, density and other physical properties. Deliver pipe with surfaces free from nicks and scratches with joining surfaces of spigots and joints free from gouges and imperfections which could cause leakage.

C. PVC Restrained Pipe: Must be listed on the City's current Product Approval List.

1. Pipe Material:
    a. DR 18: For restrained joints where shown on Drawings.
    b. DR 14: For alternate to offset pipe sections shown on the Drawings. Do not use PVC for offset sections with depth of cover greater than twenty feet (20 Ft) or less than four feet (4 Ft). Do not use PVC in potentially petroleum contaminated areas.

D. Water Service

1. Provide self-extinguishing PVC pipe that bears Underwriters' Laboratories mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.

2. Bear National Sanitation Foundation Seal of Approval (NSF-PW).

E. Gaskets:
1. Gaskets shall meet requirements of ASTM F477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
2. Flat Face Mating Flange: Full faces one-eighth inch (1/8 In) thick ethylene propylene (EPR) rubber.
3. Raised Face Mating Flange: Flat ring one-eighth inch (1/8 In) ethylene propylene (EDR) rubber, with filler gasket between OD of raised face and flange OD to protect flange from bolting moment.

F. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.

G. Do not use PVC in potentially or known contaminated areas.

H. Do not use PVC in areas exposed to direct sunlight.

2.2 WATER SERVICE PIPE

A. Pipe four inch (4 In) through twelve inch (12 In): AWWA C900, AWWA C909, Class 150, DR 18; AWWA C900, Class 200, DR 14 as alternate to offset pipe sections; nominal twenty foot (20 Ft) lengths; cast-iron equivalent outside diameters.

B. Pipe fourteen inch (14 In) through twenty inch (20 In): AWWA C905; Class 235; DR 18; nominal twenty foot (20 Ft) lengths; cast-iron equivalent outside diameter.

C. Provide Polyvinyl Chloride Pipe from approved manufacturers.

D. Make curves and bends by deflecting joints. Do not exceed maximum deflection recommended by pipe manufacturer. Submit details of other methods of providing curves and bends for review by the Project Manager.

E. Hydrostatic Test: AWWA C900, AWWA C905, AWWA C909, ANSI A21.10 (AWWA C110); at point of manufacture; submit manufacturer's written certification.

2.3 GRAVITY SEWER PIPE

A. PVC gravity sanitary sewer pipe and storm sewer pipe shall be as specified in TABLE 4.1 – PVC PIPE DESIGNATION in the Section.

B. When solid wall PVC pipe eighteen inches (18 In) to twenty-seven inches (27 In) in diameter is required in SDR 26, provide pipe conforming to ASTM F679, except provide wall thickness as required for SDR 26 and pipe strength of one hundred fifteen pounds per square inch (115 psi).

C. For sewers up to twelve inch (12 In) diameter crossing over water lines or crossing under water lines with less than two feet (2 Ft) separation, provide minimum one hundred fifty pounds per square inch (150 psi) pressure-rated pipe conforming to ASTM D2241 with suitable PVC

adapter couplings.

D. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D3212 and ASTM F477 or ASTM D3139 and ASTM F477. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. Manufacturer shall test sample from each batch conforming to requirements ASTM D2444.

E. Fittings: Provide PVC gravity sewer sanitary bends, tee or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings shall not be acceptable.

F. Conditioning: Conditioning of samples prior to and during tests is subject to approval by the Project Manager. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D618 at seventy-three and four-tenths degrees Fahrenheit (73.4° F) plus or minus three and six-tenths degrees Fahrenheit (±3.6° F) and fifty percent (50%) relative humidity plus or minus five percent (5%) relative humidity for not less than forty hours (40 Hrs) prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified.

G. Pipe Stiffness: Determine pipe stiffness at five percent (5%) deflection in accordance with Test Method D 2412. Minimum pipe stiffness shall be forty-six pounds per square inch (46 psi). For diameters four inches (4 In) through eighteen inches (18 In), test three (3) specimens, each a minimum of six inches (6 In) in length. For diameters twenty-one inch (21 In) through thirty-six inch (36 In), test three (3) specimens, each a minimum of twelve inch (12 In) in length.

H. Flattening: Flatten three (3) specimens of pipe, prepared in accordance with Paragraph 2.3.F, in suitable press until internal diameter has been reduced to sixty percent (60%) of original inside diameter of pipe. Rate of loading shall be uniform. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking or separation of pipe walls or bracing profiles. Perform the flattening test in conjunction with pipe stiffness test.

I. Joint Tightness: Test for joint tightness in accordance with ASTM D3212, except that joint shall remain watertight at minimum deflection of five percent (5%). Manufacturer shall be required to provide independent third (3rd) party certification for joint testing each diameter of storm sewer pipe.

J. Purpose of Tests: Flattening and pipe stiffness tests are intended to be routine quality control tests. Joint tightness test is intended to qualify pipe to specified level of performance.

2.4 SANITARY SEWER FORCE MAIN PIPE

A. Provide approved PVC pressure pipe conforming to requirements for water service pipe and conforming to minimum working pressure rating specified in Section 02510 – Sanitary Sewer Force Mains.

B. Acceptable pipe joints are integral bell-and-spigot, containing a bonded-in elastomeric sealing ring meeting requirements of ASTM F477. In designated areas requiring restrained joint pipe and fittings, use approved joint restraint device conforming to UNI-B-13, for PVC pipe twelve inch (12 In) diameter and less.

C. Fittings: Provide approved ductile iron fittings as per Section 02215 – Ductile Iron Pipe (DIP) and Fittings, Paragraph 2.4, except furnish fittings with one (1) of following approved internal linings:
   1. Nominal forty (40) mils [thirty-five (35) mils minimum] virgin polyethylene complying with ASTM D1248, heat fused to interior surface of fitting.
   2. Nominal forty (40) mils [thirty-five (35) mils minimum] polyurethane.
   3. Nominal forty (40) mils [thirty-five (35) mils minimum] ceramic epoxy.
   4. Nominal forty (40) mils [thirty-five (35) mils minimum] fusion bonded epoxy.

D. Exterior Protection: Provide polyethylene wrapping of ductile-iron fittings as required by Section 02260 – Polyethylene Wrap.

E. Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with Paragraph 2.2.E.

2.5 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

A. Bends and Fittings: ANSI A 21.10 or ANSI A 21.53, ductile iron; ANSI A 21.11 single rubber gasket push-on type joint; minimum two hundred pounds per square inch (150) psi pressure rating. Approved restrained joints, two hundred pounds per square inch (200 psi) and two hundred fifty pounds per square inch (250 psi), may be provided for up to twelve (12) inches in diameter (water or sanitary).

B. Provide approved restrained joint fittings: Integral restrained joint fittings and pipe shall not require secondary restraint.

PART III: EXECUTION

3.1 PROTECTION

A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with manufacturer’s recommendations.

3.2 INSTALLATION

A. Conform to requirements of Section 02400 – Water Lines, Section 02500 – Gravity Sanitary Sewers and Section 02510 – Sanitary Sewer Force Mains, as applicable.

B. Install PVC pipe in accordance with Section 02125 – Excavation and Backfill for Utilities, ASTM D2321 for Sewer Pipe and manufacturer's

recommendations.

C. Install PVC water service pipe to clear utility lines and have minimum depth of cover below property line grade of street, unless otherwise required by Drawings:
   1. Water service pipe twelve (12) inches in diameter and smaller four feet (4 Ft) of cover.
   2. Water service pipe sixteen (16) inches in diameter and larger five (5) feet of cover.

D. Avoid imposing strains that shall overstress or buckle pipe when lowering pipe into trench. Do not drop pipe more than two feet (2 Ft).

E. Hand shovel pipe bedding under pipe haunches and along sides of pipe barrel and compact to eliminate voids and ensure side support.

F. Store PVC pipe under cover out of direct sunlight. Protect pipe from excessive heat or harmful chemicals. Prevent damage by crushing or piercing.

G. Allow PVC pipe to cool to ground temperature before backfilling when assembled out of trench to prevent pullout due to thermal contraction.

3.3 PVC RESTRAINED MECHANISM

A. Do not apply lubricant to spline or pipe or coupling spline grooves.

B. Do not use excessive force while inserting the spline through coupling.

C. Insert spline until it is fully seated around circumference of pipe.

D. Field Cutting of Pipe Ends:
   1. Perform by workers certified by manufacturer.
   2. Use a PVC pipe cutter and provide square ends.
   3. Use manufacturer approved power routing and grooving tool to field fabricate required pipe groove.

PART IV: TABLES

4.1 – PVC PIPE DESIGNATION

WALL CONSTRUCTION	MANUFACTURER	ASTM DESIGNATION	SDR (MAX.)/ STIFFNESS (MIN.)	DIAMETER SIZE RANGE
Solid	J-M Pipe	D3034	SDR 26 / PS 115	6” TO 10”
		D3034	SDR 35 / PS 46	12” & 15”
	CertainTeed	F679	SDR 35 / PS 46	18” to 27”
	Diamond	AWWA C900	DR 18 / N/A	4” to 12”
	Uponor ETI	AWWA C909	DR 18 / N/A	4” to 12”
	North American	AWWA C905	DR 18 / N/A	14” to 16”
Truss (Gasketed)	Contech	D2680	N/A / 200 psi	8” to 15”
Profile	Contech A-2000	F949	N/A / 46 psi	12” to 16”
	Contech A-2026	F949	N/A / 115 psi	8” to 10”
	ETI, Ultra-Rib	F794	N/A / 46 psi	8” to 30”
	ETI, Ultra-Corr	F794	N/A / 46 psi	24” to 36”

END OF SECTION

SECTION 02240
REINFORCED CONCRETE BOXES (RCB)

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Precast reinforced concrete box sewers.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for precast reinforced concrete box sewer under this Section. Include payment in the unit price for Section 02600 – Storm Sewers.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C1433 – Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit shop drawings and data on box sections, fittings, gaskets and appurtenances for approval. Indicate conformance to reference standards.

1.5 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that pipe was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 PRECAST REINFORCED CONCRETE BOX SEWERS
- A. Conform to ASTM C1433, as indicated on the Drawings.
- B. Pipe and boxes shall be machine-made or cast by process which shall provide for uniform placement of concrete in forms and compaction by mechanical devices to produce dense, structurally sound concrete.

2.2 CONCRETE
- A. Conform to requirements of Section 03300 – Structural Concrete.

B. Use concrete mixed in central batch plant or other batching facility from which quality and uniformity of concrete can be assured. Transit-mixed concrete is not acceptable.

2.3 SOURCE QUALITY CONTROL

A. The Project Manager shall inspect manufacturer's plant and casting operations as deemed necessary.

PART III: EXECUTION

3.1 BEDDING

A. Bed box sections on foundation of firm and stable material accurately shaped to conform to their bases. Install bedding as specified in Section 02125 – Excavation and Backfill for Utilities. When required by the Drawings, use special bedding material. When single-cell box sections are placed in parallel for multi-cell installation, place in conformance with details shown on the Drawings.

3.2 PLACEMENT

A. Carefully lower box sections to bottom of trench and lay accurately in line and grade, with spigot or tongue end downstream entering bell or groove end to full depth and in such manner as not to drag foreign material into annular space.

3.3 JOINTING

A. Join box sections together and match so that they shall form continuous smooth and uniform invert.

3.4 BACKFILLING

A. After box has been properly jointed and bedded, commence backfilling.
B. Backfill in accordance with Section 02125 – Excavation and Backfill for Utilities.

END OF SECTION

SECTION 02245
REINFORCED CONCRETE PIPE (RCP)

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Reinforced concrete pipe for sanitary sewers and storm sewers.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for reinforced concrete pipe under this Section. Include cost in unit price work as specified in following Sections:
     a. Section 02500 – Gravity Sanitary Sewers.
     b. Section 02600 – Storm Sewers.
  2. Refer to Section 01270- Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
  2. ASTM C443 – Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets.
  3. ASTM C497 – Standard Test Method for Concrete Pipe, Manhole Sections or Tile.
  4. ASTM C506 – Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
  5. ASTM C655 – Standard Specification for Reinforced Concrete D-load Culvert, Storm Drain and Sewer Pipe.
  6. ASTM C877 – Standard Specification for External Sealing Bands for Noncircular Concrete Sewer, Storm Drain and Culvert Pipe.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit complete product data for pipe, fittings and gaskets for approval. Indicate conformance to appropriate reference standards.
- C. Submit manufacturer's certificate that concrete pipes meet applicable standards.
- D. For jacking pipe, submit drawings and data describing grouting port design and closure procedures when required by Section 03105 – Grout,

including liner repair, as applicable.

1.5 QUALITY ASSURANCE

A. Provide manufacturer's affidavits that pipe was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 REINFORCED CONCRETE PIPE

A. Conform circular reinforced concrete pipe to requirements of ASTM C76, for Class III wall “B” thickness. Conform to rubber gasket joints for sanitary sewers and storm sewers and tongue and groove for roadside ditch culverts to ASTM C443.

B. Conform reinforced concrete arch pipe to requirements of ASTM C506 for Class A-III. Joints shall conform to ASTM C877.

C. Reinforced concrete elliptical pipe, either vertical or horizontal, shall conform to requirements of ASTM C507 for Class VE-III for vertical or Class HE-III for horizontal. Use rubber gasket joints conforming to ASTM C877.

D. Conform reinforced concrete D-load pipe requirements of ASTM C655.

2.2 GASKETS

A. When no contaminant is identified, furnish rubber gasket conforming to ASTM C443 for circular reinforced concrete pipe and rubber gasket conforming to ASTM C877 for reinforced concrete elliptical pipe.

B. Pipes allowed to be installed in potentially contaminated areas, where free product is found near elevation of proposed sewer, shall have gasket materials for noted contaminant as specified in TABLE 4.1 – GASKET MATERIAL REQUIRED FOR CONTANIMANTS in this Section.

2.3 LINERS FOR SANITARY SEWER PIPE

A. Reinforced concrete pipe for sanitary sewers shall be PVC lined.

B. Reinforced concrete pipes to be installed in potentially contaminated areas shall have liners recommended by manufacturer as resistant to contaminants identified in Phase II Environmental Site Assessment Report.

2.4 SOURCE QUALITY CONTROL

A. The Project Manager shall inspect manufacturer's plant and casting operations as deemed necessary.

PART III: EXECUTION

3.1 BEDDING

A. Bed pipe sections on foundation of firm and stable material accurately shaped to conform to their bases. Install bedding as specified in Section 02125 – Excavation and Backfill for Utilities. When required by the Drawings, use special bedding material. When single-cell pipe sections are placed in parallel for multi-cell installation, place in conformance with details shown on the Drawings.

3.2 PLACEMENT

A. Carefully lower pipe sections to bottom of trench and lay accurately in line and grade, with spigot or tongue end downstream entering bell or groove end to full depth and in such manner as not to drag foreign material into annular space.

3.3 JOINTING

A. Join pipe sections together and match so that they shall form continuous smooth and uniform invert.

3.4 BACKFILLING

A. After pipe has been properly jointed and bedded, commence backfilling.
B. Backfill in accordance with Section 02125 – Excavation and Backfill for Utilities.

PART IV: TABLES

4.1 GASKET MATERIAL REQUIRED FOR CONTANIMANTS

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by pipe manufacturer

END OF SECTION

SECTION 02250
STEEL PIPE AND FITTINGS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Steel pipe and fittings for water lines for aerial crossings, aboveground piping and encasement sleeves.
- B. Specifications identify requirements for small-diameter less than or equal to twenty inches (20 In).

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No payment will be made for steel pipe and fittings under this Section. Refer to Section 02400 – Water Lines for measurement and payment.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHTO – American Association of State Highway and Transportation Officials.
  1. AASHTO – Standard Specifications for Highway Bridges.
- B. ASME – American Society of Mechanical Engineers.
  1. ASME B16.1 – Cast-Iron Pipe Flanges and Flanged Fittings.
- C. ASTM – American Society for Testing and Materials.
  1. ASTM A36 – Standard Specification for Carbon Structural Steel.
  2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  3. ASTM A105 – Standard Specification for Carbon Steel Pipe Forgings for Piping Applications.
  4. ASTM A106 – Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
  5. ASTM A135 – Standard Specification for Electric-Resistance-Welded Steel Pipe.
  6. ASTM A139 – Standard Specification for Electric-Fusion (ARC) – Welded Steel Pipe (NPS 4 and Over).
  7. ASTM A1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
  8. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

D. AWWA – American Water Works Association.
   1. AWWA C200 – Standard for Steel Water Pipe 6 in. and Larger.
   2. AWWA C206 – Standard for Field Welding of Steel Water Pipe.
   3. AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service – Sizes 4 in. through 144 in.
   4. AWWA C210 – Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
   5. AWWA M11 – Steel Pipe – A Guide for Design and Installation.

E. CFTS – City of Friendswood Technical Specifications.

F. SSPC – Steel Structure Painting Council.
   1. SSPC Good Painting Practice, Volume 1.
   2. SSPC SP1 – Surface Preparation Specification No. 1 Solvent Cleaning.
   3. SSPC SP5 – Joint Surface Preparation Standard White Blast Cleaning.
   4. SSPC SP6 – Surface Preparation Specification No. 6 Commercial Blast Cleaning.
   5. SSPC SP10 – Surface Preparation Specification No. 10 Near-White Blast Cleaning.
   6. SSPC VIS1 – Visual Standard for Abrasive Blast Cleaned Steel.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures. For aerial crossings and above ground piping, include lay schedule of new pipe and fittings indicating alignment and grade, laying dimensions, lining and coating systems, proposed welding procedures, fabrication, fitting, flange and special details. Show station numbers for pipe and fittings corresponding to the Drawings.

B. Submit manufacturer's certifications that pipe and fittings are new and unused.

C. Submit manufacturer's certifications that pipe and fittings have been hydrostatically tested at factory in accordance with AWWA C200.

D. Submit manufacturer's affidavits that coatings and linings comply with applicable requirements of this Section and:
   1. Polyurethane coatings were applied in strict accordance with manufacturer's recommendation and allowed to cure at temperature five degrees Fahrenheit (5° F) above dew point.
   2. Linings were applied and allowed to cure at temperature above thirty-two degrees Fahrenheit (32° F).

E. Submit certification from National Association of Corrosion Engineers (NACE) Certified Coatings Inspector, having Level III certification for coatings and linings, that steel pipe furnished on project was properly inspected and any defective coating detected was properly repaired.

1.5 QUALITY CONTROL

A. Prior to start of work, provide proof of certification of qualification for

welders employed for type of work, procedures and positions involved. Provide welder qualifications in accordance with AWWA C206.

B. Shop-applied coatings and linings; provide services of an independent coating and lining inspection service or testing laboratory with qualified coating inspectors. Perform inspection by NACE trained inspectors under supervision of NACE Level III Certified Coatings Inspector verifying compliance with same requirements specified in Paragraph 3.2.

C. Coatings: Measure temperature and dew point of ambient air before applying coatings. Inspect physical dimensions and overall condition of coatings. Inspect for visible surface defects, thickness and adhesion of coating to surface and between layers.

D. Final Inspection:
   1. Before shipment, inspect each finished pipe, fitting, special and accessory for markings, metal thickness, coating thickness, lining thickness (if shop applied), joint dimensions and roundness.
   2. Inspect for coating placement and defects. Test exterior coating for holidays.
      a. Inspect linings for thickness, pitting, scarring and adhesion.

E. Ensure workmen engaged in manufacturing are qualified and experienced in performance of their specific duties.

PART II: PRODUCTS

2.1 STEEL PIPE

A. Manufacture pipe with nominal diameter twenty inches (20 In) and less, but more than two inches (2 In), to conform to ASTM A106 or A 53 Grade B, standard weight.

B. Provide steel pipe and encasement sleeves designed and manufactured in conformance with AWWA C200 and AWWA M11 except as modified herein. Steel to be minimum of A36, ASTM A1011 Grade 36, ASTM A53 Grade B, ASTM A135 Grade B or ASTM A139 Grade B.

C. Minimum Allowable Steel-Wall Thickness shall be as specified in TABLE 4.1 – STEEL WALL THICKNESS FOR CARRIER PIPE in this Section.
   1. Review pipe and fitting design for conditions exceeding those specified herein.
   2. Provide pipe with wall thickness of no less than listed in TABLE 4.1 – STEEL WALL THICKNESS FOR CARRIER PIPE in this Section.

D. Minimum Diameter for Casing Pipe shall be as specified in TABLE 4.2 – MINIMUM DIAMETER FOR CASING PIPE in this Section.
   1. Provide casing pipe with wall thickness of no less than listed in TABLE 4.2 – MINIMUM DIAMETER FOR CASING PIPE in this Section.

2. Casing pipe: AWWA C200 new uncoated welded steel.
3. Verify casing diameter required with dimensions of casing spacer.

E. Provide pipe sections in lengths of not less than sixteen feet (16 Ft) except as required for special sections and not greater than forty feet (40 Ft).

F. Provide short sections of steel pipe not less than four feet (4 Ft) in length unless indicated on the Drawings or specifically permitted by the Project Manager.

G. Fittings: Factory forged for sizes two inches (2 In) through twenty inches (20 In); long radius bends; beveled ends for field butt welding; wall thickness equal to or greater than pipe to which fitting is to be welded unless otherwise shown on the Drawings.

H. Joints:
1. Standard field joint for steel pipe and encasement sleeve: AWWA C206. Single-welded, butt joint.
2. Provide mechanically coupled or flanged joints for valves and fittings, as shown on the Drawings. Flanges: AWWA C207, Class D; same diameter and drilling as Class 125 cast iron flanges ASME B16.1. Maintain electrically isolated flanged joints between steel and cast iron by using epoxy-coated bolts, nuts, washers and insulating type gasket.
3. Elbows to be standard weight seamless elbows per ASTM A106, Grade A or B.
4. Flanges for pipe twenty inches (20 In) in diameter and less, but more than two inches (2 In), shall be ANSI one hundred fifty pound (150 Lb) flat face, slip on or weld neck flanges, meeting ASTM A105 requirements. Where flanges are to join to valves with raised face flanges, use ANSI one hundred fifty pound (150 Lb) raised flange.
5. Provide same coating for exposed portions of nuts and bolts as flanges which they secure.

I. Fabricate flanges with over-size bolt holes, with flanges drilled in pairs, to accommodate insulating sleeves.

2.2 INTERNAL LINING SYSTEMS FOR STEEL PIPE, ALL INSTALLATIONS

A. Supply steel pipe with epoxy lining, capable of conveying water at temperatures not greater than one hundred forty degrees Fahrenheit (140° F). Provide linings conforming to American National Standards Institute/National Sanitation Foundation (ANSI/NFS) Standard 61 and certification to be from organization accredited by ANSI. Unless otherwise noted, coat exposed (wetted) steel parts of flanges, blind flanges, bolts, access manhole covers, etc., with epoxy lining, as specified in TABLE 4.3 EPOXY LINING in this Section.

B. Epoxy Lining AWWA C210, White or approved equal for shop and field joint applied, except as modified in this Section. Provide material from same

manufacturer. For Pipe larger than two inches (2 In) in diameter protect interior surface with liquid two-part chemically cured epoxy primer specified for interior surfaces.

1. Total allowable dry film thickness for system:
   a. Minimum: Twelve (12) mils.
   b. Maximum: Eighteen (18) mils.
   c. Minimum field adhesion: Seven hundred pounds per square inch (700 psi).
2. Dry film thicknesses for approved alternate products in accordance with product manufacturer's recommendations.
3. Lining system may consist of three (3) or more coats of same approved alternate epoxy lining without use of separate primer.

2.3 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVEGROUND AND IN VAULTS (EXPOSED)

A. Provide three (3) coat epoxy/polyurethane coating system as specified in TABLE 4.4 – THREE PART EPOXY/POLYURETHANE COATINGS in this Section. Provide material from same manufacturer.
B. Total Allowable Dry Film Thickness (DFT) for System:
   1. Minimum: Nine and one-half (9.5) mils
   2. Maximum: Twelve and one-half (12.5) mils
C. Clean bare pipe free from mud, mill lacquer, oil, grease or other contaminant. Inspect and clean surfaces according to SSPC SP1 to remove oil, grease and loosely adhering deposits prior to blast cleaning. Remove visible oil and grease spots by solvent wiping. Use only approved safety solvents which do not leave residue. Use preheating to remove oil, grease, mill scale, water and ice provided pipe is preheated in uniform manner to avoid distortion.
D. Remove surface imperfections such as slivers, scabs, burrs, weld spatter and gouges, presence of metallic defects may be cause for rejection of pipe.

PART III: EXECUTION

3.1 PIPING INSTALLATION

A. Conform to applicable provisions of Section 02400 – Water Lines, except as modified in this Section.
B. Comply with the following:
   1. Bedding and Backfilling: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities.
   2. For pipes with coating: Do not roll or drag pipe on ground, move pipe in such a manner as not to damage pipe or coating. Carefully inspect pipe for abrasions and repair damaged coating before pipe is installed.
C. Static Electricity:

1. Properly ground steel pipeline during construction as necessary to prevent build-up of static electricity.
2. Electrically test where required after installation is complete.

D. Do not bury steel pipe, unless it is large diameter water line.

3.2 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVE GROUND AND IN VAULTS (EXPOSED) AND EPOXY INTERNAL LINING SYSTEM.

A. Safety: Paints, coatings and linings specified in this Section are hazardous materials. Vapors may be toxic or explosive. Protective equipment, approved by appropriate regulatory agency, is mandatory for personnel involved in painting, coating and lining operations.

B. Workmanship:
1. Application: By qualified and experienced workers who are knowledgeable in surface preparation and application of high-performance industrial coatings.
2. Paint Application Procedures: SSPC Good Painting Practices, Volume 1.

C. Surface Preparation:
1. Prepare surfaces for painting by using abrasive blasting.
2. Schedule cleaning and painting so that detrimental amounts of dust or other contaminants do not fall on wet, newly-painted surfaces. Protect surfaces not intended to be painted from effects of cleaning and painting operations.
3. Prior to blasting, clean surfaces to be coated or lined of grease, oil and dirt by steaming or detergent cleaning in accordance with SSPC SP1.
4. Metal and Weld Preparation: Remove surface defects such as gouges, pits, welding and torch-cut slag, welding flux and spatter by grinding to one-quarter inch (1/4 In) minimum radius.
5. Abrasive Material:
   a. Blast only as much steel as can be coated same day of blasting.
   b. Use sharp, angular, properly graded abrasive capable of producing depth of profile specified herein. Transport abrasive to job site in moisture-proof bags or airtight bulk containers. Copper slag abrasives are not acceptable.
   c. After abrasive blast cleaning, verify surface profile with replica tape such as Tes-Tex Coarse or Extra Coarse Press-O-Film Tape or approved equal. Furnish tapes to the Project Manager.
   d. Do not blast if metal surface may become wet before priming commences or when metal surface is less than five degrees Fahrenheit (5° F) above dew point.
6. Evaluate degree of cleanliness for surface preparation with use of Pictorial Surface Preparation Standards for Painting Steel

Surfaces, SSPC Vis1.

7. Remove dust and abrasive residue from freshly blasted surfaces by brushing or blowing with clean, dry air. Test cleanliness by placing three-quarters inch by four inch (3/4 In x 4 In) piece of clear Scotch type tape on blasted surface, then removing and placing tape on three inch by five inch (3 In x 5 In) white index card. Re-clean areas exhibiting dust or residue.

D. Coating and Lining Application:

1. Environmental Conditions: Do not apply coatings or linings when metal temperature is less than fifty (50) degrees F; when ambient temperature is less than five degrees Fahrenheit (5° F) above dew point; when expected weather conditions are such that ambient temperature will drop below forty degrees Fahrenheit (40° F) within six hours (6 Hrs) after application; or when relative humidity is above eighty-five percent (85%). Measure relative humidity and dew point by use of sling psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables. Provide dehumidifiers for field-applied coatings and linings to maintain proper humidity levels.
2. Application Procedures:
   a. Apply in accordance with manufacturer's recommendations and requirements of this Section. Provide finish free of runs, sags, curtains, pinholes, orange peel, fish eyes, excessive over spray or delaminations.
   b. Thin materials only with manufacturers recommended thinners. Thin only with an amount required to adjust viscosity for temperature variations, proper atomization and flow-out. Mix material components using mechanical mixers.
   c. Discard catalyzed materials remaining at end of day.
3. Thoroughly dry pipe before primer is applied. Apply primer immediately after cleaning surface. Apply succeeding coats before contamination of undersurface occurs.
4. Cure a minimum of twenty-four hours (24 Hrs) at seventy-seven degrees Fahrenheit (77° F) before successive coats are applied. During curing process, provide force air ventilation in volume sufficient to maintain solvent vapor levels below published threshold limit value. Apply successive coats within recoat threshold time as recommended by coating or lining manufacturer on printed technical data sheets or through written communications. Brush blast joints of pipe which have been shop primed and are to receive intermediate and finish coats in field prior to application of additional coats. After interior coatings are applied, provide forced air ventilation in sufficient volume and for sufficient length of time to ensure proper curing

before filling pipe with water.

E. Testing of Coatings and Linings:
   1. Inspect pipe for holidays and damage to coating:
      a. If test indicates no holidays and coating is damaged, remove deficient or damaged layers of coating and repair in accordance with coating manufacturer's recommendations.
   2. Perform holiday test in accordance with NACE Standard Recommended Practice, RPO 188-90, Discontinuity (Holiday) Testing of Protective Coatings.
   3. Begin testing of completed coating after coating has sufficiently cured, usually one day (1 D) to five days (5 D). Consult coating manufacturer for specific curing schedule.
   4. Perform adhesion test on pipe in accordance with ASTM D4541.
   5. For coating thickness of twenty (20) mils or less, test with wet sponge low-voltage holiday detector. For coating thickness in excess of twenty (20) mils, test with high-voltage holiday detector. Perform electrical holiday test with sixty (60) cycle current audio detector. Select test voltage as specified in TABLE 4.5 – MINIMUM VOLTAGES FOR HIGH VOLTAGE SPARK TESTING in this Section.

3.3 JOINTS AND JOINTING

A. Welded Joints:
   1. Conform to requirements of Section 02400 – Water Lines.
   2. Field weld to be full penetration butt welded joints for steel pipe and encasement sleeves for entire circumference.
   3. The City shall employ an independent certified testing laboratory to perform weld acceptance tests on welded joints. Testing Laboratory shall test by X-ray methods for butt welds, for 100 percent of joint welds. The Project Manager has final decision as to suitability of welds tested.

B. Flanged Joints: Conform to requirements of Section 02400 – Water Lines.

C. Joint Grouting and Testing: Conform to requirements of Section 02400 – Water Lines.

3.4 COATINGS AND LININGS INSPECTION RESPONSIBILITIES

A. Contractor is responsible for quality control of coatings and linings applications and testing and inspection stipulated in this Section. The Project Manager is responsible for quality assurance and reserves the right to inspect or acquire services of an independent third-party inspector who is fully knowledgeable and qualified to inspect surface preparation and application of high-performance coatings at all phases of coatings and linings, work, field- or shop-applied. Contractor is responsible for proper application and performance of coatings and linings whether or not the Project Manager provides such inspection.

PART IV: TABLES

4.1 MINIMUM ALLOWABLE STEEL-WALL THICKNESS

CARRIER PIPE			
Nom. Pipe Size (In.)	Min. Wall		Approx. Wt. Per L.F. Uncoated (Lb.)
	O.D. (In.)	Thick. (In.)	
4	4.50	0.250	11.35
6	6.625	0.280	18.97
8	8.625	0.322	28.55
10	10.75	0.365	40.48
12	12.75	0.375	49.56
16	16.00	0.375	62.58
20	20.00	0.375	78.60

4.2 – MINIMUM DIAMETER FOR CASING PIPE

MINIMUM DIAMETER CASING PIPE (ENCASEMENT SLEEVES)			
Corresp. Casing Pipe Size (In.)	Min. Wall		Approx. Wt. Per L.F. Uncoated (Lb.)
	O.D. (In.)	Thick. (In.)	
8	8.625	0.219	19.64
10	10.75	0.219	24.60
12	12.75	0.219	29.28
16	16.00	0.219	36.86
18	18.00	0.250	47.39
20	20.00	0.250	52.73
24	24.00	0.250	63.41

4.3 EPOXY LINING

Surface Preparation 2.0 to 3.0 mils surface profile	SSPC – 5 (64) White Blast Clean
Prime Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy – Buff or approved Equal
Intermediate Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy – Buff or approved Equal
Finish Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy – White or approved Equal

4.4 – THREE PART EPOXY/POLYURETHANE COATINGS

Surface Preparation 2.0 to 3.0 mils surface profile	SSPC SP10 Near White Blast Clean
Prime Coat 4.0 to 6.0 mils DFT	Inhibitive Epoxy Primer or approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	Chemical Resistant Epoxy or approved equal
Finish Coat 1.5 to 2.5 mils DFT	Polyurethane or approved equal Barr Blue Color as approved by the Project Manager

4.5 – MINIMUM VOLTAGES FOR HIGH VOLTAGE SPARK TESTING

MINIMUM VOLTAGES FOR HIGH VOLTAGE SPARK TESTING	
Total Dry Film Thickness (mils)	Suggested Inspection (V)
20 to 40	3,000
41 to 55	4,000
56 to 80	6,000

END OF SECTION

SECTION 02255
STEEL PIPE AND FITTINGS FOR LARGE DIAMETER WATER LINES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Large diameter [twenty-four inches (24 In) and greater] steel pipe and fittings for water lines and pumping facilities.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for steel pipe and fittings under this Section. Include cost in the unit price for water lines, pumping facilities and encasement sleeves.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHTO – American Association of State Highway and Transportation Officials.
  1. AASHTO – Standard Specifications for Highway Bridges.
- B. AREMA – American Railway Engineering and Maintenance-of-way Association.
  1. AREMA – Manual for Railway Engineering, Volume II, Chapter 15.
- C. ASTM – American Society for Testing and Materials.
  1. ASTM A36 – Standard Specification for Structural Steel.
  2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  3. ASTM A135 – Standard Specification for Electric-Resistance-Welded Steel Pipe.
  4. ASTM A139 – Standard Specification for Electric-Fusion (ARC) – Welded Steel Pipe (NPS 4 and Over).
  5. ASTM A570 – Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
  6. ASTM C33 – Standard Specification for Concrete Aggregates.
  7. ASTM C35 – Standard Specification for Inorganic Aggregates for Use in Gypsum Plaster.
  8. ASTM C150 – Standard Specification for Portland Cement.
  9. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
  10. ASTM C595 – Standard Specification for Blended Hydraulic

Cements.

11. ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
12. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
13. ASTM D512 – Standard Test Methods for Chloride Ion in Water.
14. ASTM D1293 – Standard Test Methods for pH of Water.
15. ASTM D3363 – Standard Test Method for Film Hardness by Pencil Test.
16. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tests.
17. ASTM D4752 – Standard Test Method for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub.

D. AWWA – American Water Works Association.
   1. AWWA C200 – Steel Water Pipe 6 in. and Larger.
   2. AWWA C205 – Cement-Mortar Protective Lining and Coating for Steel Water Pipe.
   3. AWWA C206 – Standard for Field Welding of Steel Water Pipe.
   4. AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service – Sizes 4 in. through 144 in.
   5. AWWA C208 – Dimensions for Fabricated Steel Water Pipe Fittings; Addendum C 208A.
   6. AWWA C209 – Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections and Fittings for Steel Water Pipelines.
   7. AWWA C210 – Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.
   8. AWWA C214 – Tape Coating Systems for the Exterior of Steel Water Pipelines.
   9. AWWA C602 – Cement-Mortar Lining of Water Pipelines – 4 In. (100 mm) and Larger – In Place.
   10. AWWA M11 – Steel Pipe-A Guide for Design and Installation.

E. CFTS – City of Friendswood Technical Specifications.

F. SSPC – Steel Structures Painting Council.
   1. SSPC Good Painting Practice, Volume 1.
   2. SSPC SP1 – Surface Preparation Specification No. 1 Solvent Cleaning.
   3. SSPC SP5 – Joint Surface Preparation Standard White Blast Cleaning.
   4. SSPC SP6 – Surface Preparation Specification No. 6 Commercial Blast Cleaning.
   5. SSPC SP10 – Surface Preparation Specification No. 10 Near-White Blast Cleaning.
   6. SSPC VIS1 – Visual Standard for Abrasive Blast Cleaned Steel.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit shop drawings signed and sealed by a Professional Engineer licensed by the State of Texas showing following:

1. Manufacturer's pipe design calculations.
2. Provide lay schedule of pictorial nature indicating alignment and grade, laying dimensions, welding procedures, fabrication, fitting, flange and special details, with plan view of each pipe segment sketched, detailing pipe invert elevations, horizontal bends, welded joints and other critical features. Indicate station numbers for pipe and fittings corresponding to the Drawings. Do not start production of pipe and fittings prior to review and approval by the Project Manager. Provide final approved lay schedule on CD-ROM in Adobe portable document format (*.PDF).
3. Include hot tapping procedure.
4. Submit certification from manufacturer that design was performed for project in accordance with requirements of this Section. Certification to be signed and sealed by a Professional Engineer licensed by the State of Texas.

C. Submit manufacturer's certifications that pipe and fittings have been hydrostatically tested at factory in accordance with AWWA C200, Section 3.4.

D. Submit certification from NACE Certified Coatings Inspector, under supervision of inspector having Level III certification for coatings and linings, that steel pipe furnished on project was properly inspected and defective coatings detected properly repaired.

E. Submit inspection procedures to be used by manufacturer and for quality control and assurance for materials and welding. Submit at least thirty days (30 D) prior to repair work, procedures that describe in details shop and field work to be preformed. Repair defects such as substandard welds, excessive radial offsets (misalignment), pitting, gouges, cracks, etc.

F. Submit following for nonshrink grout for special applications:

1. Manufacturer's technical literature including the Technical Specifications for mixing, placing and curing grout.
2. Results of tests performed by certified independent testing laboratory showing conformance to ASTM C1107, Nonshrink Grout and requirements of this specification.
3. Certification product is suitable for use in contact with potable water.

G. Submit proof of certification for welders. Indicate certified procedures and position each welder is qualified to perform. Ensure welder and welding operator have been certified within past six months (6 Mos) in accordance with AWWA C206.

H. Within forty-five calendar days (45 cD) after manufacturing of all pipe,

submit affidavit of compliance that materials and work furnished comply with applicable requirements of referenced standards and these Technical Specifications. Make available copy of physical and chemical testing reports.

I. Within forty-five days (45 D) of manufacturing of all pipe, submit manufacturer's affidavits that coatings and linings comply with applicable requirements of this Section and:
   1. Polyurethane coatings were applied in accordance with manufacturer's recommendation and allowed to cure at temperature five degrees Fahrenheit (5° F) above dew point.
   2. Mortar coatings and linings were applied and allowed to cure at temperature above thirty-two degrees Fahrenheit (32° F).
   3. Test Results:
      a. Compressive strength [seven day (7 D) and twenty-eight day (28 D)] test results for mortar coating.
      b. Hydrostatic testing, magnetic particle and x-ray weld test reports as required.

J. Prior to start of field-applied cement mortar lining operation, submit comprehensive plan which identifies and describes as minimum:
   1. Equipment used for batching, weighing, mixing transporting and placing mortar.
   2. Qualifications and specific experience of machine operators.
   3. Source and type of cement, pozzolan, sand and admixtures used and certifications from suppliers that materials meet the Technical Specifications.
   4. Mix proportions to be used and slump limits (max. and min.).
   5. A quality control plan which identifies quality control material tests and documented inspections necessary to ensure compliance with specified requirements.

K. Submit certification showing calibration within last twelve months (12 Mos) for equipment such as scales, measuring devices and calibration tools used in manufacture of pipe. Each device used in manufacture of pipe is required to have tag recording date of last calibration. Devices are subject to inspection by the Project Manager.

1.5 QUALITY CONTROL

A. Manufacturer to provide permanent quality control department and laboratory facility capable of performing inspections and testing as required by the Technical Specifications. Material testing, inspection procedures and manufacturing process are subject to inspection by the Project Manager. Perform manufacturer's tests and inspections required by referenced standards and these Technical Specifications, including the following. Correct nonconforming conditions.
   1. Steel Plate and Coils: Review mill certifications for conformance to requirements of the Technical Specifications; perform physical and chemical testing of each heat of steel for conformance to

applicable ASTM standards.

2. Pipe:
   a. Inspect thickness, circumference, roundness, strength and size of seam welds (spiral or longitudinal) and squareness of pipe ends to verify compliance with AWWA C200.
   b. Inspect physical dimensions and overall conditions of all joints for compliance with AWWA C200, approved submittals and Technical Specifications.
   c. Hydrostatically test finished pipe section to seventy-five percent (75%) of specified minimum yield strength of steel being used with zero (0) leakage.
   d. For wall thickness greater than one-half inch (1/2 In) perform Charpy V-Notch (CVN) Test in accordance with AWWA C200.
3. Linings:
   a. Inspect unlined pipe for overall condition of inside barrel. Maintain inside barrel free of corrosive products, oil, grease, dirt, chemical and deleterious material.
   b. Inspect lined pipe for physical dimensions and overall condition of lining, visible surface defects, thickness of lining and adhesion to steel surface.
   c. Review certifications by manufacturers of lining components for conformance to AWWA standards and these Technical Specifications.
4. Coatings: Measure temperature and dew point of ambient air before applying coatings. Inspect physical dimensions and overall condition of coatings. Inspect for visible surface defects, thickness and adhesion of coating to surface and between layers.
5. Final Inspection:
   a. Before shipment, inspect finished pipe, fittings, specials and accessories for markings, metal, coating thickness, lining thickness (if shop applied), joint dimensions and roundness.
   b. Inspect for coating placement and defects. Test exterior coating for holidays.
   c. Inspect linings for thickness, pitting, scarring and adhesion.

B. Shop-applied coatings and linings; provide services of independent coating and lining inspection service or testing laboratory with qualified coating inspectors. Perform inspection by National Association of Corrosion Engineers (NACE) trained inspectors under supervision of NACE Level III Certified Coatings Inspector.

C. Ensure workmen engaged in manufacturing are qualified and experienced in performance of their specific duties.

D. Cast four (4) standard test cylinders each day for each fifty cubic yards (50 Cy) of mortar coating or portion thereof for each coating and lining placed in a day. Perform compressive strength test at twenty-eight days (28 D). No cylinder test result shall be less than eighty percent (80%) of specified strength.
E. Dented steel cylinders shall result in rejection of pipe.
F. Make available copy of physical and chemical testing reports for steel cylinders and provide reports at request of the Project Manager.
G. Check physical dimensions of pipe and fittings. Physical dimensions to include at least pipe lengths, pipe I.D., pipe O.D. and bend angles.

1.6 INSPECTION

A. The Project Manager may witness manufacture and fabrication of pipe and appurtenances. Independent testing laboratory under contract to the Project Manager may perform tests at direction of the Project Manager to verify compliance with these Technical Specifications. Provide assistance to accomplish such testing, including equipment and personnel, at no additional cost to the City.

PART II: PRODUCTS

2.1 STEEL PIPE

A. Furnish pipe by same manufacturer.
B. Furnish pipe smaller than twenty-four inch (24 In) in accordance with Section 02250 – Steel Pipe and Fittings.
C. Fabricate and supply miscellaneous steel pipe and fittings with nominal diameter of twenty-four inches (24 In) and larger in accordance with AWWA C200, C207, C208 and AWWA M11 except as modified herein. Steel to be a minimum of ASTM A36, ASTM A570 Grade 36, ASTM A53 Grade B, ASTM A135 Grade B or ASTM A139 Grade B.
D. Provide pipe sections in lengths no greater than forty feet (40 Ft) and no less than ten feet (10 Ft) except as required for special fittings or closure sections.
E. Provide shop-coated and shop-lined steel pipe with minimum of one (1) coat of shop-applied primer approved for use in potable water transmission on all exposed steel surfaces. Primer for tape-coated steel pipe to be used for field-applied coatings shall have no less than five percent (5%) solids. Provide primer compatible with coating system and in accordance with coating manufacturer's recommendations.
F. Provide closure sections and short sections of steel pipe not less than four feet (4 Ft) in length unless indicated on the Drawings or specifically permitted by the Project Manager.
G. Square flanges with pipe with bolt holes straddling both horizontal and vertical axis. Provide one-half inch (1/2 In) gap between pipe ends to be coupled with sleeve coupling unless otherwise indicated on the Drawings.

1. Provide standard ring or hub type flanges, conforming to AWWA C207, Class D.
2. Apply Densco petroleum-based tape or approved equal to exposed portions of nuts and bolts.

H. Pipe Design Conditions:

1. Design: Design pipe and fittings to withstand most critical simultaneous application of external loads and internal pressures. Base design on minimum of AASHTO HS-20 loading, AREMA E-80 loads and depths of bury as indicated on the Drawings. Design pipes with Marston's earth loads for transition width trench for all heights of cover.
2. Groundwater Level: Design for most critical ground water level condition.
3. Working pressure = One hundred pounds per square inch (100 psi).
4. Hydrostatic field test pressure = One hundred fifty pounds per square inch (150 psi).
5. Maximum pressure due to surge = One hundred fifty pounds per square inch (150 psi).
6. Minimum pressure due to surge = Minus five pounds per square inch (-5 psi).
7. Modulus of elasticity (E) = Thirty million pounds per square inch (30000000 psi).
8. Maximum deflection from specified diameter: Two percent (2%) for mortar coating; three percent (3%) for flexible coatings and three percent (3%) for mortar lining.
9. Design stress due to working pressure to be no greater than fifty percent (50%) of minimum yield and stress not to exceed sixteen thousand five hundred pounds per square inch (16500 psi) for mortar coated pipe.
10. Design stress due to maximum hydraulic surge pressure to be no greater than seventy-five percent (75%) of minimum yield and stress not to exceed twenty-four thousand seven hundred fifty pounds per square inch (24750 psi) for mortar coated pipe.
11. Modulus of soil reaction (EN) < one thousand five hundred pounds per square inch (1500 psi). If EN > one thousand pounds per square inch (1000 psi), do not use silty sand (SM) for embedment.
12. Unit weight of fill (w) > One hundred twenty pounds per cubic foot (120 pcf).
13. Deflection lag factor (D1) = One and two tenths (1.2).
14. Bedding constant (K) = One tenth (0.1).
15. Fully saturated soil conditions: hw = h = depth of cover above top of pipe.
16. Do not allow diameter (D) over thickness (t) ratio to be greater than two hundred thirty (230).

17. Nominal Allowable Steel-wall Thickness for Water Lines: Provide in accordance with following table for HS-20 live loads and depths of cover of up to sixteen feet (16 Ft). Net internal diameter (including inside linings) to be no less than net inside diameter listed. The Contractor to review design for conditions more extreme than those indicated by this specification and design accordingly. If, in opinion of the Project Manager, proposed pipe wall thicknesses appear inadequate for indicated loading conditions, submittal of design calculations shall be required for review. Pipe wall to be not less than that specified in TABLE 4.1 PIPE WALL THICKNESSES in this Section.

I. Fittings for Water Lines: Fabricate in accordance with AWWA M11, Section 13.3-13.7 and AWWA C208.
   1. Wall Thickness: Equal to or greater than pipe to which fitting is to be welded.
   2. Elbows: two (2) pieces for zero degrees (0°) to twenty-two and one-half degrees (22-1/2°); three (3) pieces for twenty-three degrees (23°) to forty-five degrees (45°); four (4) pieces for forty-six degrees (46°) to sixty seven and one-half degrees (67-1/2°); and five (5) pieces for sixty-eight degrees (68°) to ninety degrees (90°), unless otherwise shown on the Drawings.
   3. Outlets: Reinforced in accordance with AWWA M11, Sections 13.3-13.7, AWWA C200 and AWWA C208. Provide interior lining and exterior coating in accordance with paragraphs on coating and lining and matching pipe to access inlets, service outlets, test inlets and air-vacuum valve and other outlets, including riser pipes.
   4. Radius: Minimum radius of two and one-half (2-1/2) times pipe diameter.
   5. Butt Straps for Closure Piece: Minimum twelve inch (12 In) wide split butt strap; minimum plate thickness equal to thinnest member being joined; fabricated from material equal in chemical and physical properties to thinnest member being joined. Provide minimum lap of four inches (4 In) between member being joined and edge of butt strap, welded on both inside and outside, unless otherwise approved by the Project Manager. Provide minimum six inch (6 In) welded outlet for inspecting each closure section, unless access manway is within forty feet (40 Ft) of closure section.
   6. Joints are to be double-welded and butt or lap joints as shown on the Drawings. Use flanged joints at valves.
   7. Provide double-welded lap field joints or full penetration butt-welded joints for tee fitting supported on pier foundation, aboveground piping and field welds for risers including vertical portion of crossover piping.

J. Joints:

1. Standard field joint for steel pipe: AWWA C206. Rubber gasket Carnegie shape joint or rolled-groove rubber gasket and O-ring joint, sixty-six inch (66 In) maximum diameter. Joints may be lap-welded slip type in accordance with AWWA C206, except where flanged joints or butt strap joints are required.
2. Provide double-welded butt joints at aerial crossings and where noted on the Drawings.
3. Pipe Manufacturer: Minimum of five years (5 Yrs) of successful service with proposed field joint or submit results from joint tests determined by the Project Manager. Tests which may be required include tensile strength or yield tests of base material and spiral welded sections (API 5L), flattening tests, chemical analysis, impact and hardness tests. The Project Manager's decision as to acceptability of joint is final.
4. Capable of withstanding jacking forces.
5. Design restrained joints for test pressure or maximum surge pressure as specified, whichever is greater. Only minimum restrained joint lengths for prestressed concrete cylinder pipe are shown on the Drawings.
6. Provide full circumferential welds at joints required to be welded.
7. Use wire and flux from same manufacturer throughout entire project.
8. Rubber Gasketed Bell-and-Spigot Joints.
    a. Bells: Formed by either expansion of pipe end or by segmental expander which stretches steel past its elastic limit or by attaching sized weld-on bell rings. Spigot ends: Sized prior to rolling gasket groove. Joints: Interchangeable and match up during installation, even if used out of sequence. Weld-on bell rings: AWWA M11; AWWA C200; attached with single or double, full thickness fillet welds (double weld in areas of thrust restraint).
    b. Provide bells and spigots with dimensions and tolerances in accordance with AWWA C200, as modified herein. Difference in diameter between I.D. of bell and O.D. of spigot shoulder at point of full engagement with allowable deflection range of zero inch (0.00 In) to four hundredths inch (0.04 In) as measured on circumference with diameter tape. Minimum thickness of completed bell ring is equal to thickness of pipe wall in barrel of pipe between joint ends.
    c. Furnish joint suitable for safe working pressure equal to class of pipe and shall operate satisfactorily with deflection, tangent of which is not to exceed seventy-five hundredths inch per inch diameter (0.75 In/D) where D is outside diameter of pipe in inches or with pull-out of

three-quarters inch (3/4 In).

d. Design clearance between bells and gasketed spigots so, when joint is assembled, it shall be self-centered and gasket shall be restrained or confined to annular space in such manner that movement of pipe or hydrostatic pressure cannot displace it. Compression of gasket when joint is completed shall not be dependent upon water pressure in pipe and shall provide watertight joints under operating conditions when properly installed.

K. Manufacturer must maintain on site or in plant enough fittings as specified in TABLE 4.2 – REQUIRED BENDS STOCK in this Section.

L. Manufacturer must be capable of delivering bends to job site within twelve hours (12 Hrs) of notification. Use fittings at direction of the Project Manager where unforeseen obstacles are encountered during construction. These fittings are in addition to fittings called out on the Drawings and must be available at all times. Use same product throughout entire project.

M. Perform x-ray or ultrasonic testing of manual welds on special pipe and fittings.

N. Hydrostatic Test of Pipe:
   1. AWWA C200, Section 3.5.3, at point of manufacture. Hold test for minimum two minutes (2 Min) and conduct thorough inspection of pipe. Repair or reject pipe revealing leaks or cracks.
   2. Calibrate pressure gauges within one year (1 Yr) prior to testing as specified in Section 1.4.L.

O. Provide forged steel threaded outlets of approved design where required for use in passing hose or lead wires into pipe. Tap plugs with standard pipe threads and weld to pipe in approved manner and use solid forged steel plugs for closure.

P. Flanges:
   1. Fabricate flanges with oversize bolt holes, with flanges drilled in pairs, to accommodate insulating sleeves.
   2. Test, coat, line and ship each shop-assembled insulated flange assembly to field as fitting. Use no less than two (2) snug-fitting alignment pins to assist in aligning flanges during assembly. Do not remove pins until bolts have been installed in all remaining holes and have been drawn up tight. After insulating joints have been assembled, subject each assembly (fitting) to shop hydrostatic test pressure of one hundred fifty pounds per square inch (150 psi) and electrically test to ensure that insulated sections are effective. After assembly has been tested, coat insulating joint and adjacent steel pipe as specified for below-ground installation. Line assembly as specified for interior surfaces and in accordance with details shown on the Drawings.

Q. Dished Head Plugs: Design dished head plugs (test plugs) to withstand

field hydrostatic test pressure from either side of plug. Design stress due to hydrostatic pressure to be no greater than fifty percent (50%) of minimum yield. Pipe on opposite side of hydrostatic test may or may not contain water. Manufacturer of the steel pipe to hydrostatically test plug at factory.

R. Make curves and bends by deflecting joints or by using beveled joints or by combination of two (2) methods, unless otherwise indicated on the Drawings or permitted by the Project Manager. Do not exceed deflection angle at joint as recommended by pipe manufacturer. Make penetration of spigot into bell at all points of circumference at least equal to minimum required penetration shown on the Drawings. Beveled pipe sections used in curved alignment to be of standard length except when shorter sections are required to limit radius of curvature, in which case all sections throughout curve are to be of equal length. Do not allow bevel to exceed five degrees (5°).

2.2 INTERNAL LINING SYSTEMS FOR STEEL PIPE, ALL INSTALLATIONS

A. Supply steel pipe with either epoxy lining or cement-mortar lining, capable of conveying water at temperatures not greater than one hundred forty degrees Fahrenheit (140° F). Provide linings conforming to American National Standards Institute/National Sanitation Foundation (ANSI/NFS) Standard 61 and certification to be from organization accredited by ANSI. Unless otherwise noted, coat all exposed (wetted) steel parts of flanges, blind flanges, bolts, access manhole covers, with epoxy lining, as specified.

B. Epoxy Lining:

1. AWWA C210, color White or approved equal for shop and field joint applied, except as modified in this Section. Provide materials from same manufacturer. Protect interior surface with approved liquid two (2) part chemically cured epoxy primer for interior surfaces as specified in TABLE 4.3 – EPOXY PRIMER FOR INTERIOR SURFACES in this Section.
2. Total allowable dry film thickness for system:
   a. Minimum: Twelve (12) mils.
   b. Maximum: Eighteen (18) mils.
3. Provide dry film thicknesses for approved alternate products in accordance with product's manufacturer recommendations.
4. Lining system may consist of three (3) or more coats of same approved alternate epoxy lining without use of separate primer.
5. Perform adhesion test on pipe forty-eight inches (48 In) in diameter and larger in accordance with ASTM D4541. Minimum field adhesion: seven hundred pounds per square inch (700 psi). Perform test on pipe for project at frequency of one (1) for every one thousand square feet (1000 Sf) of epoxy lining. Perform cure test in accordance with ASTM D4752 (solvent rub test) and ASTM D3363 (pencil hardness) for each section of pipe. Repair

tested areas with approved procedures.

C. Shop-applied Cement-mortar Lining:
   1. AWWA C205; except as specified herein: one-half inch (1/2 In) minimum thickness for pipe diameters forty-two inches (42 In) and larger; three-eighths (3/8) inch minimum thickness for pipe diameters thirty-six inches (36 In) and smaller. Cut back lining from joint ends no more than two inches (2 In) to facilitate joining and welding of pipe.
   2. Apply cement-mortar lining to inside of pipe by centrifugally spinning. For special sections (shape of which precludes application by spinning method) accomplish by mechanical placement or pneumatic placement and finish to produce smooth, dense surface comparable to centrifugally spinning.
   3. Use galvanized wire mesh when shop-applied mortar is not applied by machine. Do not extend wire mesh across welded portion of mitered fittings. Crimp mesh to provide integral "chair" so wire does not fully rest against steel cylinder.
   4. Make repairs of cement-mortar lining for widths exceeding six inches (6 In) by bonding to steel and adjacent faces of lining with bonding agent conforming to ASTM C881, Type II.
   5. Restrict usage of sprinkler heads during moist curing to prevent over spraying onto lining. No alternative curing methods are allowed as described in Section 4.4.7.4 of AWWA C205.
   6. Satisfy the Project Manager that above requirements can be accomplished by manufacturer prior to shipment of pipe.

D. Field-applied Cement-mortar Lining (for pipe > forty-eight inches (48 In) in diameter): Provide field-applied internal cement-mortar linings in accordance with AWWA C602, latest edition, except as modified in this Section.
   1. Lining: Applied in one (1) course application of cement-mortar by machine that centrifugally places mortar against wall of pipe and mechanically trowel lining to smooth finish.
   2. Steel pipe, fittings, receives cement-mortar lining.
   3. Cement-mortar for lining.
      a. Cement-mortar: Dense, smooth and of uniform quality and consistency to assure efficient machine operation and uniform cement-mortar lining on pipe wall.
      b. Water-cement ratio: Kept as low as possible; consistent with proper plasticity for application, allowing slight variations dependent upon temperature, length of haul for mortar and moisture condition in pipe.
      c. Mortar: Mixture of one (1) part cement with not less than one (1) or more than one and one-half (1-1/2) parts of dry screened sand, by volume. After determining mixture, control materials to within plus or minus two and one-half percent (2-1/2%) by weight throughout entire

work.

d. Comply with following materials for cement-mortar:
   1) Provide Type II low-alkali Portland cement conforming to ASTM C150 or Type IP (MS) Portland-Pozzolan cement conforming to ASTM C595, unless otherwise specified. Conform to low alkali requirements of Table IA of ASTM C150. Type IP (MS) cement to contain no more than percent (20%) Pozzolan, to be inter-ground with clinker.
   2) Use suitable facilities approved by the Project Manager when available for handling and weighing bulk cement. Otherwise, deliver cement in original unopened sacks that have been filled by manufacturer. Plainly mark sacks with manufacturer's name or brand, cement type lot number and weight. Discard unused cement. Use unopened bags of cement for each new batch.
   3) Material storage: Store cement to permit ready access for inspection and sampling. Protect cement and sand against contamination or moisture. Do not use and remove from site cement delivered with evidence of contamination or otherwise unsuitable. Store admixtures in accordance with manufacturer's directions.
   4) Use Portland cement of same brand and type unless otherwise approved by the Project Manager.
   5) Pozzolanic material: AWWA C602, Paragraph 2.2.
   6) Sand: AWWA C205, Section 2.3, except gradation of sand to yield fineness modulus of approximately 1.7; having no material coarser than that passing No. 16 sieve. Submit certification for compliance of sand with these Technical Specifications at least ten calendar days (10 cD) before start of lining placement.
   7) Water: Clean; free of deleterious amounts of acids, alkalis or organic materials; total dissolved solids less than one thousand milligrams per liter (1000 mg/l); ASTM D512 chloride ions less than one hundred milligrams per liter (100 mg/l) for slurry and mortar cure; ASTM D1293 pH greater than 6.5.

2.3 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVEGROUND AND IN VAULTS (EXPOSED)

A. Provide approved three (3) coat epoxy/polyurethane coating system as specified in TABLE 4.4 – THREE COAT EPOXY/POLYURETHANE COATINGS in this Section. Provide materials from same manufacturer.
B. Total Allowable Dry Film Thickness for System:
   1. Minimum: Nine and one-half (9.5) mils.
   2. Maximum: Twelve and one-half (12.5) mils.
C. Perform adhesion test on pipe forty-eight inches (48 In) in diameter and larger in accordance with ASTM D4541. Minimum field adhesion: seven hundred pounds per square inch (700 psi). Perform test on pipe for project at frequency of one (1) for every 1000 square feet of epoxy lining. Perform cure test in accordance with ASTM D4752 (solvent rub test) and ASTM D3363 (pencil hardness) for each section of pipe. Repair tested areas with approved procedures.

2.4 EXTERNAL COATING SYSTEMS FOR BURIED STEEL PIPE
A. Supply pipe with one (1) of the following coatings specified.
   1. Tape Coating: Provide approved tape for external tape coating. Apply in accordance with AWWA C214 and requirements of this section; eighty (80) mil.
      a. Components: Primer, one (1) twenty (20) mil layer of inner-layer tape for corrosion protection and two (2) thirty (30) mil layers of outer-layer tape for mechanical protection.
      b. Where sleeve type or victaulic couplings are required, bond coupling to adjacent pipes with bonding cables as shown on the Drawings.
      c. Use approved filler putty type insulating putty to fill in gap and create smooth sloped transition between top of reinforcing plate and pipe, before tape coating is applied.
      d. Primer: Compatible with tape coating, supplied by coating-system manufacturer.
      e. Provide pipe with shop coatings cut back approximately four inches (4 In) to four and one-half inches (4-1/2%) from joint ends to facilitate joining and welding of pipe. Taper successive tape layers by one inch (1 In) staggers to facilitate field wrapping and welding of joints.
      f. Inner and outer tape width: Twelve inches (12 In) or eighteen inches (18 In).
      g. Do not expose tape coating to direct sunlight for more than sixty days (60 D).
   2. Cement-mortar Coating: AWWA C205; shop-applied, cement-mortar coating except as modified in this Section; one inch (1 In) minimum thickness; cut back coating from joint ends no more than two inches (2 In) to facilitate joining and welding of pipe.
   3. Polyurethane Coating: See Section 02265 – Polyurethane Coatings on Steel or Ductile Iron Pipe for requirements for use

of polyurethane coating system.

B. Heat Shrink Joint Sleeves for Tape and Polyethane Coating: Aqua-shield or approved equal. For repairs to heat shrink joint sleeves, use Aqua-shield Repair Patch Kit or approved equal.

2.5 GROUT FOR JOINTS AND SPECIAL APPLICATIONS

A. Cement Grout Mixture: One (1) part cement to two (2) parts of fine, sharp clean sand. Mix interior joint mortar with as little water as possible until very stiff but workable. Mix exterior joint mortar with water until it has consistency of thick cream. Mix cement grout to specific gravity of nineteen pounds per gallon (19 Lb/Gal) or greater as measured by grout/slurry balance. Use balance manufactured grout/slurry by Baroid or approved equal. Perform test in presence of and at request of the Project Manager. Add additional cement grout or water to mixed cement grout to bring mix to proper moisture content or specific gravity. Discard cement grout that has been mixed more than twenty minutes (20 Min) and is not at proper specific gravity or moisture content.

1. Portland Cement: ASTM C150, Type II. Provide one (1) type of cement for entire project.
2. Sand:
   a. Interior joints: ASTM C35 fine graded plaster sand.
   b. Exterior joints: ASTM C33; natural sand with one hundred percent (100%) passing No. 16 sieve.
3. Water: Potable water with total dissolved solids less than one thousand milligrams per liter (1000 mg/l); ASTM D512 chloride ions less than one hundred milligrams per liter (100 mg/l) for slurry and mortar cure; ASTM D1293 pH greater than 6.5. Use potable water with two hundred fifty parts per million (250 ppm) limit on chlorides and sulfates.

B. Provide approved Nonshrink Grout for Special Applications, Patches and Repairs.

1. Conform to requirements of ASTM C1107, Nonshrink Grout.
2. Pre-blended factory-packaged material manufactured under rigid quality control, suitable for use in joints of prestressed concrete cylinder pipe.
3. Contain non-metallic natural aggregate and be nonstaining and noncorrosive.
4. Meeting NSF 61 Standard suitable for use in contact with potable water supply.
5. Exterior: Highly flowable to fill joint wrapper without leaving voids or trapped air. Interior capable of being placed with plastic consistency.
6. Compressive strength: ASTM C1107 two thousand five hundred pounds per square inch (2500 psi) minimum seven day (7 D) unconfined; five thousand pounds per square inch (5000 psi) minimum twenty-eight day (28 D) unconfined.

7. Non-bleeding and non-segregating at fluid consistency.
8. Contain no chlorides or additives which may contribute to corrosion of steel pipe.
9. Free of gas-producing, gas-releasing agents.
10. Resist attack by oil or water.
11. Mix, place and cure in accordance with manufacturer's instructions and recommendations. Upon seventy-two hours (72 Hrs) notice, provide services of qualified representative of nonshrink grout manufacturer to aid in assuring proper use of product under job conditions. Representative to be on site when product is first (1st) used.
12. Mix cement grout to specific gravity of seventeen and seven-tenths pounds per gallon (17.7 Lb/Gal) or greater as measured by grout/slurry balance. Use balance manufactured grout/slurry by Baroid or approved equal. Perform test in presence of and at request of the Project Manager. Add additional cement grout to mixed cement grout or water to bring mix to proper moisture content or specific gravity. Discard cement grout that has been mixed more than twenty minutes (20 Min) and is not at proper specific gravity or moisture content.
13. Compressive strength: ASTM C1107 two thousand five hundred pounds per square inch (2500 psi) minimum seven day (7 D) unconfined; five thousand pound per square inch (5000 psi) minimum twenty-eight day (28 D) unconfined.

C. Finished surface of lining and interior joint to be comparable to surface rubbed with No. 16 Carborundum stone. Rub joint mortar sufficiently to bring paste to surface, to remove depressions and projections and to produce smooth, dense surface. Add cement to form surface paste as necessary. Leave interior with clean, neat and uniform-appearing finish.

D. Joint Wrapper: Minimum width of nine inches (9 In) for thirty-three inch (33 In) diameter and smaller; minimum width of twelve inches (12 In) for diameters greater than thirty-three inch (33 In) hemmed at edge to allow threading with minimum five-eighths inch (5/8 In) wide steel strap. Provide minimum six inch (6 In) wide Ethafoam strip sized, positioned and sewn such that two (2) circumferential edges of Ethafoam are one and one-half inches (1-1/2 In) from outer edge of wrapper.

2.6 COLD-APPLIED TAPE COATING

A. Shop-applied Tape Wrap Coating
1. Use primer furnished by tape manufacturer.
2. Wrap, specials and fittings that cannot be machine wrapped due to configuration with primer layer and two (2) layers of prefabricated tape each thirty-five (35) mils thick.
3. Overlap machine applied tape with hand applied tape by minimum of two inches (2 In) and bind to it.
4. Apply approved thirty (30) mil filler tape parallel to spiral weld

seams if weld height measures greater than or equal to one-eighth inch (1/8 In).

B. Surface Preparation

1. Clean bare pipe from mud, mill lacquer, oil, grease or other contaminants. Inspect and clean surfaces according to SSPC SP1 to remove oil, grease and loosely adhering deposits prior to blast cleaning. Remove visible oil and grease spots by solvent wiping. Use approved safety solvents which do not leave residue. Preheating to remove oil, grease, mill scale, water and ice may be used provided pipe is preheated in uniform manner to avoid distortion.
2. Remove surface imperfections such as slivers, scabs, burrs, weld spatter and gouges by hand filling or grinding to prevent excessive number of holidays. Presence of metallic defects may be cause for rejection of pipe.

2.7 EXTERNAL TAPE COATING SHOP APPLICATION

A. Separate tape dispensing equipment far enough apart to visually inspect continuous steps.
B. Make cutbacks straight and for total thickness of coating.
C. State of dryness of primer prior to application of weld filler and inner layer of tape to be in accordance with written recommendation of manufacturer.
D. Apply weld filler tape over primer and extend minimum of one inch (1 In) on each side of weld seam. Filler tape may contact rollers as long as release liner is in place and adhesion requirements are met. Remove release liner before applying inner layer tape.
E. Spirally apply inner layer of tape in direction of helix weld. Overlap each spiral of tape one inch (1 In) or greater with next successive spiral of tape applied.
F. Overlap end of new roll on top of previous roll minimum of six inches (6 In).
G. Tape-roll body temperature to be greater than seventy degrees Fahrenheit (70° F); pipe surface temperature to be greater than sixty degrees Fahrenheit (60° F).
H. Spirally apply outer layer tapes in direction of helix weld and use overlap width and application tensions as recommended by manufacturer.

2.8 INSPECTION AND TESTING OF COATINGS

A. Perform electrical inspection on inner layer of tape before intermediate layer of tape is applied.
B. If holidays are detected, repair holidays immediately before applying outer layer of tape. Clear holiday area of material and reprime if necessary. Recoat area with inner wrap tape. Overlap inner wrap tape onto surrounding inner wrap coating by at least two inches (2 In). Perform electrical retest at repaired area after repairing holiday and before outer wrap is continued.

C. Shrink Wrap: Perform electrical inspection on shrink wrap to check for holidays. Perform peel tests over heat affected zone. Minimum acceptable result: fifteen foot-pounds per inch (15 Ft-Lbs/In).

PART III: EXECUTION

3.1 PIPING INSTALLATION

A. Conform to applicable provisions of Section 02400 – Water Lines, except as modified in this Section.

B. Comply with following:

1. Make available services of manufacturer's representative when deemed necessary by the Project Manager. Representative to advise in aspects of installation, including but not limited to handling and storing, cleaning and inspecting, coating and lining repair and general construction methods as applicable to pipe.
2. Install stulls prior to placement of pipe, bends and fittings to prevent deflection during installation. Provide stulls consisting of timber struts with end blocks shaped to fit curvature of interior surface of pipe or other appropriate configuration and material. Firmly edge and secure stulls to blocks so that they shall remain intact position during handling and installation. Provide stulls adequate to resist loads encountered without structural failure to stull members or damage to pipe. Where applicable, place stulls at such lengths so as to elongate vertical diameter of pipe as required to suit trench conditions encountered.
3. Handling and Storage: Install padded struts or stulls prior to shipping, horizontally and vertically at ten foot (10 Ft) intervals or as proposed by manufacturer and approved by the Project Manager. Spiders: Installed in joint ends of fittings. Stulls to remain in place, horizontally and vertically positioned under following conditions:
   a. During storage and shipping.
   b. Until welding is complete.
4. Reject and remove immediately from site pipe that arrives at site with defects in lining, including sand pockets, voids and oversanded areas.
5. Store pipe at job site with securely fastened plastic endcaps to maintain moist pipe interior. Promptly replace damaged endcaps to avoid shrinkage or cracking of cement-mortar lining.
6. Immediately replace damaged plastic end caps. Do not leave uncapped for more than four hours (4 Hrs).
7. Bedding and Backfilling:
   a. Conform to requirements of Section 02125 – Excavation and Backfill for Utilities.
   b. Align pipe at proper grade prior to joint connection and do not shift after jointing operation has been completed.

c. Take necessary precautions during bedding and backfilling operations to prevent deformation or deflection of cylindrical shape of pipe by more than allowable pipe deflection. Do not move trench support system (trench safety system) once bedding material is compacted.

d. Excavate outside specified trench section for bell holes and for spaces sufficient to permit removal of slings. Provide bell holes at proper locations for unrestricted access to joint. Form bell holes large enough to facilitate joint wrapping and to permit visual examination of process. Enlargement of bell holes as required or directed by the Project Manager. Subsequent backfilling thereof shall not be considered as authorized additional excavation and backfill. Backfill bell holes and spaces to satisfaction of the Project Manager.

e. Blocking may be removed twenty-four hours (24 Hrs) after placing backfill to top of pavement or natural ground level.

8. Pipe Deflection: After backfill is complete, test pipe for excessive deflection by measuring actual inside vertical diameter. For maximum deflection allowable, see Section 2.1.H.8.

a. Deflection may be measured by the Project Manager at location along pipe. Arithmetical averages of deflection are not acceptable.

b. If deflection exceeds that specified, do one (1) of the following:

1) Remove backfill and side support. Re-round the pipe and properly replace compacted backfill and side support. Review cement mortar lining to assure that no harmful damage has occurred.

2) Remove entire portion of deflected pipe section and install new pipe as directed by the Project Manager at no additional cost to the City.

9. Move pipe in such manner not to damage pipe or coating. Do not roll pipe nor drag on ground. Inspect and repair coating abrasions before pipe is lowered into trench.

10. Use of dogs, clips, lugs or equivalent devices welded to steel pipe for purpose of forcing it into position shall not be permitted unless approved by the Project Manager. Remove foreign matter and protective material from surfaces that are to be in contact at joints. Leave surfaces of joint areas thoroughly clean for metal-to-metal contact of field joints.

C. Static Electricity:

1. Properly ground steel pipeline during construction as necessary to prevent build-up of static electricity.

2. Electrically test where required after installation of pipeline is complete.

D. Deviation of installed pipe in one pipe section from line and grade shown on approved shop drawing layout shall not exceed two inches (2 In) from grade and three inches (3 In) from line. No deviation from line and grade at contact interfaces are allowed.

E. Use adequate surveying methods, procedures and employ competent surveying personnel to ensure pipe sections are laid to line and grade and within stipulated tolerances. Measure and record, in form approved by the Project Manager and submit copy of data to the Project Manager at end of that day. Survey data to include unique pipe number, deflection angle at pipe joint and whether beveled ends were used, invert elevation at pipe joint, deviation of joint from project line, deviation of joint from project grade, inside pipe joint lap measured at top, bottom and at springline (each side).

F. Any time that laying of additional pipe is stopped for more than eight hours (8 Hrs); plug ends of installed pipe and take proper precautions against flotation of pipe segments.

3.2 EXTERNAL COATING SYSTEM FOR STEEL PIPE INSTALLED ABOVE GROUND AND IN VAULTS (EXPOSED) AND EPOXY INTERNAL LINING SYSTEM

A. Safety: Paints, coatings and linings specified in this Section are hazardous materials. Vapors may be toxic or explosive. Protective equipment, approved by appropriate regulatory agency, is mandatory for personnel involved in painting, coating and lining operations.

B. Workmanship:

1. Application: By qualified and experienced workers who are knowledgeable in surface preparation and application of high-performance industrial coatings.
2. Paint Application Procedures: SSPC Good Painting Practices, Volume 1.

C. Surface Preparation:

1. Use abrasive blasting to prepare surfaces.
2. Schedule cleaning and painting so that detrimental amounts of dust or other contaminants do not fall on wet, newly-painted surfaces. Protect surfaces not intended to be painted from effects of cleaning and painting operations.
3. Prior to blasting, clean surfaces to be coated or lined of grease, oil and dirt by steaming or detergent cleaning in accordance with SSPC SP1.
4. Metal and Weld Preparation: Remove surface defects such as gouges, pits, welding and torch-cut slag, welding flux and spatter by grinding to one-quarter inch (1/4 In) minimum radius.
5. Abrasive Material:
   a. Blast only as much steel as can be coated within same

day of blasting.

b. Use sharp, angular, properly graded abrasive capable of producing depth of profile specified herein. Transport abrasive to jobsite in moisture-proof bags or airtight bulk containers. Copper slag abrasives are not acceptable.

c. After abrasive blast cleaning, verify surface profile with replica tape such as Tes-Tex Coarse or Extra Coarse Press-O-Film Tape or approved equal. Furnish tapes to the Project Manager.

d. Do not blast if metal surface may become wet before priming commences or when metal surface is less than five degrees Fahrenheit (5° F) above dew point.

6. Evaluate degree of cleanliness for surface preparation with use of SSPC Pictorial Surface Preparation Standards for Painting Steel Surfaces, SSPC Vis1.

7. Remove dust and abrasive residue from freshly blasted surfaces by brushing or blowing with clean, dry air. Test cleanliness by placing three-quarters inch by four inch (3/4 In x 4 In) piece of clear Scotch-type tape on blasted surface, then removing and placing tape on three inch by five inch (3 In x 5In) white index card. Re-clean areas exhibiting dust or residue.

D. Coating and Lining Application:

1. Environmental Conditions: Do not apply when metal temperature is less than fifty degrees Fahrenheit (50° F); when ambient temperature is less than five degrees Fahrenheit (5° F) above dew point; when expected weather conditions are such that ambient temperature shall drop below forty degrees Fahrenheit (40° F) within six hours (6 Hrs) after application; or when relative humidity is above eighty-five percent (85%). Measure relative humidity and dew point by use of sling psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychometric Tables. Provide dehumidifiers for field-applied coatings and linings to maintain proper humidity levels.

2. Application Procedures:

a. Apply in accordance with manufacturer's recommendations and requirements of this Section. Provide finish free of runs, sags, curtains, pinholes, orange peel, fish eyes, excessive over spray or delaminations.

b. Thin materials only with manufacturers recommended thinners. Thin only amount required to adjust viscosity for temperature variations, proper atomization and flow-out. Mix material components using mechanical mixers.

c. Discard catalyzed materials remaining at end of day.

3. Thoroughly dry pipe before primer is applied. Apply primer

immediately after cleaning surface. Apply succeeding coats before contamination of undersurface occurs.

4. Cure minimum of twenty-four hours (24 Hrs) at seventy-seven degrees Fahrenheit (77° F) before successive coats are applied. During curing process, provide force air ventilation in volume sufficient to maintain solvent vapor levels below published threshold limit value. Apply successive coats within recoat threshold time as recommended by coating or lining manufacturer on printed technical data sheets or through written communications. Brush blast joints of pipe which have been shop primed and are to receive intermediate and finish coats in field prior to application of additional coats. After interior coats are applied, provide forced-air ventilation in sufficient volume and for sufficient length of time to ensure proper curing before filling pipe with water.

3.3 EXTERNAL COATING SYSTEM FOR BURIED STEEL PIPE

A. Tape Coating System:

1. Joint Protection

a. Coating field joints, tie-ins and other field-welded joints: Provide application of approved insulating putty at bell step-offs and two (2) wraps of Field Joint Tape Primer: Furnished by tape manufacturer.

b. At the Contractor's option, apply approved special heat resistant tape system prior to internal welding of pipe. Coat entire pipe with shop-applied tape. Coat bell end with shop-applied heat-resistant tape. In field, fill joint step off area with insulating putty. Field apply two (2) layers of field joint tape over joint followed by high shear strength outerwrap. Follow manufacturer's recommendation for field-applied tape coating.

c. At the Contractor's option, provide field-applied shrink-wrap coating system for coating field joints, tie-ins and other field welded joints. Apply heat-shrink sleeves prior to internal welding of pipe using approved procedure compatible with coating system. Install heat-shrink joint sleeves in accordance with manufacturer's recommendations. Provide shrink-wrap systems consisting of primer, tape coating and polyurethane coating and high-strength application of Aqua-shield Wrap for pipeline. Provide services of technical representative of manufacturer available on site at beginning of pipelaying operations. Representative to advise the Contractor and the Project Manager regarding installation, repairs and general construction methods.

2. Field Application: AWWA C209 around joint cutbacks except as modified:
   a. Field-welded joints: Clean shop-primed ends of weld splatter, damaged primer and rust to achieve required surface preparation prior to field repair of coatings.
   b. Extend joint cleaning four inches (4 In) onto existing coating. Completely remove damaged and loose end-coatings.
   c. Prior to placing pipe in trench, remove shop-applied primer by abrasive blasting, solvent or other method as approved by the Project Manager. Avoid damage to adjacent existing coatings.
   d. Clean surfaces to achieve surface preparation at least equivalent to SSPC SP6 in accordance with AWWA C209. Provide solvent that is environmentally safe and compatible with coating system primer.
   e. Apply insulating putty onto bell step-off as shown on the Drawings. Remove release liner during application.
   f. Apply primer immediately prior to application of first layer of tape to achieve maximum bond. Apply tape while primer is still "tacky" with three inch (3 In) minimum overlap over shop-applied coating.
3. Joint Tape
   a. Extend inner wrap minimum of two inches (2 In) onto existing coating on each side of joint. Extend outer wrap minimum of four inches (4 In) onto existing coating each side of joint. Stagger end laps minimum of six inches (6 In). Overlap adjacent tape wraps at least one inch (1 In) and overlap seam of outer wrap. Do not allow to be coincident with overlap seam of inner wrap. Wash with Xylol area that shall be overlapped.
   b. Apply approved joint wrap tape to uncontaminated primer at proper roll body temperature. If necessary, store joint wrap material in heated box up to point of application.
   c. Apply joint wrap material to pipe in either spiral or cigarette fashion dependent upon specification. Begin wrapping process two inches (2 In) to four inches (4 In) onto mill-applied pipe wrap and proceed wrinkle-free up over bell and across joint to spigot side pipe wrap.
   d. Apply joint wrap under machine tension of five pounds (5 Lbs) to ten pounds (10 Lbs) per inch width. Joint wrap width should narrow (neck down) as material is applied tightly around pipe.
   e. Apply first one-third (1/3) and last one-third (1/3) turn of joint material around pipe with less tension to prevent

wrap crawlback. Overlap of joint wrap material and system's total thickness as specified in this Section.

f. End joint wrap process such that its final edge is directed downwards when pipe is placed in ditch to prevent backfill from pulling exposed joint wrap edge.

4. Do not expose tape coatings or heat-shrinkable joint sleeves to harmful ultraviolet light for more than ninety days (90 D). Discard (remove) and replace outer layer of tape coating when exposure exceeds ninety days (90 D). In case of factory-applied coatings, remove pipe from site for removal and reapplication of outer layer of tape coatings.

5. At option of the Project Manager, coating system and application may be tested and inspected at plant site in accordance with AWWA C214.

B. Test for holidays:

1. Inspect pipe for holidays and damage to coating.

a. If test indicates no holidays and outer wrap is torn, remove damaged layers of outer wrap by carefully cutting with sharp razor-type knife. Wash with Xylol area to be patched and at least four inches (4 In) of undamaged tape where hand-applied tape wrap shall overlap. AWWA C209 cold-applied tape compatible with tapewrapping system applied for each layer of outer-wrap tape that has been removed.

b. If test indicates holiday, remove outer layers and expose inner wrap. Prime exposed area and overlaps with light coat of primer. Firmly press into place patch of two (2) thirty-five (35) mil inner wrap tape extending four inches (4 In) from affected area in all directions. Second patch to overlap first patch by two inches (2 In). Perform holiday test of patch to verify satisfactory installation. Wash exposed outer wrap tape with Xylol and prime.

c. For severe outer wrap tape tears or damage and holiday is not detected, remove outer wrap to boundaries of damaged area, taking care not to damage inner wrap coating. Before replacing outer wrap, apply holiday detector to exposed area to determine that no damage has been made to primary coating. After verification that no holidays exist in underlying tape, clean damaged area and use patch of thirty-five (35) mil outer wrap tape. Apply as specified herein for repair of areas where bare pipe is exposed.

2. Do not allow bubbles in tape coating system regardless of holiday test results, cut out bubbles and patch as described above as directed by the Project Manager.

3. Perform test procedure in accordance with NACE Standard RP-

02-74. Perform electrical holiday test with sixty (60) cycle current audio detector. Use test voltage as specified in TABLE 4.5 TEST VOLTAGES in this Section.

C. Remove areas having physical damage and recoat. After repairing area, apply holiday detector as stated above to verify area is adequately repaired.

D. Cement mortar coating. AWWA C205; one inch (1 In) minimum thickness; Cut back from joint ends no more than two inches (2 In) to facilitate joining and welding of pipe.

3.4 JOINTS AND JOINTING

A. Rubber Gasketed Bell-and-Spigot Joints.

1. Use O-ring gasket with sufficient volume to approximately fill area of groove and gasket material in accordance with AWWA C200. Check each splice in gasket by stretching gasket to at least twice original length of gasket. Visually check stretched splice by rotating three hundred sixty degrees (360°). Reject splices showing visible separation or cracks.
2. Equalize rubber gasket cross section after rubber gasket is placed in spigot groove of pipe by inserting tool or bar such as large screwdriver under rubber gasket and moving it around periphery of pipe spigot. Lubricate gaskets with nontoxic water-soluble lubricant before pipe units are joined. Fit pipes together in manner to avoid twisting or otherwise displacing or damaging rubber gasket. Check gaskets after pipe sections are joined with feeler gauge to ensure that no displacement of gasket has occurred at point around circumference after joining. If displacement has occurred, remove pipe section and remake joint as if for new pipe. Remove old gasket and replace before remaking joint.

B. Welded Joints:

1. Conform to requirements of Section 02400 – Water Lines.
2. Field weld to be double-welded lap field joints or full penetration butt welded joints for steel pipe and encasement sleeves for entire circumference.
3. Employ independent certified testing laboratory, approved by the Project Manager, to perform weld acceptance tests on welded joints. Include cost of such testing in contract the unit price bid for water line. Furnish copies of all test reports to the Project Manager for review. Test by magnetic particle test method for lap welds and fillet welds or by X-ray methods for butt welds, for one hundred percent (100%) of all joint welds. The Project Manager has final decision as to suitability of welds tested.

C. Flanged Joints: Conform to requirements of Section 02400 – Water Lines.

D. Joint Grouting and Testing: Conform to requirements of Section 02400

– Water Lines.

E. Do not allow steel plugs for threaded outlets to project beyond inner surface of pipe shell and seal weld by at least two (2) passes. Apply weld around outside of plug after it has been inserted in final position. Coat outlets and plugs inside and outside as required at field joints on pipe.

3.5 FIELD-APPLIED CEMENT-MORTAR LINING

A. Entrances Into Pipeline:

1. Establish means to permit entry and exit of labor, materials and equipment necessary for progress of work, as approved by the Project Manager.
2. Provide dikes and channeling for diversion of flood and drainage waters away from these openings in pipeline. Use temporary airtight covers over openings to provide proper curing conditions in completed sections of lined pipe. Where operation of equipment requires that end of pipe be left open, install temporary bulkhead inside pipe to eliminate direct draft through pipe over completed sections.
3. Brace closure sections of pipeline left out to facilitate field lining above ground to conform as nearly as possible to shape of pipe in ground and then place cement-mortar lining by machine or hand trowel to same thickness as in adjoining machine-lined sections. Bulkhead sections immediately after being lined to maintain proper curing conditions for period of not less than forty-eight hours (48 Hrs) before sections are installed in pipeline. Install these sections of steel pipe.
4. Coat exterior surface of buttstraps and uncoated exterior surface area of steel pipe within excavations in accordance with the Technical Specifications. Place cement-mortar lining inside areas of joints in accordance with the Technical Specifications.

B. Mixing of Cement-mortar: Mix ingredients for cement-mortar for not less than one and one-half minutes (1-1/2 Min) and not more than six minutes (6 Min); use mortar promptly after mixing for lining pipe. Do not use mortar that has attained its initial for lining. Do not re-temper mortar. Add water to mix last.

C. Placing Cement-mortar Lining:

1. Complete joint work, backfill and welding before cement-mortar lining begins. After cement-mortar lining has cured hydrostatic testing of pipe can begin.
2. Provide provisions necessary for the Project Manager to conduct inspections of work in safe and thorough manner during and after initial application of mortar and after necessary repairs made. Include, as minimum, space on application machine and adequate lighting to inspect gross surface areas
3. Comply with ASTM C494 and with manufacturer's recommendations when using chemical admixtures, bonding

agents, accelerators and other additives.

4. Remove dirt, debris, oil, grease and loose mill scale and rust from interior surfaces of pipe and scrape or brush surface with stiff bristle brush and/or water blast as may be necessary and approved by the Project Manager, to ensure clean surfaces for successful application of cement-mortar lining. Interior surfaces to be approved by the Project Manager prior to placing lining.
5. Provide cement-mortar lining uniform in thickness along entire length of pipe. Provide cement-mortar no less than one-half inch (1/2 In) over all surfaces with tolerance of plus one-eighth inch (+1/8 In) and no allowance for minus tolerance.
6. Mechanically control travel of machine and rates of discharge of mortar to produce uniform thickness of lining without segregation around perimeter and along length of pipe.
7. Check finished surface by placing twelve inch (12 In) straightedge parallel to axis of pipe along surface of straight section of lining. At no point shall space between lined surface and straightedge be greater than one-sixteenth inch (1/16 In).
8. Provide smooth finished surface, within tolerances specified. Repair or replace surface irregularities including corrugations, ripples or pits in any direction, to satisfaction of the Project Manager. Remove defective lining material, including, sand pockets, voids, oversanded areas, blisters, delaminations or unbounded areas, cracked areas, irregular surfaces and unsatisfactory thin spots. Remove to pipe wall and area repaired to full thickness of mortar lining.
9. Repair cracks one-sixteenth inch (1/16 In) and larger to satisfaction of the Project Manager.
10. Place cement-mortar lining by machine having following features:
    a. An applicator head which can be centered within pipe and which shall centrifugally project mortar against wall of pipe at high velocity producing dense, uniformly distributed mortar on wall of pipe.
    b. Equipped with mechanically driven, rotating steel trowels that immediately follow applicator, providing smooth, hard surface without spiral shoulders. Compensate for torque so that machine shall sit true in pipe and trowel faces shall not vary in angle with mortar face during complete three hundred sixty degree (360°) cycle. Clean trowels at frequent intervals to prevent accumulated mortar from obtaining initial set resulting in sanded or unglazed finish. Continuously operate trowels during application of cement-mortar and forward progress of lining machine.

c. Design applicator so that nothing shall come in contact with troweled surface until it has attained final set and so that forward progress of machine and mechanical placing of mortar can be controlled to assure uniform thickness of lining.

11. Cement-mortar Lining: Adhere to steel at all points; provide consistent thickness except that lining of bell end of pipe where lining is to be thicker in order to fill depression and make smooth surface.
12. Immediately prior to application of cement-mortar lining, sweep and clean off slime, dirt, loose rust, loose mill scale and other foreign materials. Free interior surface of pipe after cleaning of accumulated water on pipe wall or at joints.
13. After receiving its finish troweling, do not roughen lining by rebound material or by mortar direct from machine.
14. Temporarily close outlets in pipeline with easily removable stoppers to prevent spun mortar from being thrown into such openings. After lining is applied, remove stoppers from outlets and repair lining damaged by removal of stoppers. Point outlet openings up to provide smooth flow.

D. Hand Finishing:
1. Repair defective areas in machine-applied lining and unlined joints by hand patching to yield lining equal to that required for machine-applied troweled lining.
2. Provide nonshrink grout for patching or lining joints as specified in this Section.
3. Clean defective areas of loose foreign material and moisten with water just prior to application of hand-applied mortar.
4. Use steel finishing trowels for hand application of cement-mortar.
5. Complete hand finishing required in given pipe section not later than day following machine application of mortar lining to that particular pipe section, whether normal working day or otherwise. Slow down or stop machine application of mortar lining to allow time for hand patching.

E. Curing of Lining: Begin curing operations immediately after completing any portion of mortar lining. Close pipe by airtight bulkheads and maintain moist atmosphere in completed section of pipe to keep lining damp and to prevent evaporation of entrained water from mortar lining. Humidify air introduced into pipe for ventilating or curing purposes and maintain moist atmosphere inside pipe until the Project Manager accepts the Work.

3.6 INSPECTION (EXCEPT MORTAR COATED PIPE)

A. Include cost of inspection described in Paragraph 3.7, Inspection, in contract the unit price for water line. Furnish copies of certified inspection reports to the Project Manager for review.

B. Holiday Test and Adhesion Test: Provide services of independent coating and lining inspection service or testing laboratory with qualified coating inspectors. Provide inspections by NACE trained inspectors under supervision of NACE Certified Coatings Inspector having Level III Certification.

3.7 COATINGS AND LININGS INSPECTION RESPONSIBILITIES

A. The Contractor is responsible for quality control of coatings and linings applications and testing and inspection stipulated in this Section. The Project Manager is responsible for quality assurance and reserves right to inspect or acquire services of independent third-party inspector who is fully knowledgeable and qualified to inspect surface preparation and application of highperformance coatings at phases of coatings and linings, field or shop applied. The Contractor is responsible for proper application and performance of coatings and linings whether or not the Project Manager provides such inspection.

B. Cement Mortar Lining and Joint Finish: Finished surface of lining and joint to be comparable to surface rubbed with No. 16 Carborundum stone. Rub joint mortar sufficiently to bring paste to surface, to remove depressions and projections and to produce smooth, dense surface. Add cement to form surface paste as necessary. Leave interior with clean, neat and uniform-appearing finish.

3.8 FIELD REPAIR PROCEDURES AND SPECIAL FITTINGS APPLICATION FOR CEMENT MORTAR LINING

A. Areas less than or equal to six inches (6 In) in diameter: Patch honeycomb and minor defects in concrete surfaces with nonshrink grout. Repair defects by cutting out unsatisfactory material and replacing with nonshrink grout, securely bonded to existing concrete. Finish to make junctures between patches and existing concrete as inconspicuous as possible. After each patch has stiffened sufficiently to allow for greatest portion of shrinkage, strike off grout flush with surrounding surface.

B. Areas greater than six inches (6 In) in diameter:

1. Remove defective lining down to bare steel by chipping, making sure care is taken to prevent further lining damage. Ends of lining where defective lining is removed are to be left square and uniform not feathered.
2. Clean bare steel with wire brush to remove loose or other foreign matter.
3. Remove existing wire reinforcement and replace. Overlap new reinforcement to existing reinforcement by one-half inch (1/2 In). Secure reinforcement, against wall of pipe, at frequent intervals, by tack welding to pipe.
4. Prepare cement mortar mixture. Mixture to compose of Portland Type II cement, sand and water. Proportions of sand to cement not to exceed three (3) parts sand to one (1) part cement, by

weight. Use only enough water to obtain proper placement characteristics. Set up time before mixture is to be discarded is to be no longer than one-half hour (1/2 Hr). Nonshrink grout may also be used. Do not use combination of cement mortar and nonshrink grout within same repair.

5. Apply WELD-CRETE or approved equal, concrete bonding agent to bare steel and interface of existing lining. After bonding agent is applied to steel and lining new mix must be applied within ten minutes (10 Min).
6. Apply cement mortar to repair area one-half inch (1/2 In) thick then hand trowel to achieve smooth dense finish, making sure wire is not left exposed. To ensure proper thickness while placing new mortar, check thickness with one-half inch (1/2 In) long wire gauge.
7. Curing: Place plastic sheeting over repair area, use tape to adhere plastic to area surrounding repair area. Let cure for four days (4 D) then remove plastic sheeting.

PART IV: TABLES

4.1 PIPE WALL THICKNESSES

Net Inside Diameter (Inches)	Minimum Wall Thickness (Inches)	
	Flexible Coating	Mortar Coating
24	0.149	0.136
30	0.149	0.136
36	0.178	0.163
42	0.207	0.189
48	0.235	0.215
54	0.271	0.250
60	0.301	0.268
66	0.333	0.295
72	0.362	0.320
78	0.393	0.359
84	0.423	0.395
90	0.454	0.430
96	0.484	0.464

4.2 – REQUIRED BENDS STOCK

Line Diameter	Required Bends*
20 and 24 inches	Four 45 degree bends per 5,000 LF of water line
>24 inches	Four 22.5 degree bends per 10,000 LF of water line

* Based on total length of contract [minimum of four (4)]). Any combination of bends may be substituted at manufacturer's option [i.e. two (2) – twenty-two and one half degree (22-1/2°) bends are equivalent to one (1) – forty-five degree (45°) bend] and shall be counted as one (1) fitting.

4.3 – EPOXY PRIMER FOR INTERIOR SURFACES

Surface Preparation	**SSPC SP5 White Blast Clean 2.0 to 3.0 mils surface profile**
Prime Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy – Buff or approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy – Buff or approved equal
Finish Coat 4.0 to 6.0 mils DFT	NSF Certified Epoxy – White or approved equal

4.4 – THREE COAT EPOXY/POLYURETHANE COATINGS

Surface Preparation	**SSPC SP10 Near White Blast Clean 2.0 to 3.0 mils surface profile**
Prime Coat 4.0 to 6.0 mils DFT	Inhibitive Epoxy Primer of approved equal
Intermediate Coat 4.0 to 6.0 mils DFT	Chemical Resistant Epoxy or approved equal
Finish Coat 1.5 to 2.5 mils DFT	Polyurethane or approved equal

4.5 TEST VOLTAGES

Total Coating Thickness (Mils)	**Test Voltage (Volts)**
20	6,000
30/35	7,500
50	9,000
70	11,500
80	12,000

END OF SECTION

SECTION 02260
POLYETHYLENE WRAP

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Polyethylene wrap to be used in open-cut construction for cast iron and ductile iron pipe when cathodic protection system is not required by the Drawings.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for polyethylene wrap. Include cost of polyethylene wrap in the unit price for pipes and fittings to be wrapped.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCE
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D1248 – Standard Specification for Polyethylene Plastics Molding and Extrusion Materials For a Wire and Cable.
- B. AWWA – American Water Works Association.
  1. AWWA C105 – Standard for Polyethylene Encasement for Ductile-Iron Pipe System.
- C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit product data for proposed film and tape for approval.

1.5 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that material was manufactured in compliance with Technical Standards referenced in this Section.

PART II: PRODUCTS

2.1 MATERIALS
- A. Polyethylene Film: Tubular or sheet form without tears, breaks, holidays or defects; conforming with requirements of AWWA C105, two and one-half percent (2-1/2%) to three (3%) percent carbon black content, either low- or high-density:

1. Low-density polyethylene film: Low-density polyethylene film shall be manufactured of virgin polyethylene material conforming to following requirements of ASTM D1248.
   a. Raw material.
      1) Type : I.
      2) Class: C (black).
      3) Grade: E-5.
      4) Flow rate (formerly melt index): Four tenths gallons per ten minutes (0.4 Gal/10 Min), maximum.
      5) Dielectric strength: Volume resistivity, 10_{15} ohm-cm, minimum.
   b. Physical properties.
      1) Tensile strength: One thousand pounds per square inch (1200 psi), minimum.
      2) Elongation: Three hundred percent (300%), minimum.
      3) Dielectric strength: Eight hundred volts per mil (800 V/mil) thickness, minimum.
   c. Thickness: Low-density polyethylene film shall have normal thickness of eight thousandths inch (0.008 In). Minus tolerance on thickness is ten percent (-10%) of nominal thickness.
2. High-density, cross-laminated polyethylene film: High-density, cross laminated polyethylene film shall be manufactured of virgin polyethylene material conforming to following requirements of ASTM D1248.
   a. Raw material.
      1) Type: III.
      2) Class: C (black).
      3) Grade: P33.
      4) Flow rate (formerly melt index): Four tenths Gallon per ten minutes (0.4 Gal/10 Min) to five tenths gallon per ten minutes (0.5 Gal/10 Min), maximum.
      5) Dielectric strength: Volume resistivity, 10_{15} ohm-cm, minimum.
   b. Physical properties:
      1) Tensile strength: Five thousand pounds per square agent (5000 psi), minimum.
      2) Elongation: One hundred percent (100%), minimum.
      3) Dielectric strength: Eight hundred volts per mil (800 V/mil) thickness, minimum.
   c. Thickness: Film shall have nominal thickness of four thousandths inch (0.004 In). Minus tolerance of thickness is ten percent (-10%) of nominal thickness.

B. Polyethylene Tape: Provide three inch (3 In) wide, plastic-backed, adhesive tape; Paleocene No. 900, Scotchwrap No. 50 or approved equal.

PART III: EXECUTION

3.1 PREPARATION

A. Remove lumps of clay, mud and cinders from pipe surface prior to installation of polyethylene encasement. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.

B. Fit polyethylene film to contour of pipe to affect snug, but not tight fit; encase with minimum space between polyethylene and pipe. Allow sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints or fittings and to prevent damage to polyethylene due to backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.

C. For installations below water table or in areas subject to tidal actions, seal both ends of polyethylene tube with adhesive tape at joint overlap.

3.2 INSTALLATION

A. Tubular Type (Method A):

1. Cut polyethylene tube to length approximately two feet (2 Ft) longer than pipe section. Slip tube around pipe, centering tube to provide one foot (1 Ft) overlap on each adjacent pipe section and bunching it accordion-fashion lengthwise until it clears pipe ends.
2. Lower pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene tube.
3. After assembling pipe joint, make overlap of polyethylene tube. Pull bunched polyethylene from preceding length of pipe, slip it over end of adjoining length of pipe and secure in place, then slip end of polyethylene from adjoining pipe section over end of first wrap until it overlaps joint at end of preceding length of pipe. Secure overlap in place. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points.
4. Repair cuts, tears, punctures or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.

B. Tubular Type (Method B):

1. Cut polyethylene tube to length approximately one foot (1 Ft) shorter than pipe section. Slip tube around pipe, centering it to provide six inches (6 In) of bare pipe at each end. Take up slack width at top of pipe to make snug, but not tight, fit along barrel of

pipe, securing fold at quarter points; secure ends.

2. Before making up joint, slip three foot (3 Ft) length of polyethylene tube over end of preceding pipe section, bunching in accordion-fashion lengthwise. After completing joint, pull three foot (3 Ft) length of polyethylene over joint, overlapping polyethylene previously placed on each adjacent section of pipe by at least one foot (1 Ft); make each end snug and secure.
3. Repair cuts, tears, punctures or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.

C. Sheet Type:
1. Cut polyethylene sheet to length approximately two feet (2 Ft) longer than pipe section. Center length to provide one foot (1 Ft) overlap on each adjacent pipe section, bunching sheet until it clears pipe ends. Wrap polyethylene around pipe so that sheet circumferentially overlaps top quadrant of pipe. Secure cut edge of polyethylene sheet at intervals of approximately three feet (3 Ft).
2. Lower wrapped pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene. After completing joint, make overlap and secure ends.
3. Repair cuts, tears, punctures or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.

D. Pipe-shaped Appurtenances: Cover bends, reducers, offsets and other pipe-shaped appurtenances with polyethylene in same manner as pipe.

E. Odd-shaped Appurtenances: When it is not practical to wrap valves, tees, crosses and other odd-shaped pieces in tube, wrap with flat sheet or split length of polyethylene tube by passing sheet around appurtenance and encasing it. Make seams by bringing edges together, folding over twice and taping down. Tape polyethylene securely in place at valve stem and other penetrations.

F. Openings in Encasement: Create openings for branches, service taps, blow-offs, air valves and similar appurtenances by making X-shaped cut in polyethylene and temporarily folding back film. After appurtenance is installed, tape slack securely to appurtenance and repair cut, as well as other damaged area in polyethylene, with tape. Service taps may also be made directly through polyethylene, with resulting damaged areas being repaired as specified.

G. Junctions between Wrapped and Unwrapped Pipe: Where polyethylene-wrapped pipe joins adjacent pipe that is not wrapped, extend polyethylene wrap to cover adjacent pipe for distance of at least three feet (3 Ft). Secure end with circumferential turns of tape. Wrap service lines of dissimilar metals with polyethylene or suitable dielectric tape for minimum clear distance of three feet (3 Ft) away from cast or ductile iron pipe.

3.3 REPAIRS

A. Repair cuts, tears, punctures or damage to polyethylene with adhesive tape or with short length of polyethylene sheet or cut open tube, wrapped around pipe to cover damaged area and secured in place.

END OF SECTION

SECTION 02265
POLYURETHANE COATINGS ON STEEL OR DUCTILE IRON PIPE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Two (2) component polyurethane coating system for use as external coating for steel or ductile iron pipe.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
   1. No separate payment will be made for work performed under this Section. Include cost of polyurethane coatings in contract unit prices for steel pipe or ductile iron pipe.
   2. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):
   1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES

A. ASTM – American Society for Testing and Materials.
   1. ASTM D522 – Standard Test Method for Mandrel Bend Test of Attached Organic Coatings.

B. AWWA – American Water Works Association.
   1. AWWA C210 – Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.

C. CFTS – City of Friendswood Technical Specifications.

D. SSPC – Steel Structures Painting Council.
   1. SSPC PA2 – Measurement of Dry Paint Thickness with Magnetic Gauges.
   2. SSPC PA Guide 3 – A Guide to Safety in Paint Application.
   3. SSPC PS Guide 17.00 – Guide for Selecting Urethane Painting Systems.
   4. SSPC PS10 – Near-White Blast Cleaning.

1.4 SAFETY

A. Secure, from manufacturer, Material Safety Data Sheet (MSDS) for polyurethane coatings and repair materials listed in this Section.

B. Safety requirements stated in this specification and in related sections apply in addition to applicable federal, state and local rules and regulations. Comply with instructions of coating manufacturer and requirements of insurance underwriters.

C. Follow handling and application practices of SSPC PA Guide 3; SSPC PS Guide 17.00; Coating Manufacturer's Material Safety Data Sheet.

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit coating manufacturer's catalog sheets and technical information for approval, prior to delivery of pipe.
C. Obtain from coating manufacturer and submit coating "affidavit of compliance" to requirements of this Section stating that coatings were applied in factory and in accordance with manufacturer's minimum requirements.

1.6 DELIVERY, STORAGE and HANDLING

A. Use standard containers to prevent gelling, thickening deleteriously or forming of gas in closed containers within period of one year (1 Yr) from date of manufacture.
B. Label each container of separately packaged component clearly and durably to indicate date of manufacture, manufacturer's batch number, quantity, color, component identification and designated name or formula specification, number of coatings together with special instructions. Do not use coating components older than one year (1 Yr).
C. Deliver coating materials to pipe manufacturer in sealed containers showing designated name, batch number, color, date of manufacture and name of coating manufacturer.
D. Store material onsite in enclosures, out of direct sunlight in a warm, ventilated and dry area.
E. Prevent puncture, inappropriate opening or other action which may lead to product contamination.

1.7 QUALITY ASSURANCE

A. Provide manufacturer's affidavits that pipe was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 COATING MATERIAL

A. CORROPIPE II PW – TOUCHUP (two-component) or approved equal; mix in accordance with coating manufacturer's recommendations.
    1. For areas less than or equal to six inches (6 In) in diameter, brush apply.
    2. For areas greater than six inches (6 In) in diameter, spray apply.
B. Coating System: Use Type V system which is two (2) package polyisocyanate, polyol-cured urethane coating, mixed in one to one (1:1) ratio at time of application. Components shall be balanced viscosities in their liquid state and not require agitation during use.
C. Exterior Coating Material: CORROPIPE II-TX and Joint Coating Material CORROPIPE II-PW, manufactured by Madison Chemical Industries, Inc.
D. Internal Coating Material: Joint Coating Material CORROPIPE II-PW, manufactured by Madison Chemical Industries, Inc

E. Cured Coating Properties:
   1. Conversion to Solids by Volume: Ninety-seven percent (97%) plus or minus three percent (±3%).
   2. Temperature Resistance: Minus forty degrees Fahrenheit (-40° F) and plus one hundred degrees Fahrenheit (130° F).
   3. Minimum Adhesion: Five hundred pounds per square inch (500 psi), when applied without primer to ductile iron pipe which has been blasted to comply with SSPC SP10.
   4. Cure Time: For handling in one minute (1 Min) at one hundred twenty degrees Fahrenheit (120° F) and full cure within seven days (7 D) at seventy degrees Fahrenheit (70° F).
   5. Maximum Specific Gravities: Polyisocyanate resin, 1.20. Polyol resin, 1.15.
   6. Minimum Impact Resistance: eighty inch-pounds (80 in-lb) using one inch (1 In) diameter steel ball where coating is applied at thirty (30) mils to ductile iron pipe surface which has been blasted to SSPC No. 10 finish.
   7. Minimum Tensile Strength: Two thousand pounds per square inch (2000 psi).
   8. Hardness: Fifty-five (55) plus or minus five (±5) Shore D at seventy degrees Fahrenheit (70° F).
   9. Flexibility Resistance: ASTM D522 using one inch (1 In) mandrel. Allow coating to cure for seven days (7 D). Perform testing on test coupons held for fifteen minutes (15 Min) at temperature extremes specified in this Paragraph.

2.2 REPAIR AND TOUCHUP MATERIAL
A. CORROPIPE II PW [Two (2) component, brush applied or approved equal]. Mix in accordance with coating manufacturer's recommendations.

PART III: EXECUTION

3.1 SURFACE PREPARATION
A. Remove deposits of oil, grease or other organic contaminates before blast cleaning by using solvent wash as specified in SSPC PA Guide 3. Clean and dry surfaces making them completely dry, free of moisture, dust, grit, oil, grease or other deleterious substances prior to application of coating.
B. Exterior and Interior Surfaces: SSPC SP10, near-white metal blast cleaning. Blast with clean, hard, sharp cutting abrasives with no steel or cast iron shot in mix.
C. Ductile Iron Pipe: Prior to start of production blasting, prepare specimens for white metal blast and near-white metal blast using equipment and abrasives proposed for work. During preparation of specimens, Change blasting intensity and abrasive as necessary to provide degree of

cleaning required by SSPC SP10, except that color of blasted substrate is not expected to match color of blasted steel. After examination and concurrence by the Project Manager, production blasting may begin. Monitor and control production blasting so that production pipe surfaces match surface of approved blasting specimens.

3.2 THICKNESS

A. External Coatings: Minimum DFT of twenty-five (25) mils (0.025 inch).
B. Internal Coatings: Minimum DFT of thirty-five (35) mils.
C. Thickness Determinations: Use Type 1 magnetic thickness gauge as described in SSPC PA2 specification. Individual readings below ninety percent (90%) of specified minimum are not acceptable. Average individual spot readings [consisting of three (3) point measurements within three inches (3 In) of each other] less than ninety-five percent (95 %) of minimum are not acceptable. Average of all spot readings less than minimum thickness specified are not acceptable.

3.3 FACTORY APPLICATION OF POLYURETHANE COATING

A. Equipment: Two-component, one to one (1:1) mix ratio, heated airless spray unit.
B. Temperature: Minimum five degrees Fahrenheit (5° F) above dew point temperature. Temperature of surface shall not be less than sixty degrees Fahrenheit (60° F) during application.
C. Humidity: Heating of pipe surfaces may be required to meet requirements of Paragraph 2.1E, Cured Coating Properties, when relative humidity exceeds eighty percent (80%).
D. Do not thin or mix resins; use as received. Store resins at temperature above fifty-five degrees Fahrenheit (55° F) at all times.
E. Application: Conform to coating manufacturer's recommendations. Apply directly to substrate to achieve specified thickness. Multiple-pass, one (1) coat application process is permitted provided maximum allowable recoat time specified by coating manufacturer is not exceeded.
F. Recoat only when coating has cured less than maximum time specified by coating manufacturer. When coating has cured for more than recoat time, brush-blast or thoroughly sand coating surface. Blow-off cleaning using clean, dry, high pressure compressed air.
G. Cure at ambient temperature above zero degrees Fahrenheit (0° F). Do not handle pipe until coating has been allowed to cure as specified in TABLE 4.1 – MINIMUM CURE TIME in this Section.

3.4 JOINTS

A. Apply coating to unlined pipe surfaces including inside of bell socket and outside of spigot.
B. Coating thickness on sealing areas of spigot end of pipe exterior: Minimum eight (8) mils (0.008 inch), maximum of ten (10) mils (0.010 inch). Maximum ten (10) mils may be exceeded in spigot end provided

maximum spigot diameter as specified by pipe manufacturer is not exceeded.

3.5 INSPECTION

A. The Project Manager may inspect coatings at coating applicator's facilities.
B. Secure approval of surface preparation by coating manufacturer's representative prior to coating application.
C. Holiday Inspection: Conform to AWWA C210, Section 5.3.3.1. Follow coating manufacturer's recommendation. Conduct inspection any time after coating has reached initial cure. Repair in accordance with Paragraph 3.7, Repair and Field Touchup.

3.6 PIPE INSTALLATION

A. When required by the Project Manager, provide services of manufacturer's representative for period of not less than two weeks (2 Wks) at beginning of actual pipe laying operations to advise the Contractor regarding installation, including, but not limited to, handling and storing, cleaning and inspecting, coatings repairs and general construction methods as to how they may affect pipe coatings.
B. Use nylon straps, padded lifts and padded storage skids. Field cuts shall be kept to minimum. Repair damage to coating due to handling or construction practices. See Section 02215 – Ductile Iron Pipe (DIP) and Fittings and Section 02250 – Steel Pipe and Fittings for additional requirements.
C. Just before each section of pipe is to be placed into trench, conduct visual and holiday inspection. Repair defects in coating system before pipe is installed.

3.7 REPAIR AND FIELD TOUCHUP

A. Apply repair and touchup materials to holidays and other deficient coating in conformance with factory application of polyurethane coating requirements specified in this Section, excluding equipment requirements.
B. Repair Procedure – Holidays:
    1. Remove traces of oil, grease, dust, dirt and other deleterious materials.
    2. Roughen area to be patched by sanding with rough grade forty (40) grit sandpaper.
    3. Apply one (1) coat of repair material described above. Work repair material into scratched surface by brushing.
C. Repair Procedure – Field Cuts or Large Damage:
    1. Remove burrs from field cut ends or handling damage and smooth out edge of polyurethane coating.
    2. Remove traces of oil, grease, dust, dirt and other deleterious materials

3. Roughen area to be patched with rough grade forty (40) grit sandpaper. Feather edges and include overlap of one inch (1 In) to two inches (2 In) of roughened polyurethane in area to be patched.
4. Apply thick coat of repair material described above. Work repair material into scratched surface by brushing. Feather edges of repair material into prepared surface. Cover at least one inch (1 In) of roughened area surrounding damage or adjacent to field cut.

D. Repair Procedure – Thermite Brazed Connection Bonds:
1. Remove polyurethane coating with power wire brush from area on metal surface which is to receive thermite brazed connection.
2. Grind metal surface to shiny metal with power grinder and coarse grit grinding wheel.
3. Apply thermite-brazed connection using equipment, charge and procedure recommended by manufacturer of thermite equipment.
4. After welded surface has cooled to temperature below one hundred thirty degrees Fahrenheit (130° F), apply protective coating repair material to weld, exposed pipe surface and damaged areas of polyurethane coating.
5. Do not cover or backfill freshly repaired areas of coating at thermite-brazed connection until repair material has completely cured. Allow material to cure in conformance with manufacturer's recommendations.

PART VI: TABLES

4.1 – MINIMUM CURE TIME

Ambient Temperature	**Minimum Full Cure Time**
Over 70 degrees F	7 days
50 to 70 degrees F	9 days
0 to 50 degrees F	12 Days

END OF SECTION

SECTION 02270

AUGERING WATER PIPE AND CONDUIT

PART I: GENERAL

1.1 GENERAL REQUIRMENTS
- A. Installing water line service pipe by methods of augering or casing by jacking and boring.
- B. Installing Telecommunication Conduit along or under Public Ways

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  - 1 No separate payment will be made for augering pipe for water lines under this Section. Include payment in the unit price for Section 02400 – Water Lines.
  - 2. When open-cut construction is requested by the Contractor for his convenience in areas designated for augering and when approved in advance by the Project Manager, such areas shall be paid for at the unit price for Section 02400 – Water Lines.
  - 3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  - 1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 DEFINITIONS
- A. Auger Method: Installation of steel casing by excavating soil at advancing end of casing and transporting spoil through casing by otherwise uncased auger, while advancing casing by jacking at same rate as auger excavation progresses.
- B. Slurry Auger Method: Installation of casing or pipe by first drilling small diameter pilot hole from pit to pit, followed by removing excess soil and installing pipe or conduit by pull-back or jacking method.

1.4 REFERENCE STANDARDS
- A. ASTM – American Society for Testing and Materials.
  - 1. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
  - 2. ASTM D648 – Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
  - 3. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
  - 4. ASTM D790 – Standard Test Method for Flexural Properties of

Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

B. CFTS – City of Friendswood Technical Specifications.

1.5 REGULATORY REQUIREMENTS

A. Conform to Texas Department of Transportation (TxDOT) for installations under state highways. The City shall obtain required permits for State Highway crossings on behalf of the contractor.

B. Installations Under Railroads:

1. The City shall obtain required permits for Railroad crossings, from affected railroad companies, on behalf of the Contractor.
2. Comply with requirements of right-of-entry for crossing Railroad Company's easement or right-of-way from railroad companies affected. Comply with railroad permit requirements.
3. Use dry auger method only.
4. Damages due to delays caused by railroad requesting work to be done at hours which shall not inconvenience railroad shall be at no additional cost to the City.
5. Maintain a minimum of thirty-five foot (35 Ft) clearance from centerline of tracks, to the closest edge of the bore pit, but in any case outside of the right-of-way unless otherwise permitted by the railroad.
6. At no time shall any equipment, excavations or materials be closer than thirty-five feet (35 Ft) from the centerline of tracks.

1.6 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. For installation by augering, submit for review:

1. Description of mechanized excavating equipment.
2. Method of controlling line and grade.
3. Grouting techniques to be used for filling annular void between water line pipe and casing, and void between water line pipe or casing and ground, including equipment, pumping and injection procedures, pressure grout types, and mixes.
4. Locations and dimensions of pits.
5. Pit design and construction drawings.
6. Identification of casings required and paid under Contract and casings installed at the Contractor's option.
7. Design of casings.
8. Copy of railroad company permits and right-of-entry.

C. Prepare auger pit and casing design submittals that are site specific. Have auger pit and casing design submittals signed and sealed by a Professional Engineer licensed by State of Texas.

D. Include in construction phase submittals:

1. Daily logs of augering and boring operations

2. Settlement monitoring data to meet requirements of paragraph 3.11, Settlement Monitoring.
3. Submit daily logs and settlement monitoring data within five days (5 D) after day of observation

1.7 CRITERIA FOR CASING INSTALLATION LOADS

A. The Contractor shall be responsible for selection of casing, pipe and pipe joints to carry anticipated thrust of jacks or loads.

PART II: PRODUCTS

2.1 MATERIALS

A. Piping and Fittings: As required by the Technical Specifications or the Drawings.

B. Casings: Where shown on the Drawings, in accordance with Section 02250 – Steel Pipe and Fittings.

C. Casing Spacers: Where casings are shown on the Drawings, use casing spacer width eight inches (8 In) for pipe sizes four inches (4 In) to twelve inches (12 In); twelve inches (12 In) for pipe sizes fourteen inches (14 In) and larger. Wood skids or concrete "donuts" are not acceptable.
   1. For welded steel pipe twelve inches (12 In) and smaller, use Pipeline Seal & Insulator Model PE or approved equal.
   2. For other pipe materials, use Pipeline Seal & Insulator Model C8G-2 or approved equal for pipe sizes up to twelve inches (12 In).
   3. For all pipe sizes above twelve inches (12 In), use Pipeline Seal & Insulator Model C12G-2 or approved equal.
   4. Obtain approval for equal product in writing from the Project Manager prior to bid.
   5. Use ISO-9002 registered casing spacer manufacturer or supplier. Submit copy of current certificate with submittal package.

D. Casing End Seals: Provide Pipeline Seal and Insulator Model C or approved equal.

E. Casing Spacers (For Pipes Diameters sixteen inches (16 In) or Greater): Bolt-on style with shell made of two (2) sections of fourteen (14) gauge carbon steel, hot rolled, cleaned and lined with PVC liner, ninety thousandths inch (0.090 In) thick with Durometer A 85-90 overlapping edges to secure liner to spacer; deep embossed flanges for added strength; coated prior to installation of liner and runner with fusion-bonded PVC powder of fourteen (14) mils to twenty (20) mils thickness; electroplated studs, nuts and washers.
   1. Runners [For Pipe Diameters sixteen inches (16 In) or Greater]: Supported by ten (10) gauge carbon steel MIG risers welded to shell. Total length of weld beads shall be at least fifty percent

(50%) of the length of the runner. Fill bolt holes with caulk or approved equal to provide a water-tight seal. Minimum requirements: Glass reinforced plastic conforming to the following tests:

a. Tensile Strength: ASTM D638; Seventeen thousand six hundred pounds per square inch (17600 psi).
b. Flexural Strength: ASTM D790; Twenty-Five thousand three hundred pounds per square inch (25300 psi).
c. Compression Strength: ASTM D695; Eighteen thousand pounds per square inch (18000 psi).
d. Deflection Temperature at two hundred sixty-four pounds per square inch (264 psi): ASTM D648; Four hundred five degrees Fahrenheit (405° F).
e. Polyethylene runners are not acceptable.

PART III: EXECUTION

3.1 LIMITS ON AUGER LENGTH WITHOUT CASING

A. Do not exceed one hundred feet (100 Ft) for length of auger hole without receiving pit.
B. Do not exceed seventy-five feet (75 Ft) for length of auger hole for PVC pipe twelve inches (12 In) and less in diameter without receiving pit.
C. Do not exceed forty feet (40 Ft) for length of auger hole for PVC pipe fourteen inches (14 In) to twenty-four inches (24 In) in diameter without receiving pit.
D. Specifications in this paragraph that are in conflict with permit requirements, the permit requirements shall supersede all Technical Specifications. As such this may require substitution of other materials.

3.2 PREPARATION

A. Conform to applicable provisions of Section 02100 – Clearing and Grubbing.
B. Utility Relocations: Relocate utility lines clear of pit and zone of potential significant settlement or other ground disturbance.
C. Install casings as required by the Drawings, in accordance with this Section.
D. Install temporary solid plug at open end of water line to prevent contamination.

3.3 TRAFFIC CONTROL

A. Conform to applicable provisions of Section 01555 – Traffic Control and Regulation.
B. Secure right-of-entry for crossing Railroad Company’s easement or right-of-way.
C. During construction operations, furnish and maintain barricades and

lights to safeguard traffic and pedestrians, until such time as backfill has been completed and removed from site. Provide additional barricades and lights as directed by the Project Manager.

3.4 LOCATION AND SIZE OF AUGER PITS

A. Show location of auger pits on auger pit construction drawings. Locate auger pits for slurry boring so that distance between pits is no greater than eighty feet (80 Ft); and for dry augering not more than one hundred twenty feet (120 Ft) apart, except where larger distances are required by railroad permits or railroad rights-of-way.

B. Locate auger pits and associated work areas to avoid blocking driveways and cross streets and to minimize disruption to business and commercial interests. Avoid auger pit locations near areas identified as potentially contaminated.

C. Pit Size: Size pits to provide adequate room to meet operational requirements for auger construction as well as structures indicated on the Drawings. Provide minimum six inch (6 In) space between pipe and walls of auger pit. Maximum allowable width of pit shall be five feet (5 Ft). Width of pit at surface shall not be less than at bottom. Maximum allowable length of pit shall be no more than five feet (5 Ft) longer than one (1) full section of pipe and shall not exceed twenty-five feet (25 Ft).

D. Excavate bore pits to finished grade at least six inches (6 In) lower than grade indicated by stakes.

E. Auger pits that are excavated and backfilled as part of open-cut water line construction shall be in accordance with Section 02125 – Excavation and Backfill for Utilities.

F. Provide and properly maintain safety protection against traffic and accidental or unauthorized entry. Provisions to include concrete traffic barriers or other suitable barriers around periphery of pit as appropriate. Fully cover and secure pits where no construction activity is in progress.

G. Install sheeting, lining, shoring and bracing required for protection of workmen and public in accordance with Section 02280 – Trench Safety Systems.

H. Provide full cover or other security fencing for each access pit in which there is no construction activity or which is unattended by the Contractor's personnel.

I. Provide groundwater control and drainage from pits while work is in progress and until pit is properly backfilled. Conform to requirements of Section 01585 – Control of Ground and Surface Water.

3.5 AUGERING (BORING)

A. Auger from approved pit locations. Excavate for pits and install shoring as outlined above under Paragraph 3.4, Pits. Auger mechanically with use of pilot hole entire length of crossing and check for line and grade. Diameter of auger hole not to exceed pipe bell diameter plus two inches (2 In). Place excavated material outside working pit and dispose of as

specified. Use water or other fluids in connection with boring operation only to lubricate cuttings; jetting is not permitted.

B. In unconsolidated soil formations, gel-forming colloidal drilling fluid may be used. Fluid is to consist of at least ten percent (10%) of high-grade processed bentonite and shall consolidate cuttings of bit, seal walls of hole and shall furnish lubrication for subsequent removal of cuttings and installation of pipe.

C. Depending on character of soil encountered during augering operation, conduct operations without interruption, insofar as practical, to prevent hole from collapsing or pipe from seizing up in hole before installation is complete.

D. Allowable variation from line and grade shall be as specified under Paragraph 3.9, Jacking.

E. Remove and replace pipe damaged in augering operations.

3.6 DRY AUGERING OF CASING

A. Provide jacks, mounted on frame or against backstop, of capacity suitable for forcing excavating auger and casing through soil conditions to be encountered. Operate jacks so that even pressure is applied to casing.

B. Provide steerable front section of casing to allow vertical grade adjustments. Provide water level or other means to allow monitoring of grade elevation of auger casing.

C. Bentonite slurry may be used to lubricate casing during installation. Use of water to facilitate removal of spoil is permitted; however, water jetting for excavation of soil is not allowed when jacking casing.

D. Tolerances from lines and grades shown on the Drawings for water line pipe installed in casing are plus or minus six inches (±6 In) in horizontal alignment, and plus or minus one and one-half inches (±1-1/2 In) in elevation.

3.7 SLURRY BORING OF CASING OR PIPE

A. Drill small diameter pilot hole and check for line and grade at receiving end. Re-drill pilot hole when bored pipe does not meet specified tolerances.

B. Using pilot hole as guide bore larger diameter hole of sufficient size for pipe or casing installation. Water jetting is not permitted.

C. Bentonite slurry may be used to maintain stable hole and furnish lubrication for pipe or casing installation.

D. Tolerances from lines and grades shown on the Drawings for installed water line pipe are plus or minus six inches (±6 In) in horizontal alignment and plus or minus one and one-half inches (±1-1/2 In) in elevation.

E. Completely fill annular space between water line pipe and surrounding soil or casing as specified in Paragraph 3.8, Filling Annular Space.

F. Do not discharge auguring liquid into operating storm sewer system. If water only, pump to adjacent ground area where sediment shall be filtered from the liquid by ground. If auguring liquid is Bentonite slurry, pump to tank or container, and dispose of off-site.

3.8 FILLING ANNULAR SPACE

A. For installation of water line, block void space around pipe in augered hole with approximately twelve inches (12 In) of packed clay or approved equal material to prevent bedding or backfill from entering void around pipe in augered hole when compacted. For pipe diameters four inches (4 In) through eight inches (8 In) use minimum one-half cubic foot (1/2 Cf) clay; for pipe diameters twelve inches (12 In) through sixteen inches (16 In) use minimum three-quarters cubic foot (3/4 Cf) clay.

3.9 JACKING

A. Comply with Section 02280 – Trench Safety for all pits, end trenches and other excavations relating to work required by the Technical Specifications. Dewater as required to provide safe working conditions.
B. Wherever end trenches are cut into sides of embankment or beyond it, sheath securely and brace such work to prevent earth caving.
C. Make up only one (1) joint at time in pit or trench prior to jacking.
D. Do not interfere with operation of railroad, street, highway or other facility, nor weaken or damage embankment or structure.
E. Use heavy-duty jacks sized for forcing casing through embankment. Use appropriate jacking head, usually of timber and bracing between jacks and jacking head and jacking frame or backstop. Apply jacking pressure uniformly around ring of casing. Set casing to be jacked on guides, properly braced together, to support section of casing and to direct it in proper line and grade. Place jacking assembly in line with direction and grade of casing. Excavate embankment material just ahead of casing and remove material through casing. Force casing through embankment with jacks into excavated auger hole.
F. Conform excavation for underside of casing to contour and grade of casing, for at least one-third (1/3) of circumference of casing. Provide clearance of not more than two inches (2 In) for upper half of casing. Taper off upper clearance to zero (0) at point where excavation conforms to contour of casing.
G. Excavation may extend beyond end of casing depending on character of material, but shall not exceed two feet (2 Ft). Decrease advance excavation at direction of the Project Manager, when character of material being excavated makes it desirable to keep advance excavation closer to end of casing.
H. Jack casing from low or downstream end. Lateral or vertical variation in final position of casing from line and grade as shown on the Drawings shall be permitted only to extent of one inch (1 In) in ten feet (10 Ft), provided such variation is regular and only in one (1) direction and that

final grade of flow line is in direction indicated on the Drawings.

I. Use cutting edge of steel plate around head end of casing extending short distance beyond end of casing with inside angles or lugs to keep cutting edge from slipping back onto casing.
J. Once jacking of casing is begun, carry on without interruption, insofar as practicable, to prevent casing from becoming firmly set in embankment.
K. Remove and replace casing damaged in jacking operations.
L. Backfill pits or trenches excavated to facilitate jacking operations immediately after completion of jacking of casing.
M. Grout annular space between casing and excavated hole when loss of embankment occurs or when clearance of two inches (2 In) is exceeded. Grout as specified in Section 03105 – Grout.

3.10 SPACER INSTALLATION

A. There shall be no inadvertent metallic contact between casing and carrier pipe. Place spacers to ensure that carrier pipe is adequately supported throughout length, particularly at ends, to offset settling and possible electrical shorting unless otherwise approved by the Project Manager. Place end spacer within six inches (6 In) of end of casing pipe, regardless of size of casing and carrier pipe or type of spacer used. Spacing between spacers depends largely on load bearing capabilities of pipe coating and flexibility of pipe.
B. Grade bottom of trench adjacent to each end of casing to provide firm, uniform and continuous support for carrier pipe. When trench requires some backfill to establish final trench bottom grade, place backfill material in six inch (6 In) lifts and compact to density of undisturbed soil.
C. Install casing spacers in accordance with manufacturer's instructions. Take special care to ensure that sub-components are correctly assembled and evenly tightened and that no damage occurs during tightening of insulators or carrier pipe insertion.
D. Seal annulus between carrier pipe and casing with casing end seals at each end of casing.
E. Insulator Spacing:
    1. Spacing shall be as shown on Drawing with maximum distance between spacers to be ten feet (10 Ft) for pipe sizes four inches (4 In) to fourteen inches (14 In) and eight feet (8 Ft) for pipe sizes sixteen inches (16 In) to thirty inches (30 In).
    2. For ductile iron pipe or bell-and-spigot pipe, install spacers within one foot on each side of bell or flange and one (1) in center of joint when eighteen foot (18 Ft) to twenty foot (20 Ft) long joints are used.
    3. If casing or carrier pipe is angled, bent or dented, reduce spacing as directed by the Project Manager. Provide casing with smooth, continuous interior surface.

3.11 SETTLEMENT MONITORING

A. Monitor ground surface elevation along length of augering operation. Locate and record settlement monitoring points with respect to construction baseline and elevations. Record elevations to accuracy of one hundredth feet (0.01 Ft) for each monitoring point location. Establish monitoring points at locations and by methods that protect them from damage by construction operations, tampering, or other external influences. As minimum, locate survey points as follows:
   1. For road crossings: Centerline and each shoulder.
   2. Railroads: Track subbase at centerline of each track.
   3. Utilities and Pipelines: Directly above and ten feet (10 Ft) before and after utility or pipeline intersection.
   4. Long bores under improved areas such as pavements: Ground surface elevations must be recorded on centerline ahead of augering operations at locations not to exceed fifty feet (50 Ft) apart (including points located for roads, railroads, utilities, and pipelines), or at least three (3) locations per augering drive.

B. Reading Frequency and Reporting. Take settlement survey readings:
   1. Prior to auger excavation reaching point.
   2. After auger reaches monitoring point in plan.
   3. After grouting of ground supporting pipe or casing is complete.

C. Immediately report to the Project Manager movement, cracking, or settlement which is detected.

D. Following substantial completion but prior to final completion, make final survey of monitoring points.

3.12 DISPOSAL OF EXCESS MATERIAL

A. Remove and dispose of spoil from job site in accordance with Section 01580 – Waste Material Disposal.

END OF SECTION

SECTION 02270SP

AUGERING WATER PIPE AND CONDUIT

The following supplement modifies Section 02270 AUGERING WATER PIPE AND CONDUIT Standard Specification. Where a portion of the of the Specification is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

1.1 GENERAL REQUIREMENT

ADD THE FOLLOWING IN SECTION 1.6 SUBMITALS

E. Shaft design submittals by Contractor shall be signed and sealed by Professional Engineer registered in the State of Texas. If trench box is used in tunnel shaft and such utilization is in a manner other than what is indicated and certified in manufacturer's technical data, submit trench box manufacturer certification of proposed usage.

F. Submit shaft construction drawings and seal slabs. Clearly indicate allowable surcharge loads and restrictions on surcharge capacity, including live loads, on shaft construction drawings. Indicate thrust blocks or other reactions required for pipe jacking, when applicable.

1. Location of shafts by station and limits of working sites.

2. Description of site security arrangements in conformance with Section 3.6, Tunnel Shaft Construction.

3. description of method of extending shaft above flood level in conformance with Section 3.6, Tunnel Shaft Construction.

4. Any geotechnical / boring undertaken by contractor for whatever purpose connected to work.

G. Shaft Monitoring Plan: Submit for review prior to construction, shaft monitoring plan that includes schedule of instrumentation design, layout of instrumentation parts, equipment installation details, manufacturer's catalog literature, and monitoring report forms.

H. Structures Assessment. Provide pre-construction and post-construction assessment reports for critical structures located withing radius of shaft center or equal to shaft depth plus shaft radius, measured in plan. Include photographs or video of any existing damage to structures in vicinity of shafts in assessment reports.

I. Submit shaft surface settlement monitoring plan for review prior to construction; Identify location of settlement monitoring points, reference benchmarks, survey frequency and procedures, and reporting formats on plan.

G submit readings of monitoring plans to Project Managers, signed and sealed by Contractor's Professional Engineer in event that shaft is not needed for immediate construction activity, in conformance with Section 3.6, Tunnel Shaft Construction.

1.2 1.1 GENERAL REQUIREMENTS

ADD THE FOLLOWING IN SECTION 1.8 PERFORMANCE REQUIREMENTS

A. Shaft design must include allowance for contractor's equipment and stored material and spoil stockpile as appropriate. Design must allow for HL-93 highway loading if located in the vicinity of a paved area.

B. Design shaft to withstand full hydrostatic head without failure. Design shaft with adequate factor of safety for full hydrostatic head.

C. Design shaft located withing 50-year flood plain with water retaining liner extending 2 feet above 50-year flood elevation. It is acceptable when liner is stored at site for immediate installation in lieu of it being installed at shaft, provided that shaft liner extends 2 feet above existing ground elevation

D. Design shaft cover for minimum 25 pounds per square foot distributed load plus 300-pound point load.

E. Design steel plate deck, if such is required, for HL-93 loading

3.4 LOCATION AND SIZE OF AUGER PITS

A. UPDATE SECTION TITLE TO READ. LOCATION AND SIZE OF AUGER PITS AND TUNNEL SHAFT DESIGN

3.5 LOCATION AND SIZE OF AUGER PITS AND TUNNEL SHAFT DESIGN

B. ADD THE FOLLOWING IN SECTION 3.4 LOCATION AND SIZE OF AUGER PITS AND TUNNEL SHAFT DESIGN

J. Contractor has sole responsibility for selection of tunnel shaft sites needed for construction operations unless otherwise indicated on Drawings. Location will be subject to the approval of the Project Manager.

K. Locate tunnel shaft and associated work areas to avoid blocking driveways and cross streets, and to minimize disruption to business and commercial interests. Avoid shaft locations near areas identified as residential or potentially contaminated.

L. Plan tunnel shaft locations to minimize interference with storm drainage channels, ditches, water lines, sanitary sewers, storm water sewers or culverts, which, when

damaged, could result in ground washout or flooding of shafts and tunnels.

3.6 TUNNEL SHAFT CINSTRUCTION

C. ADD IN SECTION 3.6 TUNNEL SHAFT CONSTRUCTION. SUBSEQUENT SECTIONS NUMBERS TO BE UPDATED ACCORDINGLY

A. Conform to the following for ground support systems:
Install liner elements, bracing and shoring structural members at locations and in method sequence and tolerances defined on shaft construction drawings as excavation progresses.

1. Ensure bracing and shoring are in contact with liner to provide full support as shown in shaft construction drawings. Evaluate and check modifications to liner, bracing and shoring. Obtain approval from Contractor's Professional Engineer and submit to Project Manager.

2. Install seal slab as soon as final depth and stable bottom conditions have been reached and accepted by Project Manager. Construct seal slab capable of withstanding full piezometric pressure, either by pressure relief using under drains, or in case of more permeable ground condition, by use of structural reinforced slab. Construct seal slab in accordance with design provided by Contractor's Professional Engineer.

3. Design and construct entire shaft to appropriate factors of safety against yield, deformation, or instability as determined by Contractor's Professional Engineer. Shaft must withstand full hydrostatic head without failure.

4. Special framing, bracing or shoring required around tunnel "eyes" or other penetrations shall be in-place according to shaft construction drawings before liner or any bracing or shoring at penetration is cut or removed.

5. Securely breast and shore face of starter or back tunnels to resist both soil and hydrostatic pressure.

6. When applicable, pressure grout voids or seepage paths around shafts and adjoining tunnels in accordance with Section 03005- Grout. Pressure grout bolted steel liner plates as they are installed, unless otherwise approved by Project Manager. Perform secondary or 'back grouting' as ground measurement, voids or deformation of shaft liner are detected.

B. Install suitable thrust or reaction blocks as required for pipe jacking equipment.

C. Provide drainage from shafts while work is in progress and until adjacent pipe joints have been sealed and shaft is backfilled.

D. Surface Water Control. Divert surface water runoff and discharge from dewatering system away from shaft. Protect shafts from infiltration or flooding.

E. Each surface work site is to be surrounded by security fence meeting requirements of Section 01070 - Temporary Facilities and Controls, which shall be secure any time site is unattended by Contractor's personnel.

F. Protect shaft, when not in use by second security fence at perimeter of shaft, or alternatively by cover designed in accordance with Section 1.8, Performance Requirements.

G. Provide portable concrete traffic barriers at locations where work site is situated adjacent to highway, road, driveway, or parking lot. Angle traffic barriers in direction of lane flow. Do not place perpendicular to on-coming traffic.

H. Provide and maintain traffic control system in accordance with provision of Section 01705 - Traffic Control and Regulation.

I. Cover shaft which is constructed more than 60 days in advance of its intended use by steel plate deck designed by Contractor's Professional Engineer and restore surface to permit full traffic flow during time shaft is not in use. Remove from site other material and equipment used by Contractor including portable concrete traffic barriers, traffic control system, fencing and reinstall at time shaft is re-opened for use.

J. Construct suitable guardrail barrier around periphery of shaft, meeting applicable safety standards. Properly maintain barrier throughout period shaft remains open. Repair broken boards, supports, and structural members. Provide ladder with safety cage, when required by OSHA, in each shaft. Provide security barrier for each access shaft in which there is no construction activity, or which is unattended by Contractor's personnel.

K. Size of Shafts: Make size adequate for construction of permanent structures indicated on Drawings and to provide adequate room to meet operational requirements for tunnel construction and backfill.

END OF SPECIAL PROVISION

SECTION 02273

TUNNEL SHAFTS

PART 1: GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Construction, maintenance, and backfilling requirements of tunnel shafts.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
   1. Tunnel shafts, both those shown on Drawings and those additional ones needed for Contractor's operations, are bid as lump sum for all shafts, collectively. Prior to construction, provide schedule of valves. Itemize cost by station for each shaft designated on Drawings and additionally required for construction operations. 75% of itemized amount will be submitted on pay estimate upon shaft installation; 25% will be submitted on pay estimate upon backfill and site restoration (including topsoil, sodding and hydro-mulching). Payment will include excavation, disposal of excavated materials, ground support systems, backfilling, and cleanup. Manholes constructed in tunnel shafts are to be paid separately at contract unit price.
   2. Removal and replacement of surface improvements necessary for shaft construction, including but not limited to sidewalks, asphaltic or concrete pavement, base and subbase, curbs, curb and gutter, driveways, topsoil, sodding, and hydro-mulch shall be included in lump sum for tunnel shafts.
   3. Pay for relocation of City-owned utilities at contract unit price, only when included Section 00145 – Unit Price Bid Form.
   4. If Contractor’s alternative construction method or alignment is approved by the City, the Contractor shall resubmit the schedule of values per the alternative alignment for approval. Itemize cost by station for each shaft designated on the revised plan and any additional shaft required for construction operations.

B. Stipulated Price (Lump Sum).
   1. If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

C. Unit Prices for Water Main Projects.
   1. Payment will be made for construction of tunnel shafts and related work on a lump sum basis only if included on Section 00145 – Unit Price Bid Form. If work is not included on Section 00145 – Unit Price Bid Form, include the cost for construction of tunnel shafts in unit price for related items.
   2. Unless otherwise shown on Drawings removal and replacement of surfaces necessary for shaft construction, including but NOT limited to sidewalks, asphaltic and correct pavement, base and subbase shall be paid to limits no further than 5 feet from shaft wall.

1.3 REFERENCES

A. AASHTO – American Association of State Highway and Transportation Officials:
   1. AASHTO LRFD Bridge Design Specifications, current edition.

1.4 SUBMITTALS

A. Conform to requirements of Section 01000 – Submittal Procedures.
B. Shaft design submittals by Contractor shall be signed and sealed by Professional Engineer registered in State of Texas. If trench box is used in tunnel shaft and such utilization is in a manner other than what is indicated and certified in manufacturer's technical data, submit trench box manufacturer certification of proposed usage.
C. Submit shaft construction drawings and seal slabs. Clearly indicate allowable surcharge loads and restrictions on surcharge capacity, including live loads, on shaft construction drawings. Indicate thrust blocks or other reactions required for pipe jacking, when applicable.
   1. Location of shafts by station and limits of working sites.
   2. Description of site security arrangements in conformance with Paragraph 3.03, Shaft Construction.
   3. Description of method of extending shaft above flood level in conformance with Paragraph 3.03, Shaft Construction.
   4. Any geotechnical / boring undertaken by Contractor for whatever purpose connected to Work.
D. Shaft Monitoring Plan:
   1. Submit for review prior to construction, shaft monitoring plan that includes schedule of instrumentation design, layout of instrumentation parts, equipment installation details, manufacturer's catalog literature, and monitoring report forms.
E. Structures Assessment:
   1. Provide preconstruction and post-construction assessment reports for critical structures located within radius of shaft center equal to shaft depth plus shaft radius, measured in plan. Include photographs or video of any existing damage to structures in vicinity of shafts in assessment reports.
F. Submit shaft surface settlement monitoring plan for review prior to construction. Identify location of settlement monitoring points, reference benchmarks, survey frequency and procedures, and reporting formats on plan.
G. Submit readings of monitoring plans to Project Manager as soon as readings have been taken.
H. Submit shaft temporary deck drawings and calculations to Project Manager, signed and sealed by Contractor's Professional Engineer in event that shaft is not needed for immediate construction activity, in conformance with Paragraph 3.03, Shaft Construction.

1.5 PERFORMANCE REQUIREMENTS

A. Shaft design must include allowance for contractor's equipment and stored material and spoil stockpile as appropriate. Design must also allow for HL-93 highway loading if located in the vicinity of a paved area.
B. Design shaft to withstand full hydrostatic head without failure. Design shaft with adequate factor of safety for full hydrostatic head.

C. Design shaft located within 50-year flood plain with water retaining liner extending 2 feet above 50-year flood elevation. It is acceptable when liner is stored at site for immediate installation in lieu of it being installed at shaft, provided that shaft liner extends at least 2 feet above existing ground elevation.
D. Design shaft cover for minimum 25 psf distributed load plus 300-pound point load.
E. Design steel plate deck, if such is required, for HL-93 loading.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 LOCATION OF ACCESS SHAFTS
A. Contractor has sole responsibility for selection of shaft sites needed for construction operations unless otherwise indicated on Drawings. Location will be subject to the approval of the Project Manager.
B. Locate shafts and associated work areas to avoid blocking driveways and cross streets, and to minimize disruption to business and commercial interests. Avoid shaft locations near areas identified as residential or potentially contaminated.
C. Plan shaft locations to minimize interference with storm drainage channels, ditches, water lines, sanitary sewers, storm water sewers or culverts, which, when damaged, could result in ground washout or flooding of shafts and tunnels.

3.2 UTILITY RELOCATION
A. Relocate utilities as shown on Drawings. Utility relocations required by Contractor for shaft construction shall consider zone of potential settlement in vicinity of shaft.
B. Obtain approval from Project Manager for permanent relocations prior to relocating.

3.3 SHAFT CONSTRUCTION
A. Ground Support Systems:
1. Install liner elements, bracing and shoring structural members at locations and in method sequence and tolerances defined on shaft construction drawings as excavation progresses.
2. Make sure bracing and shoring are in contact with liner to provide full support as shown in shaft construction drawings. Evaluate and check modifications to liner, bracing and shoring. Obtain approval from Contractor's Professional Engineer and submit to Project Manager.
3. Install seal slab as soon as final depth and stable bottom conditions have been reached and accepted by Project Manager. Construct seal slab capable of withstanding full piezometric pressure, either by pressure relief using under drains, or in case of more permeable ground condition, by use of structural reinforced slab. Construct seal slab in accordance with design provided by Contractor's Professional Engineer.
4. Design and construct entire shaft to appropriate factors of safety against yield, deformation, or instability as determined by Contractor's Professional Engineer. Shaft must withstand full hydrostatic head without failure.

5. Special framing, bracing or shoring required around tunnel "eyes" or other penetrations shall be in-place according to shaft construction drawings before liner or any bracing or shoring at penetration is cut or removed.
6. Securely breast and shore face of starter or back tunnels to resist both soil and hydrostatic pressure.
7. When applicable, pressure grout voids or seepage paths around shafts and adjoining tunnels in accordance with Section 03005 – Grout. Pressure grout bolted steel liner plates as they are installed, unless otherwise approved by Project Manager. Perform secondary or 'back grouting' as ground measurement, voids or deformation of shaft liner are detected.

B. Install suitable thrust or reaction blocks as required for pipe jacking equipment.
C. Provide drainage from shafts while work is in progress and until adjacent pipe joints have been sealed and shaft is backfilled.
D. Surface Water Control:
   1. Divert surface water runoff and discharge from dewatering system away from shaft. Protect shafts from infiltration or flooding.
E. Each surface work site is to be surrounded by security fence meeting requirements of Section 01070 – Temporary Facilities and Controls, which shall be secure any time site is unattended by Contractor's personnel.
F. Protect shaft, when not in use by second security fence at perimeter of shaft, or alternatively by cover designed in accordance with Paragraph 1.04, Performance Requirements.
G. Provide portable concrete traffic barriers at locations where work site is situated adjacent to highway, road, driveway, or parking lot. Angle traffic barriers in direction of lane flow. DO NOT place perpendicular to oncoming traffic.
H. Provide and maintain traffic control system in accordance with provision of Section 01705 – Traffic Control and Regulation.
I. Cover shaft which is constructed more than 60 days in advance of its intended use by steel plate deck designed by Contractor's Professional Engineer, and restore surface to permit full traffic flow during time shaft is not in use. Remove from site other material and equipment used by Contractor including portable concrete traffic barriers, traffic control system, fencing and reinstall at time shaft is reopened for use.
J. Construct suitable guardrail barrier around periphery of shaft, meeting applicable safety standards. Properly maintain barrier throughout period shaft remains open. Repair broken boards, supports, and structural members. Provide ladder with safety cage, when required by OSHA, in each shaft. Provide security barrier for each access shaft in which there is no construction activity or which is unattended by Contractor's personnel.
K. Size of Shafts:
   1. Make size adequate for construction of permanent structures indicated on Drawings and to provide adequate room to meet operational requirements for tunnel construction and backfill.

3.4 BACKFILL

A. Provide cement-stabilized sand to minimum depth of 10 feet above crown of sanitary sewer, but where shaft is in paved area, cement-stabilized sand shall be used to within one foot of pavement subgrade elevation. Provide cement-stabilized sand in

accordance with Section 02145 – Cement-Stabilized Sand. Compact cement-stabilized sand in accordance with Section 02125 – Excavation and Backfill for Utilities. In locations where backfill is not subject to traffic loading, depth above initial cement-stabilized sand may be backfilled with select backfill in accordance with Section 02120 – Excavation and Backfill of Structures. When insufficient work space exists, Grout manhole or structure annular space in accordance with Section 03005 – Grout.

B. Remove shaft liner above level of 8 feet below ground surface, unless otherwise indicated on Drawings. Maintain sufficient ground support to meet excavation safety requirements while removing shaft structure.

3.5 MONITORING

A. Monitoring Instrumentation:
   1. Instrumentation specified and readings shall always be accessible to Project Manager.
   2. Install and maintain instrumentation system to monitor and detect movement of ground surface and adjacent structures. Establish vertical survey control points at distance from construction area that avoids disturbance due to ground settlement.
   3. Project Manager may through independent contractor or consultant, from installing instrumentation in, on, near, or adjacent to construction work. Provide access to work for such independent installations.
   4. Install instruments in accordance with Drawings and manufacturer's recommendations.

B. Surface Settlement Monitoring:
   1. Establish monitoring points on all critical structures.
   2. Record location of settlement monitoring points with respect to construction baselines and elevations. Record elevations to an accuracy of 0.01 feet for each monitoring point location. Establish monitoring points at locations and by methods that protect them from damage by construction operations, tampering, or other external influences.
   3. Monitoring points to measure ground elevation are required at distance of 10 feet and 20 feet from perimeter of shaft on each of four radial lines, at 90 degrees to each other.
   4. Railroads:
      a. Monitor ground settlement of track subbase at centerline of each track when within zone of potential settlement.

C. Reading Frequency and Reporting:
   1. Submit to Project Manager, records of readings from various instruments and survey points.
   2. Record all shaft monitoring readings at least once per week starting prior to shaft construction and continuing until shaft has been backfilled and until no more detectable movement occurs.
   3. Immediately report to Project Manager any movement, cracking, or settlement which is detected.

4. Following substantial completion but prior to final completion, make final survey of all shaft related monitoring points.

END OF SECTION

SECTION 02274

JACK AND BORE/JACK AND MINE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing and installation of pipes by Jack and Bore, Jack and Mine or Pilot Tube Guided Boring.

1.02 RELATED SECTIONS

A. Section 01000 – Submittal Procedures

B. Section 01040 - Control of Ground and Surface Water

C. Section 02273 – Tunnel Shafts

D. Section 02400 – Water Lines

E. Section 02275 – Water Line in Tunnels

F. Section 02245 – Reinforced Concrete Pipe

1.03 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be paid for water lines in tunnel under this Section. Refer to Section 02400 – Water Lines or Section 02275 – Water Line in Tunnel for measurement and payment.

B. Stipulated Price (Lump Sum): If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.04 REFERENCE STANDARDS

A. American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering.

B. American Association of State Highway and Transportation Officials (AASHTO).

C. ASTM A 36 – Standard Specification for Carbon Structural Steel

D. ASTM A 139 – Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)

E. ASTM A 515 – Standard Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate and Higher Temperature Service

F. ASTM A 572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

G. ASTM A 1097 – Standard Specification for Steel Casing Pipe, Electric-Fusion (Arc)-Welded (Outside Diameter of 10 in. and Larger)

H. AWWA C200 – Steel Water Pipe-6 in. and Larger

I. National Electrical Code - (NFPA 70).

J. NSF/ANSI 60 – Drinking Water Chemicals – Health Effects

K. Occupational Safety and Health Administration (OSHA).

1.05 DEFINITIONS

A. Critical Structure: Buildings, structures, bridges, piers, or similar construction partially or entirely located within Zone of Active Excavation, or otherwise identified in Drawings.

B. Jack and Bore: Pipe or casing is installed by jacking process with system that has limited steering capability and does not have continuous face support. Excavation is performed using open face auger.

C. Jack and Mine: Pipe or casing is installed by jacking it into place from jacking shaft to receiving shaft, using hydraulic jacks while excavation takes place at the face by hand mining or mechanical excavation.

D. Jacking Pipe: Pipe or casing installed by jacking process and that is capable of carrying installation jacking loads in addition to normal pipe loads.

E. Pilot Tube Guided Boring: Multi-stage method of installing pipe or casing to line and grade by use of guided pilot tube and followed by enlargement to install pipe or casing.

F. Work Plan: Written description together with supporting documentation that defines plans and procedures for tunneling operations.

G. Zone of Active Excavation: Area located within the radial distance centered about surface point immediately above the face of excavation and with radius equal to depth from ground surface to bottom of excavation, or as otherwise indicated in Drawings.

1.06 SUBMITTALS

A. Conform to requirements of Section 01000 - Submittal Procedures.

B. The following submittals are required:

1. Work Plan: Written description together with supporting documentation that

defines plans and procedures for tunneling operations. Description should be sufficient to convey the following:

a. Proposed method of pipe or casing installation and type of face support.

b. Installation of jacking or boring supports or back stop. Installation of pipe jack or Pilot Tube Guided Boring thrust block.

c. Jack and Bore system manufacturer's literature describing equipment and proposed jacking system including machine:

(1) Dimensions

(2) Weight

(3) Power and torque capabilities

(4) Arrangement and position of jacks and pipe guides

(5) Cutterhead configuration details including cutterhead teeth

(6) Mucking system

(7) Auger size

d. Type of lighting and description of ventilation systems when person entry is required.

e. Pilot Tube Guided Boring tooling and reaming equipment.

f. System of alignment monitoring and steering control and activation.

g. Number and duration of shifts planned to be worked each day.

h. Sequence of operations.

i. Locations of boring and receiving shafts.

j. Method of spoil transportation from face, surface storage and disposal location.

k. Jacking mechanism including maximum jacking capacity.

l. Jacking force monitoring and recording details.

m. Capacity of jacking equipment and type of cushioning. Anticipated jacking forces for each drive. Safe jacking capacity of Jacking Pipe.

n. Identify critical utility crossings and special precautions proposed.

o. Description and details of any temporary underground facility

proposed for operation including lights, sump pits, and mud slabs.

p. If a thrust block is used, thrust block design calculations and safe capacity.

q. Calibration table correlating jacking pressure gage readings and applied load in tons.

r. Provisions for injecting slurry for Pilot Tube Guided Boring. Slurry mix design, volume and measurement procedures, pumps, piping, valve arrangements, and pressure gages.

s. Provisions for injecting pipe lubricants. Pipe jacking lubricant mix design, including lubricant type, injection volume and measurement procedures, pumps, piping, valve arrangements, and pressure gages.

2. Drawings and Calculations.

a. Submit drawings and calculations for tunnel support system. Provide adequate drawings and installation details for construction. Shop Drawings shall identify proposed Jack and Bore, Jack and Mine or Pilot Tube Guided Boring method complete in assembled position including locations of equipment, staging, and storage areas, and emergency access around the construction operations. Drawings shall show pipe seals, pipe joint, collars, cushioning materials, and reinforcing details. Calculations shall include clear statement of criteria used for design as described in Article 1.07.A, Design Requirements.

b. Drawings for hydraulic jacking system, including hydraulic jack configuration and frame dimensions.

c. Provide signed and sealed by a Professional Engineer registered in the State of Texas the following calculations:

(1) Confirming maximum allowable loads on pipe will not be exceeded by maximum jacking capacity of the jacking system during Jack and Bore, Jack and Mine, or Pilot Tube Guided Boring operations.

(2) Demonstrate pipe selected has been designed to support maximum anticipated earth loads and superimposed live loads, both static and dynamic, which may be imposed on pipe and additional stresses imposed on pipe during jacking operations.

(3) Showing maximum expected jacking loads and confirm these are not greater than maximum jacking capacity of jacking system. Calculations should indicate if lubrication is being accounted for.

(4) Demonstrating that the jacking shaft and backstop arrangement

can safely accommodate the maximum calculated jacking load without excessive or detrimental movement.

3. Personnel – Submit for record purposes, résumés for project manager, field superintendent and tunneling machine operators.

   a. Experience: Minimum of 3 previous successful pipe-jacked tunnel installations of similar size and scope.

   b. Detailed descriptions of pipe-jacked tunnel projects.

4. Quality Control: Description of quality control methods including:

   a. Method and frequency of survey control.

   b. Example of daily report.

5. Geotechnical Investigation: When geotechnical investigations are conducted, submit results to the Project Manager for record purposes.

6. Monitoring Plans:

   a. Instrumentation Monitoring Plan: Submit for review, prior to construction, monitoring plan that includes schedule of instrumentation design, layout of instrumentation points, equipment installation details, manufacturer's catalog literature, and monitoring report forms.

   b. Surface Settlement Monitoring Plan. Submit surface settlement monitoring plan for review prior to construction. Plan shall identify the location of settlement monitoring points, reference benchmarks, survey frequency and procedures, and reporting formats.

7. Structures Assessment. Provide preconstruction and post construction assessment reports for Critical Structures (including photographs or video).

8. Monitoring readings shall be submitted to Project Manager at the frequency indicated in Article 3.07.C.2.

9. Daily Reports: Maintain a shift log as defined in Article 3.04 - Tunneling Data and make available to Project Manager on request.

1.07 SYSTEM DESCRIPTION

A. Design Requirements.

1. Assume responsibility for selection of appropriate pipe and pipe joints to carry thrust of any jacking forces or other construction loads in combination with overburden, earth and hydrostatic loads. Design of pipe indicated on Drawings considers in-place loads only and does not take into account any construction loads. Criteria for longitudinal loading (jacking forces) on pipe and joints shall

be determined, based on selected method of construction.

2. Jacking Pipe shall be designed to withstand thrust without damage or distortion. Configure main jacking frame so thrust is uniformly distributed and will not damage or distort pipe.

3. Take into account loads from handling and storing.

4. Criteria to be used at railroad crossings shall be Cooper E-80 locomotive loading distributions in accordance with AREMA specifications for culverts. Account for additive loadings due to multiple tracks.

5. Criteria for non-railroad crossings to be in accordance with the AASHTO LRFD Bridge Design Specification.

6. Provide pipes and casing of diameter shown on Drawings. Substitution of pipe with larger diameter to suit equipment availability for water lines will only be permitted if demonstrated to satisfaction of the Project Manager that design flows and velocities can be achieved.

PART 2 PRODUCTS

2.01 JACKING PIPE

A. Pipe joints shall be flush with outside pipe face when pipes are assembled. Pipe materials shall be as indicated on Drawings or selected from the following if not indicated on the Drawings:

1. Steel casing pipe: Provide new, uncoated steel pipe manufactured in AWWA C200 for water line applications. Joints may be field-welded butt joints or interlocking joints and shall be watertight.

a. For field-welded butt-joint casing, manufacture in accordance with ASTM A139 Grade E, or ASTM A572 Grade 50. Provide full circumferential welds at butt joints.

b. For steel casing pipe with interlocking joints, provide in accordance with the following:

(1) Provide ASTM A36, ASTM A515, Grade 60, or ASTM A572, Grade 42 for pipe, and provide minimum ASTM A36 for connections.

(2) Maintain pipe roundness to within 1 percent of specified diameter.

(3) Maintain outside circumference to within 1% of nominal specified circumference, or 3/4 inches, minimum.

(4) Maintain wall thickness to within 5% of specified thickness.

(5) Provide rolled and welded cylinder method utilizing the double submerged arc welding (DSAW) process in sections not less than 8 feet long, except as needed to achieve the final finished length of pipe.

(6) Provide complete penetration butt-welded connectors square to ends of pipe sections.

(7) Perform welding in accordance with ANSI/AWS D1.1.

(8) Examine connections at time of shipment. Reject sections with defects.

(9) Mark all sections with manufacturer's name, job number, customer name, outside diameter, wall thickness, and weight per foot.

(10) Ship pipe with protective wax coating over machined surfaces.

(11) Provide Permalok joints or approved equal.

c. Design stress in pipe wall shall be 50 percent of minimum yield point of steel or 18,000 psi, whichever is less when subjected to loading conditions.

d. Design deflection to be used in determining wall thickness shall not exceed 3 percent of nominal casing pipe size.

e. Bedding constant to be used in determining wall thickness shall be 0.10. Lag factors shall be 1.0 for all live loads.

f. Casing pipe design shall also include stresses due to jacking forces when pipe is to be installed by jacking method.

B. Use pipe that is round with smooth, even outer surface, and has joints that allow for easy connections between pipes. Design pipe ends so jacking loads are evenly distributed around entire pipe joint and point loads will not occur when pipe is installed. Jacking Pipe shall be capable of withstanding all forces imposed by process of installation, as well as final in-place loading conditions. Protect driving ends of pipe and joints against damage.

2.02 ANNULAR SPACE LUBRICATION

A. Lubricants shall be NSF 60 approved.

B. Water used for pipe lubrication shall be clean, fresh, and free from oil, organic matter, or other deleterious matter and of neutral pH.

2.03 WATER

A. Water used in slurry, lubricant, and grout shall be obtained from potable water source.

Soda ash or accepted equal, with submittal of Safety Data Sheet (SDS), shall be used to adjust pH of water as required in mix design.

PART 3 EXECUTION

3.01 CONSTRUCTION OPERATIONS CRITERIA

A. Use methods that minimize ground settlement. Select method that controls flow of water and prevents loss of soil into tunnel and provides stability of face under anticipated conditions.

B. For Jack and Bore, at minimum use a level manometer (dutch level) for guidance. Free boring is not an acceptable method.

C. For Jack and Mine, use surveying or other means for guidance.

D. Pilot Tube Guided Boring system shall utilize a two or three phase system as described below:

1. Three Pass System.

a. Phase 1 – Rigid steel pilot tube in approximately 3-foot lengths shall be installed through ground from boring shaft to receiving shaft by earth displacement with jacking frame. Alignment of pilot tube shall be established with theodolite mounted at rear of boring shaft and set to desired line and grade. Theodolite shall view lighted target in lead or steering pilot tube. Camera shall be fitted to theodolite and transmit image of crosshair and target onto monitor screen to be viewed in boring shaft by operator. As operator advances pilot tube through ground, center of target will drift from crosshair as a result of biased or slanted leading tip of the pilot tube. Operator shall rotate pilot tube as required to orient slanted steering tip toward crosshair and continue to advance pilot tube until it reaches receiving shaft. Check line and grade of bore at the receiving shaft.

b. Phase 2 – An enlargement casing with an outside diameter up to 1 ½" larger than Jacking Pipe shall be rigidly connected to final pilot tube and advanced into earth behind pilot tube. Auger shall be used inside enlargement casing to remove material being excavated. Auger shall be contained inside limits of enlargement casing as it progresses along proposed alignment. A train of temporary steel casings with an outside diameter very similar to the enlargement casing shall be used to move enlargement casing from the boring shaft to receiving shaft. Enlargement casing will cut bore hole from boring shaft to receiving shaft and temporary casings will case hole as it is cut. Fit each temporary casing with internal auger to transport excavated material to boring shaft to be removed from shaft and disposed at an approved location. Recover pilot tubes in receiving shaft as temporary casings are installed.

c. Phase 3 – Jacking Pipe shall be installed directly behind final temporary casing pipe with jacking frame. Casing pipes and augers shall be recovered in receiving shaft as Jacking Pipe is installed.

2. Two Pass System.

a. Phase 1 – Install pilot tube in same manner described in Phase 1 of Three Pass System.

b. Phase 2 – Install enlargement casing in same manner described in Phase 2 of Three Phase System. Fit each Jacking Pipe with internal protective-casing pipe to house auger and prevent damage to Jacking Pipe. Install Jacking Pipe directly behind enlargement casing with internal casing rigidly connected to auger chamber of enlargement casing. Manufacture internal casing such that excavated material does not leak excessively into Jacking Pipe. Fit internal casing with protective shoe to protect Jacking Pipe from damage and to support casing and auger at centerline of pipe. Advance Jacking Pipe along proposed alignment with jacking frame thus progressing enlargement casing from boring shaft to receiving shaft with pilot tubes being recovered in receiving shaft. Excavated material shall be funneled into and conveyed through internal casing to boring shaft where it shall be removed from shaft and disposed at approved location. Upon reaching receiving shaft remove enlargement casing and internal casings and augers retracted and recovered at boring shaft.

E. Conduct operations in accordance with applicable safety rules and regulations, OSHA standards, and Contractor's safety plan. Use methods which include due regard for safety of workmen, adjacent structures, utilities, and public and safe means of ingress and egress.

F. Maintain clean working conditions wherever there is man access.

G. Perform installation to avoid interference with operation of railroads, highways, or streets, except as approved by owner of facility.

3.02 GROUND WATER CONTROL

A. Provide ground water control measures in conformance with Section 01040 - Control of Ground and Surface Water, when necessary to perform Work.

3.03 EQUIPMENT

A. Assume responsibility for selection of equipment which, based on past experience, has proven to be satisfactory for excavation of soils to be encountered.

B. Employ equipment that will be capable of handling various anticipated ground conditions and is capable of minimizing loss of soil and shall provide satisfactory support of excavated face.

C. Tunnel Shield. If hand shield is used for Jack and Mine (with or without attached

mechanized excavating equipment), shield must be capable of handling various anticipated ground conditions. In addition, shield shall:

1. Conform to shape of tunnel with uniform perimeter that is free of projections that could produce over-excavation or voids. Appropriately sized overcutting bead may be provided to facilitate steering.

2. Be designed to allow face of tunnel to be closed by use of gates or breasting boards without loss of ground.

D. The following are minimum requirements for Pilot Tube Guided Boring:

1. Line and Grade Control System: Control system shall include but not be limited to a theodolite, lighted target, camera, and monitor screen. The equipment must be capable of installing the pipe to the desired line and grade.

2. Jacking Frame: The jacking frame shall possess adequate strength to advance the pilot tube, the enlargement casing and the string of Jacking Pipe from the boring shaft to the receiving shaft. The jacking force shall be easily regulated down to the safe working load rating of the Jacking Pipe. The frame shall develop a uniform distribution of jacking forces on the end of the pipe. The auger motor shall possess adequate torque to steer the pilot tube and adequate torque and speed to effectively auger the excavated material from the face of the bore to the boring shaft.

3. Pilot Tube: The pilot tubes shall be constructed of steel in rigid but short sections to accommodate the boring and receiving shafts. The tubes shall rigidly connect to each other, the steering tip and the enlargement casing and have a clear inside diameter large enough to adequately view the lighted target. The tubes shall withstand the torque encountered in the steering process.

4. Enlargement Casing: The enlargement casing shall be constructed of steel to a diameter just larger than the Jacking Pipe and have a leading connection compatible with the pilot tube. The leading face of the enlargement casing shall possess several large openings for the soil to enter as it advances along the proposed alignment. An internal auger chamber shall funnel the excavated material into the temporary full diameter casings of the Three-Phase Process or into the internal auger casings of the Two-Phase Process. Structural members shall connect the leading edge of the casing to the pilot tube connections.

5. Soil Transportation System: The soil transportation system shall consist of an auger train operating inside the full diameter temporary steel casing of the Three-Phase System and an internal casing and auger train operating inside the Jacking Pipe. The internal casings of the Two-Phase Process shall be manufactured to minimize leakage of the excavated material into the Jacking Pipe.

6. Soil Removal: A soil removal system shall be provided to safely remove the

excavated material from the boring shaft to the surface.

7. Hydraulic Power Unit: The hydraulic power unit shall rest on the surface and be connected to the jacking frame by hoses

8. Lubrication System: A lubrication system shall be employed to minimize pipe friction to ensure that pipe can be installed from the boring shaft to the receiving shaft within the shaft working load rating of the Jacking Pipe. The system may also be required to minimize the torque required to transport the excavated material to the boring shaft.

E. Jacking Equipment: Provide jacking system with the following features:

1. Has main jacks mounted in jacking frame located in boring shaft. Jacks shall have individual actuation, synchronized actuation, and maximum thrust control. Jacks shall not exert forces when idle but shall resist displacements.

2. Control gauges shall be accessible to allow the Project Manager's representative to check readings during excavation.

3. The maximum thrust on the jacked pipe shall not exceed the safe jacking capacity of the pipe at any point or time.

4. Has jacking frame which successively pushes a string of connected pipes following tunneling excavation equipment towards the receiving shaft.

5. Has sufficient jacking capacity to push the tunneling excavation equipment and string of pipe through ground.

6. Has capacity at least 20 percent greater than calculated maximum jacking load.

7. Develops uniform distribution of jacking forces on end of pipe by use of spreader rings and packing.

8. Provides and maintains pipe lubrication system at all times to lower friction developed on surface of pipe during jacking.

9. Jack Thrust Reactions: Use reaction/thrust walls for pipe jacking that are adequate to support jacking pressure developed by main jacking system. Special care shall be taken when setting pipe guide rails in jacking shaft to ensure correctness of alignment, grade, and stability.

F. Air Quality: Provide equipment to maintain proper air quality of manned tunnel operations during construction in accordance with OSHA requirements.

G. Where used, enclose lighting fixtures in watertight enclosures with suitable guards. Provide separate circuits for lighting, and other equipment.

H. Electrical systems shall conform to requirements of National Electrical Code - NFPA70.

3.04 TUNNELING DATA

A. Maintain shift logs of construction events and observations. Project Manager shall have continuous access to all logs containing the following required information:

1. Location of bore face by station and progress during shift.

2. Hours worked per shift on tunneling operations.

3. Completed field forms, such as steering control logs, for checking line and grade of tunneling operation, showing achieved tolerance relative to design alignment.

4. Maximum jacking pressures per drive.

5. Lubricant pressures and estimated quantities.

6. Ground water control operations and piezometric levels.

7. Observation of any lost ground or other ground movement.

8. Any unusual conditions or events.

9. Reasons for operational shutdown in the event a drive is halted or stopped.

3.05 EXCAVATION AND JACKING OF PIPE

A. Excavate material just ahead of Jacking Pipe and remove material through Jacking Pipe as it is forced through ground by jacking, into the space thus provided. In general, excavated material shall be removed as jacking progresses and no accumulation of excavated material within Jacking Pipe will be permitted. Should appreciable loss of ground occur in installations where face of excavation is accessible, voids shall be backpacked promptly to the extent practicable with approved soil cement.

B. The distance that excavation shall extend beyond end of Jacking Pipe depends on character of material encountered but shall not exceed 2 feet.

C. Boring for Jack and Bore and Pilot Tube Guided Boring.

1. Boring shall proceed from shaft provided for boring equipment and workers. Boring shall be done mechanically using either a pilot tube or auger method.

2. For auger method, jacking pipe of appropriate diameter equipped with cutter head to mechanically perform excavation shall be used. Augers shall be of sufficient diameter to convey excavated material to shaft.

3. Remove excavated material from shaft and dispose of properly. Use of water or other fluids in connection with boring operation will be permitted only to the extent needed to lubricate cuttings. Water jetting will not be permitted.

D. Excavation for Jack and Mine.

1. Perform excavation operations in a manner to minimize movement of ground in front of and surrounding tunnel. Prevent damage to structures and utilities above and in vicinity of tunneling operations.

2. Keep face breasted or otherwise supported to prevent falls, excessive raveling, or erosion. Maintain standby face supports for immediate use when needed.

3. During shut-down periods, support face of excavation by positive means; no support shall rely solely on hydraulic pressure.

E. Assume responsibility for damage due to settlement from any construction-induced activities.

F. Jacking Operation.

1. Provide a suitable jacking frame or backstop.

2. Set pipe to be jacked on guides properly braced together, to support section of pipe and to direct proper line and grade. Place complete jacking assembly to line up with direction and grade of pipe.

3. Cushion pipe joints as necessary to transmit jacking forces without damage to pipe or pipe joints, in accordance with pipe manufacturer's recommendations. For plywood cushioning material, use ½-inch minimum thickness for pipe diameter 30 inches or less and use ¾-inch minimum thickness for pipe diameter greater than 30 inches.

4. Maintain envelope of bentonite slurry around exterior of pipe during jacking and excavation operation to reduce exterior friction and possibility of pipe seizing in place.

5. If a recovery access shaft is needed, obtain approval from Project Manager prior to excavation. Coordinate traffic control measures and utility adjustments as necessary prior to commencing work.

6. If a section of pipe is damaged during jacking operation, or joint failure occurs, as evidenced by inspection, visible ground water inflow or other observations, submit for approval methods for repair or replacement of pipe. Proposed repair methods shall follow pipe manufacturer's recommendations.

3.06 CONTROL OF LINE AND GRADE

A. Construction Control.

1. Project Manager will establish baselines and benchmarks indicated on Drawings. Check baselines and benchmarks at beginning of Work and report any errors or discrepancies to Project Manager.

2. Use baselines and benchmarks established by Project Manager to establish and maintain construction control points, reference lines and grades for locating tunnel, pipe, and structures.

3. Establish construction control points sufficiently far from work so as not to be affected by ground movement caused by pipe-jacked tunneling operations.

B. Benchmark Movement: If settlement of ground surface occurs during construction which affects accuracy of temporary benchmarks, detect and report such movement and reestablish temporary benchmarks. Locations of permanent City of Houston monumentation benchmarks are indicated on Drawings. Advise Project Manager of any settlement affecting permanent monumentation benchmarks.

C. Guidance System and Alignment Control for Jack and Mine and Jack and Bore.

1. A laser guidance system shall be used to determine location at front of jacked pipe relative to laser.

2. Guidance system shall include target to indicate deviations in line and grade.

3. Equip system with means by which Project Manager can verify casing alignment and grade, such as access to laser guidance system.

4. Initial alignment of equipment and final alignment shall be documented.

D. Line and Grade.

1. Check and record alignment for tunnel against above-ground undisturbed reference after installation of each Jacking Pipe.

2. Record exact face location after each shove to ensure alignment is within specified tolerances. Make immediate correction to alignment before allowable tolerances are exceeded.

3. If it is determined that pipe cannot be used, pipe installed outside tolerances shall be fully grouted and abandoned.

3.07 MONITORING

A. Instrumentation Monitoring: Instrumentation requirements are shown on Drawings. Instrumentation specified shall be accessible at all times to Project Manager.

1. Install and maintain instrumentation system to monitor and detect movement of ground surface and adjacent structures. Establish vertical control points at a distance from construction areas that avoids disturbance due to ground settlement.

2. Installation of instrumentation shall not preclude Project Manager, through independent contractor or consultant, from installing instrumentation in, on, near, or adjacent to construction work. Access shall be provided to work for such independent installations.

3. Instruments shall be installed in accordance with Drawings and manufacturer's recommendations.

B. Surface Settlement Monitoring.

1. Establish monitoring points on all Critical Structures.

2. Record location of settlement monitoring points with respect to construction baselines and elevations. Record elevations to accuracy of 0.01 feet for each monitoring point location. Monitoring points should be established at locations and by methods that protect them from damage by construction operations, tampering, or other external influences.

3. Ground surface elevations shall be recorded on centerline ahead of tunneling operations at minimum of 100-foot intervals or at least three locations per tunnel drive. For Jacking Pipe greater than 60-inch diameter, also record similar data at approximately 20 feet each side of centerline. Settlement monitoring points must be clearly marked by studs or paint for ease of locating.

4. Railroads: Monitor ground settlement of track subbase at centerline of each track. Follow American Railway Engineering and Maintenance-of-Way Association (AREMA) crossing requirements.

5. Utilities and Pipelines: Monitor ground settlement directly above and at least 10 feet or two excavation diameters, whichever is greater, before and after utility or pipeline intersection as shown on the Drawings.

C. Reading Frequency and Reporting: Submit to Project Manager records of readings from various instruments and survey points.

1. Readings shall be taken:

a. Prior to Zone of Active Excavation reaching that point.

b. When tunnel face reaches monitoring point (in plan).

c. When Zone of Active Excavation has passed, and no further movement is detected.

2. All monitoring readings shall be submitted daily to Project Manager.

3. Immediately report to Project Manager any movement, cracking, or settlement which is detected.

4. Following substantial completion but prior to final completion, make final survey of remaining monitoring points and submit to Project Manager.

END OF SECTION

SECTION 02280
TRENCH SAFETY SYSTEMS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Trench safety system for the construction of trench excavations.
- B. Trench safety system for structural excavations which fall under provisions of State and Federal trench safety laws.

1.2 MEASUREMENT AND PAYMENT
- A. UNIT PRICES:
  1. Measurement for trench safety systems used on trench excavations is on a linear foot basis measured along the centerline of the trench, including manholes and other line structures.
  2. No payment will be made for trench safety systems for structural excavations under this section. Include payment for trench safety system in applicable structure installation sections.
  3. Refer to Section 01270 - Measurement and payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 DEFINITIONS
- A. A trench shall be defined as a narrow excavation (in relation to its depth) made below the surface of the ground at a minimum of five feet (5 Ft) in depth. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than fifteen feet (15 Ft).
- B. The trench safety system requirements shall apply to larger open excavations if the erection of structures or other installations limits the space between the excavation slope and these installations to dimensions equivalent of a trench as defined.
- C. Trench Safety Systems include, but are not limited to, sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or diversion of water to provide adequate drainage.

1.4 SUBMITTALS
- A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit a safety program specifically for the construction of trench excavation. Design the trench safety program to be in accordance with OSHA 29CFR standards governing the presence and activities of individuals working in and around trench excavations.

C. Construction and shop drawings containing deviations from OSHA standards or special designs shall be sealed by a Professional Engineer licensed by the State of Texas retained and paid by the Contractor.
D. Review of the Contractor's safety program by the Project Manager shall only be in regard to compliance with this specification and shall not constitute approval by the Project Manager nor relieve the Contractor of obligations under State and Federal trench safety laws.

1.5 REGULATORY REQUIREMENTS

A. Install and maintain trench safety systems in accordance with the detail the Specifications set out in the provision of Excavations, Trenching, and Shoring, Federal Occupation Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, as amended, including Final Rule, published in the Federal Register Vol. 54, No. 209 on Tuesday, October 31, 1989. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-652.
B. A reproduction of the OSHA standards included in "Subpart P - Excavations" from the Federal Register Vol. 54, No. 209 is available upon request to the Contractors bidding on City projects. The City assumes no responsibility for the accuracy of the reproduction. The Contractor is responsible for obtaining a copy of this section of the Federal Register.
C. Legislation that has been enacted by the Texas Legislature with regard to Trench Safety Systems, is hereby incorporated, by reference, into these specifications. Refer to Texas Health and Safety Code Ann., §756.022 (Vernon 1991).
D. Reference materials, if developed for a specific project, shall be issued with the Bid Documents, including the following:
    1. Section 00200 - Geotechnical Information: information obtained for use in design of the trench safety system.

1.6 INDEMNIFICATION

A. The Contractor shall indemnify and hold harmless the City, its employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this Contract.
B. The Contractor acknowledges and agrees that this indemnity provision provides indemnity for the City in case the City is negligent either by act or omission in providing for trench safety, including, but not limited to safety program and design reviews, inspections, failures to issue stop work orders, and the hiring of the Contractor.

1.7 REFERENCED STANDARDS

A. CFCO – City of Friendswood Code of Ordinances.
    1. Ordinance 70-114 – Trench Excavation Safety Compliance.
    2. Ordinance 70-147 – Violation of Conditions; Revocation; Repair

by the City.
3. Ordinance 70-148 – Surety Bond Required.

B. CFTS – City of Friendswood Technical Specifications.
C. OSHA – Occupational Safety and Health Administration.
1. OSHA Standards, 29CFR, Part 1926, Subpart P.
2. Federal Register Vol. 54, No. 209.
D. Texas Health and Safety Code Ann., §756.022 (Vernon 1991).

PART II: PRODUCTS – Not Used

PART III: EXECUTION

3.1 INSTALLATION
A. Install and maintain trench safety systems in accordance with provisions of OSHA 29CFR.
B. Install specially designed trench safety systems in accordance with the Contractor's trench excavation safety program for the locations and conditions identified in the program.
C. A competent person, as identified in the Contractor's Trench Safety Program, shall verify that trench boxes and other premanufactured systems are certified for the actual installation conditions.

3.2 INSPECTION
A. The Contractor, or the Contractor's independently retained consultant, shall make daily inspections of the trench safety systems to ensure that the installed systems and operations meet OSHA 29CFR and other personnel protection regulations requirements.
B. If evidence of possible cave-ins or slides is apparent, the Contractor shall immediately stop work in the trench and move personnel to safe locations until the necessary precautions have been taken by the Contractor to safeguard personnel entering the trench.
C. Maintain a permanent record of daily inspections.

3.3 FIELD QUALITY CONTROL
A. The Contractor shall verify specific applicability of the selected or specially designed trench safety systems to each field condition encountered on the project.
B. The Project Manager, under written or oral authority of the Director or Deputy Director of Engineering shall stop work on portions of the Work where conditions, equipment or personnel put other personnel, the general public or adjacent property in danger of injury or damage. Work shall not resume until conditions have been remedied and verified by the Project Manager.

END OF SECTION

SECTION 02290

WATER LINE IN TUNNELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Handling, transporting, and installing water line in primary liner tunnels, including invert cleanup and blocking and water line in casings that will be backfilled with concrete or grout.

1.02 REALTED SECTIONS

A. Section 01015 – Measurement and Payment

B. Section 01000 – Submittal Procedures

C. Section 02400 – Water Lines

D. Section 02255 – Steel Pipe and Fittings for Large Diameter Water Lines

E. Section 02274 – Jack & Bore/Jack & Mine

1.03 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment of water line installed by tunneling is by linear foot along center line of completed water line as designated on Drawings.

2. Payment for installation of water line in tunnel constructed according to Section 02274 – Jack & Bore/Jack & Mine will be authorized by Project Manager in three parts. Pay estimates for partial payments will be made as measured above according to following schedule:

a. 60 percent of installation will be authorized when excavation and primary liner installation is complete.

b. 95 percent of installation will be authorized when water line installation and grouting is complete.

c. 100 percent of installation will be authorized when section successfully hydrostatically tested.

3. Refer to Section 01015 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work is in this Section is included in total Stipulated Price.

1.04 REFERENCE STANDARDS

A. ASME B 40.1 - Pressure Gauge and Gauge Attachments.

1.05 SUBMITTALS

A. Submit work plan including following information in accordance with Section 01000 - Submittals.

1. Method of transporting pipes into tunnel.

2. Method of hoisting and positioning pipe in tunnel.

3. Method of jointing and aligning pipe.

4. Method of supporting and blocking pipe.

5. Tunnel ventilation while setting pipe and completing joints, when applicable.

6. Material, equipment and procedures for grout placement.

B. Submit results of tunnel primary liner survey in accordance with Paragraph 3.02, Tunnel Survey.

C. Submit results of installed water line survey in accordance with Paragraph 3.10, As-built Survey and Installation Tolerances.

1.06 PROCEDURES

A. Joints: Prepare joints as recommended by pipe manufacturer and in accordance with Section 02400 - Water Lines.

B. Handling: Handle, store, and transport pipe in accordance with pipe manufacturer's recommendations and to prevent damage to pipe ends, pipe barrel, steel reinforcement, and pipe protective linings.

C. Grouting: Perform grouting of annular space between water line and tunnel liner to fill voids with grout, without dislocating or damaging pipe.

PART 2 PRODUCTS

2.01 PIPE MATERIAL AND FITTINGS

A. Manufacture and deliver pipe material and fittings as described in Section 02400 - Water Lines.

2.02 SPACERS

A. Unless otherwise noted on Drawings, use casing spacers between water line and casing tunnel liner for water lines less than 24 inches in diameter. Refer to Paragraph 3.01 for exception.

PART 3 EXECUTION

3.01 APPLICATION

A. Grout in place, tunnels for water lines with diameters of 36-inches or greater. When tunnel liner plate is used, grout water line in place regardless of water line diameter.

3.02 TUNNEL SURVEY

A. Prior to installing water line in tunnel: Perform survey of tunnel in accordance with Paragraph 3.10B. Verify tunnel has been constructed within specified tolerances for line, grade, and roundness and water line to be placed in tunnel can be placed in conformance with tolerances specified. Should misalignment of tunnel preclude proper installation of water line, notify Project Manager of proposed correction method. Project Manager will make final decision on acceptability of correction.

3.03 PIPE TRANSPORT

A. Transport pipe in tunnel for final placement so that no damage occurs to pipe ends or pipe barrel and interior lining or exterior coating. Repair pipe damaged during transport or final placement in tunnel in manner acceptable to Project Manager prior to joining. Remove damaged pipe from tunnel and replace, when directed by Project Manager, at no additional cost to City.

3.04 TUNNEL CLEANUP

A. Remove temporary tunnel utilities, loose material, dirt, and debris prior to pipe placement. Broom clean concrete invert. Control seepage and remove standing water in invert. Temporary construction tracks or pipe skids may be left in place when they do not interfere with alignment of water line, short circuit cathodic protection system, or interfere with final placement of annular grout.

3.05 INVERT PIPE SUPPORT

A. Construct invert pipe support of screeded concrete, steel beam, or other method, as approved, to final grade of outside of water line. Secure invert support to primary liner to prevent movement. Cure concrete support minimum of 48 hours prior to setting pipe. Maintain minimum of 4-inches clearance between outside of water line and steel beam or steel member.

3.06 JOINING PIPE IN TUNNELS

A. Lay pipe in accordance with pipe manufacturer's recommendations, and as specified in this Section. Join pipe segments so as to properly compress gaskets and allow for correct final positioning of pipe for line and grade. Closely align pipe and bring loosely together by means of hydraulic jacks, locomotives, pipe mobiles, or winches. Once pipes have been loosely joined, pull home by means of hydraulic tugger or other similar methods suitably protecting pipe and joints against damage. Impact joining, such as ramming with locomotives or other mechanical equipment, is not permitted.

3.07 SUPPORTING PIPE IN TUNNEL AND BULKHEADS

A. Develop and submit pipe supporting system that will prevent water line from floating and deforming beyond specified limits. Loads imposed on pipe, primary liner and surrounding soil during grouting shall be determined by Registered Professional Engineer in State of Texas. Show essential details in plan for supporting system. Position water line in tunnel to allow minimum of 4 inches of grout to be placed between water line and tunnel primary liner or casing.

B. Wooden support blocks are not allowed.

C. Prevent pipe from floating during backfill operations by properly installed supporting. Remove and replace segment of pipe which is distorted or moved from final line and grade.

D. Secure supporting in place so that it cannot be dislodged during adjacent pipe laying and during grouting operations.

E. Construct bulkheads of material, compatible with grout, to withstand imposed grout pressure without leakage. Provide bulkheads at frequency to allow completion of grouting in continuous operation and to permit timely removal of pipe and grout which may be needed as result of pipe distortion or movement. Modifications to bulkhead spacing will be reviewed by Project Manager. Provide adequate venting for bulkheads.

F. Contractor may use mortar bands, casing spacers or blocking to support pipe in tunnel.

G. If mortar bands are used, mortar coating must be used. Refer to Section 02255 – Steel Pipe and Fittings for Large Diameter Water Lines for requirements.

3.08 GROUTING JOINTS

A. Materials and procedures for filling interior joint recesses shall conform to Section 02400 - Water Lines.

3.09 AS-BUILT SURVEY AND INSTALLATION TOLERANCES

A. Perform as-built survey on installed water line. Determine horizontal and vertical location for invert of each pipe joint.

B. Acceptable tolerances: Within plus or minus 3 inches of horizontal alignment, within plus or minus 2 inches of vertical alignment.

END OF SECTION

SECTION 02300
CAST-IN-PLACE CONCRETE MANHOLES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Cast-in-place concrete manholes for sanitary sewers and storm sewers, including box sewers.
- B. Pile-supported concrete foundation used for unstable subgrade treatment for manhole base.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for manholes is on a unit price basis for each manhole installed.
  2. Payment for Type C manhole with BB inlet top is on a unit price basis for each.
  3. Payment for pile-supported concrete foundation used for unstable subgrade treatment for manhole base is on a unit price basis for each foundation installed.
  4. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASME – American Society of Mechanical Engineers.
  1. ASME B16.1 – Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
  2. ASTM C270 – Standard Specification for Mortar for Unit Masonry.
  3. ASTM C923 – Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
  4. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic – Cement Grout (Nonshrink).
  5. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3).
  6. ASTM D2665 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.
  7. ASTM D2996 – Standard Specification for Filament-wound Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
  8. ASTM D2997 – Standard Specification for Centrifugally Cast

Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

C. AWWA – American Water Works Association.
   1. AWWA C213 – Standard for Fusion Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines.

D. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit proposed design mix and test data for each type and strength of concrete.

C. Submit manufacturer's data and details of following items for approval:
   1. Frames, grates, rings and covers.
   2. Materials to be used in fabricating drop connections.
   3. Materials to be used for pipe connections at manhole walls.
   4. Materials to be used for stubs and stub plugs.
   5. Plugs to be used for sanitary sewer hydrostatic testing.
   6. Installation instructions for forms.

D. Seal submittal drawings by a Professional Engineer licensed by the State of Texas.

PART II: PRODUCTS

2.1 CONCRETE

A. Conform to requirements of Section 03300 – Structural Concrete.

B. Provide Class A concrete with minimum compressive strength of four thousand pounds per square inch (4000 psi) unless otherwise indicated on the Drawings.

2.2 REINFORCING STEEL

A. Conform to requirements of Section 03200 – Reinforcing Steel.

2.3 MORTAR

A. Conform to requirements of Section 03100 – Mortar.

2.4 MISCELLANEOUS METALS

A. Provide cast-iron frames, grates, rings and covers conforming to requirements of Section 02315 – Frames, Grates, Rings and Covers.

2.5 DROP CONNECTIONS AND STUBS

A. Provide drop connections and stubs conforming to same pipe material requirements used in main pipe, unless otherwise indicated on the Drawings.

2.6 PIPE CONNECTIONS

A. Sanitary Sewers.
   1. Provide resilient connectors conforming to requirements of

ASTM C923. Use the following materials for metallic mechanical devices as defined in ASTM C923:

a. External clamps: Type 304 stainless steel.
b. Internal, expandable clamps on standard manholes: Type 304 stainless steel, eleven (11) gauge minimum.
c. Internal, expandable clamps on corrosion-resistant manholes:
   1) Type 316 stainless steel, eleven (11) gauge minimum.
   2) Type 304 stainless steel, eleven (11) gauge minimum, coated with minimum sixteen (16) mil fusion bonded epoxy conforming to AWWA C213.

2. Where rigid joints between pipe and cast-in-place manhole base are specified or shown on the Drawings, provide polyethylene-isoprene waterstop meeting physical property requirements of ASTM C923, such as Pres-Seal WS Series or approved equal.

B. Storm Sewers.
1. Use non-shrink grout for storm sewer pipe connections to concrete manholes, unless otherwise shown on the Drawings. Pipe shall be flush with the inside wall of manhole. Grout pipe penetration in place on both inside and outside of manhole.

2.7 SEALANT MATERIALS
A. Provide sealing materials between precast concrete adjustment ring and manhole cover frame, such as Adeka Ultraseal P201 or approved equal.
B. Provide external sealing material from Canusa Wrapid Seal manhole encapsulation system or approved equal.
C. Butyl Sealant: Provide Press-Seal EZ Stick or equal, for HDPE rings.

2.8 CORROSION-RESISTANT MANHOLE MATERIALS
A. Where corrosion-resistant manholes or PVC-lined manholes are indicated on the Drawings, provide the following:
1. PVC liner for precast cylindrical manhole section, base sections and cone sections.

2.9 BACKFILL MATERIALS
A. Conform to the requirements of Section 02125 – Excavation and Backfill for Utilities.

2.10 NON-SHRINK GROUT
A. Provide prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based non-shrink grout requiring only addition of water.
B. Provide grout meeting requirements of ASTM C1107 and having minimum twenty-eight day (28 D) compressive strength of seven thousand pounds per square inch (7000 psi).

2.11 VENT PIPES

A. Provide external vent pipes for manholes where indicated on the Drawings.
B. Buried Vent Pipes: Provide three inch (3 In) or four inch (4 In) PVC Drain, Waste and Vent (DWV) pipe conforming to ASTM D2665. Alternatively, provide Fiberglas Reinforced Plastic (FRP) pipe as specified for vent outlet assembly.
C. Vent Outlet Assembly: Provide vent outlet assembly as shown on the Drawings, constructed of following specified materials:
    1. FRP Pipe: Provide filament-wound FRP conforming to ASTM D2996 or centrifugally cast FRP conforming to ASTM D2997. Seal cut ends in accordance with manufacturer's recommendations.
    2. Joints and Fittings: Provide epoxy- bodied fittings and join pipe to fittings with epoxy adhesive, according to pipe manufacturer's instructions.
    3. Flanges: Provide socket-flange fittings for epoxy adhesive bonding to pipe ends where shown on the Drawings. Meet bolt pattern and dimensions for ASME B16.1, one hundred twenty-five pound (125 Lb) flanges. Use Type 304 stainless steel or hot-dip zinc coated, conforming to ASTM A 307, Class A or B flange bolts.
    4. Coating: Provide two (2) component, aliphatic polyurethane coating, using primer or tie coat recommended by manufacturer. Provide two (2) or more coats to yield dry film thickness of at least three (3) mils. Provide Amershield, Tnemec 74 or approved equal. The Project Manager selects color from manufacturer's standard colors.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify lines and grades are correct.
B. Determine if subgrade, when scarified and recompacted, can be compacted to ninety-five percent (95%) of maximum Standard Proctor Density according to ASTM D698 prior to placement of foundation material and base section. When proper density cannot be reached, condition subgrade until that density is reached or treat as an unstable subgrade.
C. Do not build manholes in ditches, swales or drainage paths unless approved by the Project Manager.

3.2 MANHOLES

A. Construct manholes to dimensions shown on the Drawings. Commence construction as soon as possible after pipes are laid. On monolithic sewers, construct manholes at same time sewer is being constructed.

B. Unstable Subgrade Treatment: When unstable subgrade is encountered, notify the Project Manager for examination of subgrade to determine if subgrade has heaved upwards after being excavated. When heaving has not occurred, over-excavate subgrade to allow for twenty-four inch (24 In) thick layer of crushed stone wrapped in filter fabric as foundation material under manhole base. When there is evidence of heaving, provide pile-supported concrete foundation under manhole base, as detailed on the Drawings.

C. Cast manhole foundations and walls monolithically. Use cold joint with approved waterstop when manhole flow line depth exceeds twelve feet (12 Ft). No other joints shall be allowed unless shown on the Drawings. Wrap cold joints with external sealing material, minimum six inch (6 In) width.

D. For concrete containing micro silica admixtures, place, finish and cure concrete for manholes following procedures in Section 03300 –Structural Concrete.

E. Top of manhole elevations shown on the Drawings are approximate, based on current pavement and natural ground conditions as determined from elevations measured on fifty foot (50 Ft) spacing. No additional payment shall be made if final elevation of manhole ring and cover is higher or lower due to requirements of finished grade or replaced pavement surface.

3.3 PIPE CONNECTIONS

A. Install approved resilient connectors at each pipe entering and exiting sanitary sewer manholes in accordance with manufacturer's instructions.

B. Grout storm sewer connections to manhole unless otherwise shown on the Drawings. Grout pipe penetrations both inside and outside of manhole. Pipes shall be flush with interior of the manhole.

C. Ensure no concrete, cement-stabilized sand, fill or other solid material is allowed to enter space between pipe and edge of wall opening at and around resilient connector on interior or exterior of manhole. When necessary, fill space with compressible material to ensure resilient connector shall maintain full flexibility where evidence of reduced flexibility is encountered.

D. Where new manhole is to be constructed on existing sewer, a rigid joint pipe may be used. Install waterstop gasket around existing pipe at center of cast-in-place wall. Join ends of split waterstop material at pipe spring line using adhesive recommended and supplied by waterstop manufacturer.

1. Field verify the elevations of all manholes to be constructed on existing sewer before the start of any related work.
2. Failure to field verify existing conditions before start of work shall be the responsibility of the Contractor should the elevations not match and the work shall be completed with no additional cost to the City.

E. Do not construct joints on sanitary sewer pipe within wall sections of manholes. Use approved connection material.
F. Construct pipe stubs with resilient connectors for future connections at locations and with material indicated on the Drawings. Install approved stub plugs at interior of manhole.
G. Test connection for watertight seal before backfilling.

3.4 INVERTS FOR SANITARY SEWERS

A. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to following criteria:
   1. Slope of invert bench: one inch per foot (1 In/Ft) minimum; one and one-half inch per foot (1-1/2 In/Ft) maximum.
   2. Depth of bench to invert:
      a. Pipes smaller than fifteen inches (15 In): one-half (1/2) of largest pipe diameter.
      b. Pipes fifteen inches (15 In) to twenty-four inches (24 In): three-quarters (3/4) of largest pipe diameter.
      c. Pipes larger than twenty-four inches (24 In): equal to largest pipe diameter.
   3. Invert slope through manhole: one-tenth foot (0.1 Ft) drop across manhole with smooth transition of invert through manhole, unless otherwise indicated on the Drawings.
B. Form invert channels with Class A concrete if not integral with manhole base. For direction changes of mains, construct channels tangent to mains with maximum possible radius of curvature. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.

3.5 DROP CONNECTIONS FOR SANITARY SEWERS

A. Backfill drop assembly with crushed stone wrapped in filter fabric, cement-stabilized sand or Class A concrete to form solid mass. Extend cement-stabilized sand or concrete encasement minimum of four inches (4 In) outside bells.
B. Install connection when sewer line enters manhole higher than twenty-four inches (24 In) above invert of manhole.

3.6 STUBS FOR FUTURE CONNECTIONS

A. In manholes where future connections are indicated on the Drawings, install resilient connectors and pipe stubs with approved watertight plugs.

3.7 ADJUSTMENT RINGS AND FRAME

A. Combine precast concrete or HDPE adjustment rings so elevation of installed casting cover matches pavement surface. Seal between concrete adjustment ring and precast top section with non-shrink grout; do not use mortar between adjustment rings. Apply latex-based bonding

agent to precast concrete surfaces to be joined with non-shrink grout. Set cast iron frame on adjustment ring in a bed of approved sealant material. Install a sealant bed consisting of two (2) beads of sealant, each bead having minimum dimensions of one-half inch (1/2 In) and one-half inch (1/2 In) wide.

B. Wrap manhole frame and adjustment rings with external sealing material, minimum three inches (3 In) beyond joint between ring and frame and ring and precast section.

C. For manholes in unpaved areas, set top of frame a minimum of six inches (6 In) above existing ground line unless otherwise indicated on the Drawings. Encase manhole frame in mortar or non-shrink grout placed flush with face of manhole ring and top edge of frame. Provide rounded corner around perimeter.

D. For Manholes in paved areas, set manhole cover is flush with surrounding pavement. Form a six foot by six foot (6 Ft x 6 Ft) area, full depth to subgrade and parallel to the roadway centerline, centered on the manhole. Install expansion joint material on the perimeter of the form. Install reinforcing bar and concrete typical of road paving. Ensure that manhole is flush with surrounding pavement before applying final finish and curing compound.

3.8 BACKFILL

A. After concrete obtains adequate strength, place and compact backfill materials in area of excavation surrounding manholes in accordance with requirements of Section 02125 – Excavation and Backfill for Utilities. Use embedment zone backfill material for adjacent utilities, as shown in City of Friendswood Standard Details over each pipe connected to manhole. Provide trench zone backfill, as specified for adjacent utilities, above embedment zone backfill.

B. Where rigid joints are used for connecting existing sewers to manhole, backfill under existing sewer up to spring line of pipe with Class A concrete or flowable fill.

C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide minimum of four inches (4 In) of topsoil conforming to requirements of Section 02905 – Topsoil. Seed in accordance with Section 02910 – Hydromulch Seeding or sod disturbed areas in accordance with Section 02915 – Sodding.

3.9 FIELD QUALITY CONTROL

A. Conduct leakage testing of Sanitary Sewer manholes in accordance with requirements of Section 02525 – Acceptance Testing of Gravity Sanitary Sewer Lines.

3.10 PROTECTION

A. Protect manholes from damage until subsequent Work has been accepted. Repair or replace damaged elements of manholes at no

additional cost to City.

B. Damaged manholes that have been repaired or replaced shall be retested at no additional cost to the City.

END OF SECTION

SECTION 02305
PRECAST CONCRETE MANHOLES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Precast concrete manholes for sanitary sewers and storm sewers.

B. Precast concrete sanitary sewer manholes with PVC liner where corrosion resistant manholes are specifically indicated in the Drawings.

C. Pile-supported concrete foundation used for unstable subgrade treatment for manhole base.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. Payment for normal depth manholes, up to eight feet (8 Ft) deep, is on a unit price basis for each manhole installed. Manhole depth is measured from top of cover to sewer invert. Air release manhole depth is measured from top of cover to inside base for air release or vacuum release manholes.
2. Payment for shallow depth manholes is on a unit price basis for each manhole installed. Shallow manholes have a depth of five feet (5 Ft) or less measured from top of cover to sewer invert.
3. Payment for extra depth manholes is on a unit price basis per vertical foot for each foot of depth greater than eight feet (8 Ft). Sewer manhole depth is measured from top of cover to sewer invert. Air release manhole depth is measured from top of cover to inside base for air release or vacuum release manholes.
4. Payment for normal depth corrosion resistant manholes is on a unit price basis for each manhole installed.
5. Payment for standard manhole drops is on a unit price basis for each drop installed. Standard manhole drops include both internal and external drops.
6. Payment for watertight manholes, including external vent pipe is on a unit price basis for each.
7. Payment for air-release manhole with valves and fittings installed is on a unit price basis for each manhole with air-release valves and fittings installed.
8. Payment for pile-supported concrete foundation used for unstable subgrade treatment for manhole base is on a unit price basis for each foundation installed.
9. Payment for sanitary sewer manholes shall be authorized when manhole has been tested as specified in Section 02525 – Acceptance Testing of Gravity Sanitary Sewer Lines.
10. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):
   1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
A. AASHTO – American Association of State Highway and Transportation Officials.
B. ASME – American Society of Mechanical Engineers.
   1. ASME B16.1 – Cast Iron Pipe Flanges and Flanged Fittings.
C. ASTM – American Society for Testing and Materials.
   1. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
   2. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   3. ASTM C270 – Standard Specification for Mortar for Unit Masonry.
   4. ASTM C443 – Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
   5. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections.
   6. ASTM C923 – Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
   7. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
   8. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3).
   9. ASTM D2665 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.
   10. ASTM D2996 – Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
   11. ASTM D2997 – Standard Specification for Centrifugally Cast “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
D. AWWA – American Water Works Association.
   1. AWWA C213 – Standard for Fusion Bonded Epoxy Coating for Interior and Exterior of Steel Water Pipelines.
E. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit manufacturer's data and details of following items for approval:
   1. Shop drawings of manhole sections, base units and construction details, including reinforcement, jointing methods, materials and dimensions.

2. Summary of criteria used in manhole design including as a minimum; material properties, loadings, load combinations and dimensions assumed. Include certification from manufacturer that precast manhole design is in full accordance with ASTM C478 and design criteria as established in Paragraph 2.1.E of this Specification.
3. Frames, grates, rings and covers.
4. Materials to be used in fabricating drop connections.
5. Materials to be used for pipe connections at manhole walls.
6. Materials to be used for stubs and stub plugs, if required.
7. Materials and procedures for corrosion-resistant liner and coatings, if required.
8. Plugs to be used for sanitary sewer hydrostatic testing.
9. Manufacturer's data for pre-mix (bag) concrete, if used for channel inverts and benches.

C. Seal submittal drawings by a Professional Engineer licensed by the State of Texas.

PART II: PRODUCTS

2.1 PRECAST CONCRETE MANHOLES

A. Provide manhole sections, base sections and related components conforming to ASTM C478. Provide base riser section with integral floors, unless shown otherwise. Provide adjustment rings which are standard components of manufacturer of manhole sections. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.

B. Construct barrels for precast manholes from standard reinforced concrete manhole sections of diameter indicated on the Drawings. Use various lengths of manhole sections in combination to provide correct height with fewest joints. Design wall sections for depth and loading conditions in Paragraph 2.1.E, with minimum thickness of five inches (5 In). Base section shall have minimum thickness of twelve inches (12 In) under invert.

C. Provide tops to support HS-20 vehicle loading and receive cast iron frame covers, as indicated on the Drawings.

D. Where manholes larger than forty-eight inch (48 In) diameter are indicated on the Drawings, provide precast base sections with flat slab top precast sections used to transition to forty-eight inch (48 In) diameter manhole access riser sections. Transition can be concentric or eccentric unless otherwise shown on the Drawings. Locate transition to provide minimum of seven foot (7 Ft) head clearance from base to underside of transition unless otherwise approved by the Project Manager.

E. Design Loading Criteria: Manhole walls, transition slabs, cone tops and manhole base slab shall be designed, by manufacturer, to requirements

of ASTM C478 for depth as shown on the Drawings and to resist following loads.

1. AASHTO HS-20 vehicle loading applied to manhole cover and transmitted down to transition and base slabs.
2. Unit soil weight of one hundred twenty pounds per cubic foot (120 pcf) located above portions of manhole, including base slab projections.
3. Lateral soil pressure based on saturated soil conditions producing an at-rest equivalent fluid pressure of one hundred pounds per cubic foot (100 pcf).
4. Internal liquid pressure based on unit weight of sixty-three pounds per cubic foot (63 pcf).
5. Dead load of manhole sections fully supported by transition and base slabs.

F. Design: Manhole walls, transition slabs, cone tops and manhole base slab shall be designed according to requirements of ASTM C478 and following:
   1. Design additional reinforcing steel to transfer stresses at openings. Area of steel to be no less than shown on the Drawings.
   2. Wall loading conditions:
      a. Saturated soil pressure acting on empty manhole.
      b. Manhole filled with liquid to a halfway depth as measured from invert to cover, with no balancing external soil pressure.
   3. Minimum clear distance between two (2) wall penetrations shall be twelve inches (12 In) or half diameter of smaller penetration, whichever is greater.

G. Provide joints between sections with O-ring gaskets conforming to ASTM C443.

H. When base is cast monolithic with portion of vertical section, extend reinforcing in vertical section into base.

I. Precast Concrete Base: Suitable cutouts or holes to receive pipe and connections.

2.2 CONCRETE

A. Conform to requirements of Section 03300 – Structural Concrete.

B. Channel Inverts: Use five (5) sack premix (bag) concrete or Class A concrete for inverts not integrally formed with manhole base, with minimum compressive strength of four thousand pounds per square inch (4000 psi).

C. Cement-Stabilized Sand Foundation: Provide cement-stabilized sand foundation under base section in lieu of foundation slab, as shown on the Drawings, conforming to requirements of Section 02145 – Cement-Stabilized Sand.

D. Concrete Foundation: Provide Class A concrete with minimum compressive strength of four thousand pounds per square inch (4000 psi) for concrete foundation slab under manhole base section where indicated on the Drawings.

2.3 REINFORCING STEEL

A. Conform to requirements of Section 03200 – Reinforcing Steel.

2.4 MORTAR

A. Conform to requirements of Section 03100 – Mortar.

2.5 MISCELLANEOUS METALS

A. Provide cast-iron frames, rings and covers conforming to requirements of Section 02315 – Frames, Grates, Rings and Covers.

2.6 DROP CONNECTIONS AND STUBS

A. Provide drop connections and stubs conforming to same pipe material requirements used in main pipe, unless otherwise indicated on the Drawings.

2.7 PIPE CONNECTIONS TO MANHOLE

A. Sanitary Sewers.
   1. Provide resilient connectors conforming to requirements of ASTM C923. Use the following materials for metallic mechanical devices as defined in ASTM C923:
      a. External clamps: Type 304 stainless steel.
      b. Internal, expandable clamps on standard manholes: Type 304 stainless steel, eleven (11) gauge minimum.
      c. Internal, expandable clamps on corrosion-resistant manholes:
         1) Type 316 stainless steel, eleven (11) gauge minimum.
         2) Type 304 stainless steel, eleven (11) gauge minimum, coated with minimum sixteen (16) mil fusion-bonded epoxy conforming to AWWA C213.
   2. Where rigid joints between pipe and cast-in-place manhole base are specified or shown on the Drawings, provide polyethylene-isoprene water-stop meeting physical property requirements of ASTM C923, such as Press-Seal WS Series or approved equal.

B. Storm Sewer Connections:
   1. Provide watertight connections in accordance with ASTM C923.

2.8 SEALANT MATERIALS

A. Approved products in accordance with Section 01630 – Product Substitution.

B. Provide sealing materials between precast concrete adjustment ring and manhole cover frame, Adeka Ultraseal P201 or approved equal.
C. Provide approved external sealing material from Canusa Wrapid Seal manhole encapsulation system or approved equal.
D. Provide Butyl Sealant: Provide Press-Seal EZ Stick or equal, for HDPE rings.

2.9 CORROSION RESISTANT MANHOLE MATERIALS
A. Where corrosion-resistant manholes or PVC-lined manholes are indicated on the Drawings, provide one of following:
1. PVC liner for precast cylindrical manhole section, base sections and cone sections.

2.10 BACKFILL MATERIALS
A. Conform to requirements of Section 02125 – Excavation and Backfill for Utilities.

2.11 NON-SHRINK GROUT
A. Provide prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only addition of water.
B. Meet requirements of ASTM C1107 and have minimum twenty-eight day (28 D) compressive strength of seven thousand pounds per square inch (7000 psi).

2.12 VENT PIPES
A. Provide external vent pipes for manholes where indicated on the Drawings.
B. Buried Vent Pipes: Provide three inch (3 In) or four inch (4 In) PVC Drain, waste and Vent (DWV) pipe conforming to ASTM D2665. Alternatively, provide Fiberglass Reinforced Plastic (FRP) pipe as specified for vent outlet assembly.
C. Vent Outlet Assembly: Provide vent outlet assembly as shown on the Drawings, constructed of following specified materials:
1. FRP Pipe: Provide filament wound FRP conforming to ASTM D2996 or centrifugally cast FRP conforming to ASTM D2997. Seal cut ends in accordance with manufacturer's recommendations.
2. Joints and Fittings: Provide epoxy bodied fittings and join pipe to fittings with epoxy adhesive.
3. Flanges: Provide socket-flange fittings for epoxy adhesive bonding to pipe ends where shown on the Drawings. Meet bolt pattern and dimensions for ASME B16.l, one hundred twenty-five pound (125 Lb) flanges. Flange bolts shall be Type 304 stainless steel or hot-dip zinc coated, conforming to ASTM A307, Class A or B.

4. Coating: Provide approved two (2) component, aliphatic polyurethane coating using primer or tie coat recommended by manufacturer. Provide two (2) or more coats to yield dry film thickness of at least three (3) mils. Color shall be selected by the Project Manager from manufacturer's standard colors.

2.13 PROHIBITED MATERIALS

A. Do not use brick masonry for construction of sanitary sewer manholes or storm sewer manholes, including adjustment of manholes to grade. Use only specified materials listed above.

PART III: E X E C U T I O N

3.1 EXAMINATION

A. Verify that lines and grades are correct.

B. Determine if subgrade, when scarified and recompacted, can be compacted to ninety-five percent (95%) of maximum Standard Proctor Density according to ASTM D698 prior to placement of foundation material and base section. When proper density is not reached, moisture condition subgrade until that density is reached or treat as unstable subgrade.

C. Do not build manholes in ditches, swales or drainage paths unless approved by the Project Manager.

3.2 PLACEMENT

A. Install precast manholes to conform to locations and dimensions shown on the Drawings.

B. Place sanitary and storm manholes at points of change in alignment, grade, size, pipe intersections and end of sewer unless otherwise shown on the Drawings.

3.3 MANHOLE BASE SECTIONS AND FOUNDATIONS

A. Place precast base on twelve inch (12 In) thick (minimum) foundation of crushed stone wrapped in filter fabric, cement-stabilized sand or concrete foundation slab. Compact cement-stabilized sand in accordance with requirements of Section 02145 – Cement-Stabilized Sand.

B. Unstable Subgrade Treatment: When unstable subgrade is encountered, notify the Project Manager for examination of subgrade to determine if subgrade has heaved upwards after being excavated. When heaving has not occurred, over-excavate subgrade to allow for twenty-four inch (24 In) thick layer of crushed stone wrapped in filter fabric as foundation material under manhole base. When there is evidence of heaving, provide pile-supported concrete foundation, as detailed on the Drawings, under manhole base.

3.4 PRECAST MANHOLE SECTIONS

A. Install sections, joints and gaskets in accordance with manufacturer's printed recommendations.
B. Install precast adjustment rings above tops of cones or flat-top sections as required to adjust finished elevation and to support manhole frame.
C. Seal any lifting holes with non-shrink grout.
D. Where PVC liners are required, seal joints between sections in accordance with manufacturer's recommendations.
E. Place at least two (2) precast concrete grade rings with thickness of twelve inches (12 In) or less, under casting.

3.5 PIPE CONNECTIONS AT MANHOLES

A. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.
    1. Where smooth exterior pipes, i.e. steel, ductile iron or PVC pipes are connected to manhole base or barrel, space between pipe and manhole wall shall be sealed with an assembly consisting of rubber gaskets or links mechanically compressed to form watertight barrier. Assemblies: "Press-Wedge," "Res-Seal," "Thunderline Link-Seals," or approved equal. See the Drawings for placement of assembly in manhole sections.
    2. When connecting concrete or cement mortar coated steel pipes or as an option for connecting smooth exterior pipes to manhole base or barrel, space between pipe and manhole wall may be sealed with an assembly consisting of stainless steel power sleeve, stainless steel take-up clamp and rubber gasket. Take-up clamp: Minimum of nine-sixteenths inch (9/16 In) wide. Provide PSX positive seal gasket system by Press-Seal Gasket Corporation or approved equal.
B. Grout storm sewer connections to manhole unless otherwise shown on the Drawings. Grout pipe penetration in place on both inside and outside of manhole. Pipes are to be flush with interior of the manhole.
C. Ensure no concrete, cement-stabilized sand, fill or other rigid material is allowed to enter space between pipe and edge of wall opening at and around resilient connector on either interior or exterior of manhole. If necessary, fill space with compressible material to ensure full flexibility provided by resilient connector.
D. Where new manhole is constructed on existing sewer, rigid joint pipe may be used. Install waterstop gasket around existing pipe at center of cast-in-place wall. Join ends of split waterstop material at pipe springline using an adhesive recommended and supplied by waterstop manufacturer.
    1. Field verify the elevations of all manholes to be constructed on existing sewer before the start of any related work.
    2. Failure to field verify existing conditions before start of work shall be the responsibility of the Contractor should elevations not

match and the work shall be completed with no additional cost to the City.

E. Test connection for watertight seal before backfilling.

F. All connection to existing manholes shall be core drilled. Making openings to existing manholes by any other means shall not be accepted.

3.6 INVERTS FOR SANITARY SEWERS

A. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to following criteria:

1. Slope of invert bench: one inch per foot (1 In/Ft) minimum; one and one-half inches per foot (1-1/2 In/Ft) maximum.
2. Depth of bench to invert:
   a. Pipes smaller than fifteen inches (15 In): one-half (1/2) of largest pipe diameter.
   b. Pipes fifteen inches (15 In) to twenty-four inches (24 In): three-quarters (3/4) of largest pipe diameter.
   c. Pipes larger than twenty-four inches (24 In): equal to largest pipe diameter.
3. Invert slope through manhole: one-tenth foot (0.1 Ft) drop across manhole with smooth transition of invert through manhole, unless otherwise indicated on the Drawings.

B. Form invert channels with concrete if not integral with manhole base section. For direction changes of mains, construct channels tangent to mains with maximum possible radius of curvature. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.

3.7. DROP CONNECTIONS FOR SANITARY SEWERS

A. Backfill drop assembly with crushed stone wrapped in filter fabric, cement-stabilized sand or Class A concrete to form solid mass. Extend cement-stabilized sand or concrete encasement minimum of four inches (4 In) outside bells.

B. Install drop connection when sewer line enters manhole higher than twenty-four inches (24 In) above invert of manhole.

3.8 STUBS FOR FUTURE CONNECTIONS

A. In manholes, where future connections are indicated on the Drawings, install resilient connectors and pipe stubs with approved watertight plugs.

3.9 MANHOLE FRAME AND ADJUSTMENT RINGS

A. Combine precast concrete or HDPE adjustment rings so elevation of installed casting cover matches pavement surface. Seal between concrete adjustment ring and precast top section with non-shrink grout; do not use mortar between adjustment rings. Apply latex-based bonding agent to precast concrete surfaces joined with non-shrink grout. Set cast

iron frame on adjustment ring in bed of approved sealant material. Install sealant bed consisting of two (2) beads of sealant, each bead having minimum dimensions of one-half inch (1/2 In) and one-half inch (1/2 In) wide.

B. Wrap manhole frame and adjustment rings with external sealing material, minimum three inches (3 In) beyond joint between ring and frame and adjustment rings and precast section.

C. For manholes in unpaved areas, set top of frame a minimum of six inches (6 In) above existing ground line unless otherwise indicated on the Drawings. In unpaved areas, encase manhole frame in mortar or non-shrink grout placed flush with face of manhole ring and top edge of frame. Provide rounded corner around perimeter.

3.10 BACKFILL

A. Place and compact backfill materials in area of excavation surrounding manholes in accordance with requirements of Section 02125 – Excavation and Backfill for Utilities. Provide embedment zone backfill material, as specified for adjacent utilities, from manhole foundation up to an elevation twelve inches (12 In) over each pipe connected to manhole. Provide trench zone backfill, as specified for adjacent utilities, above embedment zone backfill.

B. Where rigid joints are used for connecting existing sewers to manhole, backfill under existing sewer up to springline of pipe with Class B concrete or flowable fill.

C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide minimum of four inches (4 In) of topsoil conforming to requirements of Section 02905 – Topsoil. Seed in accordance with Section 02910 – Hydromulch Seeding. When shown on the Drawings, sod disturbed areas in accordance with Section 02915 – Sodding.

D. For Manholes in paved areas, set manhole cover is flush with surrounding pavement. Form a six foot by six foot (6 Ft x 6 Ft) area, full depth to subgrade and parallel to the roadway centerline, centered on the manhole. Install expansion joint material on the perimeter of the form. Install reinforcing bar and concrete typical of road paving. Ensure that manhole is flush with surrounding pavement before applying final finish and curing compound.

3.11 FIELD QUALITY CONTROL

A. Conduct leakage testing of sanitary sewer manholes in accordance with requirements of Section 02525 – Acceptance Testing of Gravity Sanitary Sewer Lines.

3.12 PROTECTION

A. Protect manholes from damage until work has been accepted. Repair damage to manholes at no additional cost to the City.

B. Damaged manholes that have been repaired or replaced shall be retested at no additional cost to the City.

END OF SECTION

SECTION 02305SP

PRECAST CONCRETE MANHOLES

The following provisions modify Section 02305 – Precast Concrete Manholes Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraphs 1.2.A.1 through 1.2.A.3 and replace with the following:

   "Precast storm sewer manholes shall be measured and paid for each manhole installed at the sizes and inside dimension as shown on the plan drawings and indicated in the Unit Price Bid Form, regardless of the depth."

END OF SPECIAL PROVISION

SECTION 02310
ADJUSTING MANHOLES, INLETS AND VALVE BOXES TO GRADE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Adjusting elevation of manholes, inlets and valve boxes to new grades.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for adjusting inlets and valve boxes to grade for new construction under this Section. Include payment in the unit price for related item.
  2. Payment for adjusting existing manhole and frame and cover to new grade is on a unit price basis for each manhole and frame and cover.
  3. Payment for adjusting existing utility structures to grade is on unit price basis for each:
     - a. Inlet adjusted.
     - b. Valve box adjusted.
     - c. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 CONCRETE MATERIALS
- A. Provide concrete, conforming to requirements of Section 03300 – Structural Concrete.
- B. Provide precast concrete manhole sections and adjustment rings conforming to requirements of Section 02305 – Precast Concrete Manholes.
- C. Provide mortar conforming to requirements of Section 03100 – Mortar.

2.2 CAST-IRON MATERIALS
- A. Provide cast-iron materials conforming to requirements of Section 02315 – Frames, Grates, Rings and Covers.

2.3 PIPING MATERIALS

A. For riser pipes and fittings, refer to all Sections from Section 02200 to Section 02280.

2.4 MASONRY MATERIALS FOR STORM SEWER MANHOLES AND INLETS

A. Provide concrete brick masonry units.

PART III: EXECUTION

3.1 EXAMINATION

A. Examine existing structure, valve box, frame and cover or inlet box, frame and cover or inlet, piping and connections for damage or defects affecting adjustment to grade. Report damage or defects to the Project Manager.

3.2 ESTABLISHING GRADE

A. Coordinate grade-related items with existing grade and finished grade or paving and relate to established bench mark or reference line.

3.3 ADJUSTING MANHOLES AND INLETS

A. Curb and Gutter Streets.
   1. Manholes and inlets in the paving shall have top of ring matching top of surrounding pavement.
   2. Manholes and inlets within five feet (5 Ft) of the back of curb shall have top of ring a minimum of three inches (3 In) above the top of the nearest adjacent curb.
   3. All other manholes and inlets shall be three inches (3 In) above finished grade. In new development where finish grade has not been established, manhole shall be six inches (6 In) above rough grade.

B. Open Ditch Streets.
   1. Manholes and inlets in the paving shall have top of ring matching top of surrounding pavement.
   2. Manholes and inlets between edge of pavement and top of ditch bank shall be one inch (1 In) above adjacent finished grade.
   3. Manholes and inlets at any location in ditch shall be a minimum of three inches (3 In) above the highest top of ditch bank.
   4. All other manholes and inlets shall be three inches above finished grade. In new development where finish grade has not been established, manhole shall be six inches (6 In) above rough grade.

C. Manholes in ditches shall be a minimum of three inches above the elevation at the center of the road.

D. Rebuild adjustment portion of manhole or inlet by adding or removing Adjustments. Follow procedures for the type of structure being adjusted detailed in the following Sections:
   1. Section 02300 – Cast-In-Place Concrete Manholes.
   2. Section 02305 – Precast Concrete Manholes.
   3. Section 02605 – Cast-In-Place Inlets, Headwalls and Wingwalls.
   4. Section 02610 – Precast Concrete, Inlets, Headwalls and Wingwalls.
   5. Section 02615 – Concrete Brick Manholes for Storm Sewers.

E. Salvage and reuse cast-iron frame and cover or grate.

F. Protect or block off manhole or inlet bottom using wood forms shaped to fit so that no debris or soil falls to bottom during adjustment.

G. Verify that manholes and inlets are free of visible leaks as result of reconstruction. Repair leaks in manner subject to the Project Manager's approval.

3.4 ADJUSTING VALVE BOXES

A. Salvage and reuse valve box and surrounding concrete block as approved by the Project Manager. No separate pay.

B. Remove and replace six inch (6 In) ductile iron riser pipe with suitable length for depth of cover required to establish adjusted elevation to accommodate actual finish grade.

C. Reinstall valve box and riser piping plumbed in vertical position. Provide minimum six inches (6 In) telescoping freeboard space between riser pipe top butt end and interior contact flange of valve box for vertical movement damping.

D. After valve box has been set, aligned and adjusted so that top lid is level with final grade.

3.5 BACKFILL AND GRADING

A. Backfill area of excavation surrounding each adjusted manhole, inlet and valve box and compact according to requirements of Section 02120 – Excavation and Backfill for Structures.

B. Grade ground surface to drain away from each manhole and valve box. Place earth fill around manholes to level of upper rim of manhole frame. Place earth fill around valve box concrete slab.

C. In unpaved areas, grade surface at uniform slope of one to five (1:5) from manhole frame to natural grade. Provide minimum of four inches (4 In) of topsoil conforming to requirements of Section 02905 – Topsoil. Provide seeding in accordance with Section 02910 – Hydromulch Seeding or if sodding in accordance with Section 02915 – Sodding.

END OF SECTION

SECTION 02315
FRAMES, GRATES, RINGS and COVERS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Iron castings for manhole frames and covers.
- B. Inlet frames and grates.
- C. Catch basin frames and grates.
- D. Meter vault frames and covers.
- E. Adjustment of rings and extensions.
- F. Ring grates.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No payment shall be made for frames, grates, rings, covers and seals under this Section. Include payment in the unit price for related item.
  2. Payment to rack over existing manhole is on a unit price basis for each manhole.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHTO – American Association of State Highway Officials.
  1. AASHTO Standard Specification for Highway Bridges.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM A48 – Standard Specification for Gray Iron Castings.
  2. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. AWS – American Welding Society.
  1. AWS – D12.1 Welding Reinforcing Steel.
- D. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit copies of manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions.
- C. Submit shop drawings for fabrication and installation of casting assemblies that are not included in the Drawings or City of Friendswood Standard Details. Include plans, elevations, sections and connection details. Show anchorage and accessory items. Include setting drawings

for location and installation of castings and anchorage devices.

PART II: PRODUCTS

2.1 CASTINGS

A. Use castings for frames, grates, rings and covers conforming to ASTM A48, Class 35B. Provide locking covers if indicated on the Drawings.

B. Use clean castings capable of withstanding application of AASHTO M306- forty thousand pound (40000 Lb) proof loading without detrimental permanent deformation.

C. Fabricate castings to conform to shapes, dimensions and with wording or logos shown on the Drawings. Standard dimensions for manhole covers are thirty-two inches (32 In) in diameter. Twenty-four inch (24 In) diameter is acceptable for curb inlets only.

D. Use clean castings, free from blowholes and other surface imperfections. Use clean and symmetrical cast holes in covers, free of plugs.

2.2 BEARING SURFACES

A. Machine bearing surfaces between covers or grates and their respective frames so that even bearing is provided for position in which casting may be seated in frame.

2.3 SPECIAL FRAMES AND COVERS

A. Where indicated on the Drawings, provide watertight manhole frames and covers with minimum of four (4) bolts and gasket designed to seal cover to frame. Supply approved watertight manhole covers and frames.

B. Where shown on the Drawing, provide manhole frames and covers with forty-eight inch (48 In) diameter clear opening, with inner cover for twenty-two inch (22 In) diameter clear opening. Provide approved inner cover with pattern shown on the Drawings.

2.4 FINISH

A. Unless otherwise specified, use uncoated coat iron.

2.5 FABRICATED RING GRATES

A. Fabricate ring grates from reinforcing steel conforming to ASTM A615.

B. Conform to welds connecting bars to AWS D12.1.

2.6 ADJUSTMENT RINGS FOR ASPHALT OVERLAYS

A. Use castings conforming to Paragraph 2.1.

B. One (1) piece casting with dimensions to fit frame and cover.

PART III: EXECUTION

3.1 INSTALLATION

A. Install castings according to approved shop drawings, instructions in related specifications and applicable directions from manufacturer's printed materials.

B. Set castings accurately at required locations to proper alignment and elevation. Keep castings plumb, level, true and free of rack. Measure location accurately from established lines and grades. Brace or anchor frames temporarily in form work until permanently set.

C. Fabricate ring grates in accordance with City of Friendswood Standard Detail, “Ring Grate for Open End of eighteen inch (18 In) to seventy-two inch (72 In) Stubs to Ditch”. Set in mortar in mouth of pipe bell.

D. Install adjustment rings in existing frames with clean bearing surfaces that are free from rocking.

END OF SECTION

SECTION 02400
WATER LINES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Installation of water lines.

B. Technical Specifications identify requirements for both small diameter water lines and large diameter water lines. When Technical Specifications for large diameter water lines differ from those for small diameter water lines, large diameter Technical Specifications shall govern for large diameter pipe.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. Payment for water lines installed by open-cut, augered with or without casing, aerial crossing and pipe offset section or within limits of Potentially Petroleum Contaminated Area (PPCA) is on linear foot basis for each size of pipe installed. Separate pay items are used for each type of installation.
   a. Mains: Measure along axis of pipe and include fittings and valves.
   b. Branch Pipe: Measure from axis of water line to end of branch.
2. Payment for interconnection is on lump sum basis for each interconnection identified on the Drawings. Payment shall include tapping sleeve and valves piping, connections and other related work necessary for construction as shown on the Drawings or specified herein.
3. Payment for removal of existing internal elliptical or dished head plug is on unit price basis for each internal elliptical or dished head plug removed. Payment shall include deletion of plug, drainage or dewatering of water lines, repair of damaged linings, rechlorination and items incidental to operation.
4. Payment for plug and clamp is on a unit price basis for each size of pipe.
5. Payment for drainline connection with service manhole is on unit price basis for each drainline shown on drawings. Payment includes valve, access manhole and connection.
6. Payment for cylindrical corrosion barriers is on a unit price basis for each pipe fitting installed with one or more barriers.
7. When directed by the Project Manager to install extra fittings as required to avoid unforeseen obstacles, payment shall be based on the following:

a. Each extra fitting requested by the Project Manager and

delivered to jobsite shall be paid according to unit price bid for "Extra Fittings in Place."

b. Payment shall include and be full compensation for items necessary for installation and operation of water line.

8. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES

A. ANSI – American National Standards Institute.

1. ANSI A21.11/AWWA C111 – Standard for Rubber-Gasket Joints for Ductile – Iron Pressure Pipe and Fittings.
2. ANSI/NSF Standard 61 – Drinking Water System -Health Components.

B. ASTM – American Society for Testing and Materials.

1. ASTM A36 – Standard Specification for Carbon Structural Steel.
2. ASTM A126 – Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
3. ASTM A536 – Standard Specification for Ductile Iron Castings.
4. ASTM B21 – Standard Specification for Naval Brass Rod, Bar and Shapes.
5. ASTM B98 – Standard Specification for Copper-Silicon Alloy Rod, Bar and Shapes.
6. ASTM B301 – Standard Specification for Free-Cutting Copper Rod and Bar.
7. ASTM B584 – Standard Specification for Copper Alloy Sand Casting for General Application.
8. ASTM E165 – Standard Test Method for Liquid Penetrant Examination.
9. ASTM E709 – Standard Guide for Magnetic Particle Examination.
10. ASTM F1674 – Standard Test Method for Joint Restraint Products for Use with PVC Pipe.

C. AWWA – American Water Works Association.

1. AWWA C206 – Standard for Field Welding of Steel Water Pipe.
2. AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service – Sizes 4 Inches through 144 Inches.
3. AWWA C508 – Standard for Swing-Check Valves for Waterworks Service, 2 IN. through 24 IN. NPS.

D. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Conform to submittal requirements of applicable Section for type of pipe used.
C. Photographs: Submit photographs conforming to requirements of Section 01320 – Construction Photographs prior to commencement of construction.
D. Submit One Call notification transmittal number(s) prior to beginning excavation.
E. Submit, a minimum of fifteen days (15 D) before beginning pipe laying operations, layout drawing(s) identifying proposed sections for hydrostatic testing (not to exceed four thousand linear feet (4000 LF) per section), disinfecting, and site restoration for entire project for review and approval.

PART II: PRODUCTS

2.1 PIPE MATERIALS

A. Install pipe materials which conform to following:
1. Section 02215 – Ductile Iron Pipe (DIP) and Fittings.
2. Section 02250 – Steel Pipe and Fittings. Water line piping within plant site and aerial crossings to be welded joint steel pipe with flange or approved restraint joint connections, unless otherwise shown on the Drawings.
3. Section 02235 – Polyvinyl Chloride Pipe (PVC).
4. Section 02225 – Prestressed Concrete Cylinder Pipe (PCCP).
5. Section 02255 – Steel Pipe and Fittings for Large Diameter Water Lines.
6. Section 02200 – Bar Wrapped Steel Cylinder Pipe.

B. Conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and have certified by an organization accredited by ANSI.
C. Type of pipe materials used is Contractor's option unless specifically identified on the Drawings.
D. Provide minimum of three-eighths inch (3/8 In) inside joint recess between ends of pipe in straight pipe sections.

2.2 WELDED JOINT PROTECTION FITTING FOR SMALL DIAMETER STEEL PIPE

A. Cylindrical Corrosion Barrier: Provide approved cylindrical corrosion barrier.
B. O-rings: Conform to National Sanitary Foundation requirements.

2.3 RESTRAINED JOINTS

A. Ductile Iron Pipe (DIP): See Section 02215 – Ductile Iron Pipe (DIP) and Fittings.
B. PVC Pipe: See Section 02235 – Polyvinyl Chloride Pipe (PVC). Perform hydrostatic testing in accordance with ASTM F1674.

C. Prestressed Concrete Cylinder Pipe (PCCP), Bar-Wrapped Pipe and Steel Pipe: Welded joints (see Paragraph 3.6 D).
D. Restrained Joints where required on DIP and PVC pipe:
   1. Restraint devices: Manufacture of high strength ductile iron, ASTM A536 up to twenty-four inches (24 In) and ASTM A36 for sizes greater than thirty inches (30 In). Working pressure rating twice that of design test pressure.
   2. Bolts and connecting hardware: High strength low alloy material in accordance with ANSI A21.11/AWWA C111.

2.4 COUPLINGS AND APPURTENANCES FOR LARGE DIAMETER WATERLINE
A. Flexible (Dresser-type) Couplings.
   1. Install where shown on the Drawings or where allowed by the Project Manager for the Contractor's convenience. Use galvanized flexible couplings when installed on galvanized pipe which is cement lined or when underground. Provide gaskets manufactured from Neoprene or Buna-N.
   2. For steel pipe; provide approved sleeve-type flexible couplings. Thickness of middle ring equal to or greater than thickness of pipe wall.
   3. Provide approved flanged adapter couplings for steel pipe.
   4. Use Type 316 stainless steel bolts, nuts and washers where flexible couplings are installed underground. Coat entire coupling with twenty (20) mil of approved coal tar coating.
B. Flap Valves: Provide approved flap valves on discharge of manhole drainline as shown on the Drawings.
   1. Body and Flap: ASTM A126-B cast iron.
   2. Seats: ASTM B21-CA482 or ASTM B301-CA145 bronze.
   3. Resilient Seat: AWWA C508.
   4. Hinge Arms: ASTM B584-CA865 high tensile bronze.
   5. Hinge pins: ASTM B98-CA655 silicon bronze.

PART III: EXECUTION

3.1 PREPARATION
A. Conform to applicable installation Technical Specifications for types of pipe used.
B. Employ workmen who are skilled and experienced in laying pipe of type and joint configuration being furnished. Provide watertight pipe and pipe joints.
C. Lay pipe to lines and grades shown on the Drawings.

D. Confirm that nine feet (9 Ft) minimum separation from gravity sanitary sewers and manholes or separation of four feet (4 Ft) minimum from force mains as specified in this Section in all directions unless a special design is provided on the Drawings.
E. Where above clearances cannot be attained and a special design has not been provided on the Drawings, obtain direction from the Project Manager before proceeding with construction.
F. Inform the Project Manager if unmetered sprinkler or fire line connections exist which are not shown on the Drawings. Make transfer to new lines only after approval by the Project Manager.
G. For projects involving multiple subdivisions or locations, limit water line installation to maximum of two (2) project site locations. Maximizing two (2) pipe installation crews shall be permitted, unless otherwise approved by the Project Manager.
H. The City of Friendswood Public Works Department shall handle, at no cost to the Contractor, operations involving opening and closing valves for wet connections and for chlorination. The Contractor is responsible for handling necessary installations and removal of chlorination and testing taps and risers.
I. If asbestos-cement (A.C.) pipe is encountered, follow safety practices outlined in American Water Works Association's publication, "Work Practices for A/C Pipe". Strictly adhere to "recommended practices" contained in this publication and make them "mandatory practices" for this Project.
J. For pipe diameters thirty-six inches (36 In) and greater, clearly mark each section of pipe and fitting with unique designation on inside of pipe along with pressure class. Locate unique identifying mark minimum of five feet (5 Ft) away from either end of each section of pipe. Provide one (1) unique identifying mark in middle of each fitting. Place markings at consistent locations. Use permanent black paint and minimum letter height of four inches (4 In) to mark designations.
K. The Contractor is responsible for assuring chosen manufacturer fulfills requirements for extra fittings and, therefore, is responsible for costs due to downtime if requirements are not met by the manufacturer.
L. Do not remove plugs or clamps during months of peak water demands; June, July and August, unless otherwise approved by the Project Manager.

3.2 HANDLING, CLEANING AND INSPECTION

A. Handling:
1. Place pipe along project site where storm water or other water shall not enter or pass through pipe.
2. Load, transport, unload and otherwise handle pipe and fittings to prevent damage of any kind. Handle and transport pipe with equipment designed, constructed and arranged to prevent damage to pipe, lining and coating. Do not permit bare chains,

hooks, metal bars or narrow skids or cradles to come in contact with coatings. Where required, provide pipe fittings with sufficient interior strutting or cross bracing to prevent deflection under their own weight.

3. Hoist pipe from trench side into trench by means of sling of smooth steel cable, canvas, leather, nylon or similar material.
4. For large diameter water lines, handle pipe only by means of sling of canvas, leather, nylon or similar material. Sling shall be minimum thirty-six inches (36 In) in width. Do not tear or wrinkle tape layers.
5. Use precautions to prevent injury to pipe, protective linings and coatings.
    a. Package stacked pipe on timbers. Place protective pads under banding straps at time of packaging.
    b. Pad fork trucks with carpet or other suitable material. Use nylon straps around pipe for lift when relocating pipe with crane or backhoe.
    c. Do not lift pipe using hooks at each end of pipe.
    d. Do not place debris, tools, clothing or other materials in pipe.
    e. Do not drop pipe into trench deeper than two feet (2 Ft). Any pipe that has been dropped shall be marked with an "X" and shall not be used.
6. Repair damage to pipe or protective lining and coating before final acceptance.
7. For cement mortar line and coated steel pipe and PCCP, permit no visible cracks longer than six inches (6 In), measured within fifteen degrees (15°) of line parallel to pipe longitudinal axis of finished pipe, except:
    a. In surface laitance of centrifugally cast concrete.
    b. In sections of pipe with steel reinforcing collars or wrappers.
    c. Within twelve inches (12 In) of pipe ends.
8. Reject pipe with visible cracks (not meeting exceptions) and remove from project site.

B. Cleaning: Thoroughly clean and dry interior of pipe and fittings of foreign matter before installation and keep interior clean until the Work has been accepted. Keep joint contact surfaces clean until jointing is completed. Do not place debris, tools, clothing or other materials in pipe. After pipe laying and joining operations are completed, clean inside of pipe and remove any debris.

C. Inspection: Before installation, inspect each pipe and fitting for defects. Reject defective, damaged or unsound pipe and fittings and remove them from site.

3.3 EARTHWORK

A. Conform to applicable provisions of Section 02125 – Excavation and Backfilling for Utilities and Section 02270 – Augering for Water Pipe and Conduit.

B. Bedding: Use bedding materials in conformance with Section 02140 – Utility Backfill Materials.

C. Backfill: Use bank run sand or earth or native soil as specified in Section 02140 – Utility Backfill Materials. Backfill excavated areas in same day excavated. When not possible, cover excavated areas using steel plates on paved areas and other protective measures elsewhere.

D. Place material in uniform layers of prescribed maximum loose thickness and wet or dry material to approximately optimum moisture content. Compact to prescribed density. Water tamping or jetting is not allowed.

E. Pipe Embedment: Including six (6) inch pipe bedding and backfill to twelve inches (12 In) above top of pipe.

3.4 PIPE CUTTING

A. Cut pipe twelve inches (12 In) and smaller with standard wheel pipe cutters. Cut pipe larger than twelve inches (12 In) in manner approved by the Project Manager. Make cuts smooth and at right angles to axis of pipe. Bevel plain end with heavy file or grinder to remove sharp edges.

3.5 PIPING INSTALLATION

A. General Requirements:

1. Lay pipe in subgrade free of water.
2. Make adjustments of pipe to line and grade by scraping away subgrade or filling in with granular material.
3. Properly form bedding to fully support bell without wedging or blocking up bell.
4. Open Cut Construction: Keep pipe trenches free of water which might impair pipe laying operations. Grade pipe to provide uniform support along bottom of pipe. Excavate for bell holes after bottom has been graded and in advance of placing pipe. Lay not more than nominal city block length of not more than three hundred feet (300 Ft) of pipe in trench ahead of backfilling operations. Cover or backfill laid pipe if pipe laying operations are interrupted and during non-working hours. Place backfill carefully and simultaneously on each side of pipe to avoid lateral displacement of pipe and damage to joints. If adjustment of pipe is required after it has been laid, remove and re-lay as new pipe.

B. Install pipe continuously and uninterrupted along each street on which the Work is to be performed. Obtain approval of the Project Manager prior to skipping any portion of the Work.

C. Protection of Pipeline: Securely place stoppers or bulkheads in openings and in end of line when construction is stopped temporarily and at end of each day's work.

D. Perform Critical Location as shown on the Drawings. Refer to Section 02125 – Excavation and Backfill for Utilities for additional requirements at critical locations.

E. Laying Large Diameter Water Line:
   1. Lay not more than fifty feet (50 Ft) of pipe in trench ahead of backfilling operations.
   2. Dig trench to proper width as shown on the Drawings. When trench width below top of pipe becomes four feet (4 Ft) wider than specified, install higher class of pipe or improved bedding, as determined by the Project Manager. No additional payment shall be made for higher class of pipe or improved bedding.
   3. Use adequate surveying methods and equipment; employ personnel competent in use of this equipment. Horizontal and vertical deviations from alignment as indicated on the Drawings shall not exceed one-tenth foot (0.10 Ft). Measure and record "as-built" horizontal alignment and vertical grade at maximum of every one hundred feet (100 Ft) on record drawings.
   4. Prevent damage to coating when placing backfill. Use backfill material free of large rocks or stones or other material which could damage coatings.
   5. Before assembling couplings, lightly coat pipe ends and outside of gaskets with cup grease or liquid vegetable soap to facilitate installation.
   6. Prior to proceeding with critical tie-ins submit sequence of work based on findings from "critical location" effort.

F. Perform following additional procedures when working on plant sites.
   1. Seventy-two hours (72 Hrs) prior to each plant shut down or connection, schedule coordination meeting with the Project Manager and Water Production personnel. At this meeting, present proposed sequencing of the Work and verification of readiness to complete the Work as required and within time permitted. Do not proceed with the Work until the Project Manager agrees key personnel, equipment and materials are on hand to complete the Work.
   2. Prior to fully excavating around existing piping, excavate as minimal as possible to confirm type and condition of existing joints. Verify size, type and condition of pipe prior to ordering materials or fully mobilizing for the Work.
   3. Do not proceed with connections to existing piping and identified critical stages of work unless approved by the Project Manager and the City's Utilities Superintendent is present to observe.
   4. Coordinate with the City's Utilities Superintendent to obtain reduction in operating pressures prior to performing connections to existing piping.
   5. Make connections to existing piping only when two (2) valves are closed off between connection and source of water pressure. Do

not make connection relying solely on one (1) valve being closed, unless otherwise approved by the Project Manager.

6. Perform critical stages of the Work identified on the Drawings at night or during low water demand months as specified in Section 01110 – Summary of Work.
7. Excavation equipment used on plant sites to have smooth bucket; no teeth or side cutters.
8. Submit to the Project Manager One Call Notification transmittal number prior to beginning excavation.
9. Before each "dig" with mechanical excavator, probe ground to determine potential obstructions. Repeat procedure until existing pipe is located or excavation reaches desired elevation. Perform excavations within one foot (1 Ft) of existing piping by hand methods.
10. Provide adequate notice to pipe manufacture's representative when connecting or modifying existing Prestressed Concrete Cylinder Pipe (PCCP).
11. Provide field surveyed (horizontal and vertical elevations) "as-builts" of new construction and existing underground utilities encountered. Submit in accordance with Section 01330 – Submittal Procedures.
12. Prior to performing plant work to be done on weekend, provide list of sites and contact person with phone numbers to the Project Manager by noon on each Thursday of week when such work is contemplated. Contact person must be accessible during weekend, have local Metro Area phone number and be authorized to make emergency decisions.
13. No night work or plant shut down shall be scheduled to begin two (2) working days before or after designated City holidays.

G. For tie-ins to existing water lines, provide necessary material on hand to facilitate connection prior to shutting down existing water line. Provide the City a minimum of seventy-two hours (72 Hrs) notice prior to shutting down existing water line.

1. Any work that has not been scheduled seventy-two hours (72 Hrs) before work is to commence, with the exception of emergency operations, shall not be allowed to start.

3.6 JOINTS AND JOINTING

A. Rubber Gasketed Bell-and-Spigot Joints for Prestressed Concrete Cylinder Pipe (PCCP), Bar Wrapped Pipe PVC, Steel and DIP:

1. After rubber gasket is placed in spigot groove of pipe, equalize rubber gasket cross section by inserting tool or bar recommended by manufacturer under rubber gasket and moving it around periphery of pipe spigot.
2. Lubricate gaskets with nontoxic water-soluble lubricant before pipe units are joined.

3. Fit pipe units together in manner to avoid twisting or otherwise displacing or damaging rubber gasket.
4. After pipe sections are joined, check gaskets to ensure that no displacement of gasket has occurred. If displacement has occurred, remove pipe section and remake joint as for new pipe. Remove old gasket, inspect for damage and replace if necessary before remaking joint.
5. Where preventing movement of sixteen inch (16 In) diameter or greater pipe is necessary due to thrust, use restrained joints as shown on the Drawings.
    a. Include buoyancy conditions for soil unit weight when computing thrust restraint calculations.
    b. Do not include passive resistance of soil in thrust restraint calculations.
6. Except for PVC pipe, provide means to prevent full engagement of spigot into bell as shown on the Drawings. Means may consist of wedges or other types of stops as approved by the Project Manager.

B. Flanged Joints where required on Prestressed Concrete Cylinder Pipe (PCCP), Bar Wrapped Pipe, Ductile Iron Pipe (DIP) or Steel Pipe:
1. AWWA C207. Prior to installation of bolts, accurately center and align flanged joints to prevent mechanical prestressing of flanges, pipe and equipment. Align bolt holes to straddle vertical, horizontal or north-south center line. Do not exceed three sixty-fourths inch per foot (3/64 In/Ft) inclination of flange face from true alignment.
2. Use full-face gaskets for flanged joints. Provide one-eighth inch (1/8 In) thick cloth inserted rubber gasket material. Cut gaskets at factory to proper dimensions.
3. Use galvanized or black nuts and bolts to match flange material. Use cadmium plated steel nuts and bolts underground. Tighten bolts progressively to prevent unbalanced stress. Maintain at all times approximately same distance between two (2) flanges at points around flanges. Tighten bolts alternately one hundred eighty degrees (180°) apart until all are evenly tight. Draw bolts tight to ensure proper seating of gaskets. Provide Densco petroleum based tape or approved equal for all exposed portions of nuts, bolts and pipe.
4. Full length bolt isolating sleeves and washers shall be used with flanged connections.
5. For in-line flange joints thirty inches (30 In) in diameter and greater and at butterfly valve flanges, provide Pyrox G-10 with nitrite seal, conforming to ANSI A 21.11 mechanical joint gaskets. For in-line flange joints sized between twelve inches (12 In) in diameter and greater and twenty-four inches (24 In) in diameter and smaller, provide Phenolic PSI with nitrite seal

gasket conforming to ANSI A 21.11 mechanical joint gaskets.

C. Welded Joints (Prestressed Concrete Cylinder Pipe (PCCP), Bar Wrapped Pipe, Steel Pipe):
   1. Prior to starting work, provide certification of qualification for welders employed on project for type of work procedures and positions involved.
   2. Joints: AWWA C206. Full-fillet, single lap-welded slip-type either inside or outside or double butt-welded type; use automatic or hand welders; completely penetrate deposited metal with base metal; use filler metal compatible with base metal; keep inside of fittings and joints free from globules of weld metal which would restrict flow or become loose. Do not use mitered joints. For interior welded joints, complete backfilling before welding. For exterior field-welded joints, provide adequate working room under and beside pipe. Use exterior welds for thirty inch (30 In) and smaller.
   3. Furnish welded joints with trimmed spigots and interior welds for thirty-six inch (36 In) and larger pipe.
   4. Bell-and-spigot, lap-welded slip joints: Deflection may be taken at joint by pulling joint up to three-quarters inch (3/4 In) as long as one and one-half inch (1-1/2 In) minimum lap is maintained. Spigot end may be miter cut to take deflections up to five degrees (5°) as long as joint tolerances are maintained. Miter end cuts of both ends of butt-welded joints may be used for joint deflections of up to five degrees (5°).
   5. Align piping and equipment so that no part is offset more than one-eighth inch (1/8 In). Set fittings and joints square and true and preserve alignment during welding operation. For butt welded joints, align abutting ends to minimize offset between surfaces. For pipe of same nominal wall thickness, do not exceed one-sixteenth inch (1/16 In) offset. Use line-up clamps for this purpose; however, take care to avoid damage to linings and coatings.
   6. Protect coal-tar-epoxy lining during welding by draping an eighteen inch (18 In) wide strip of heat resistant material over top half of pipe on each side of lining holdback to avoid damage to lining by hot splatter. Protect tape coating similarly if external welding is required.
   7. Welding rods: Compatible with metal to be welded to obtain strongest bond, E-70XX.
   8. Deposit metal in successive layers to provide at least two (2) passes or beads for automatic welding and three (3) passes or beads for manual welding in completed weld.
   9. Deposit no more than one-quarter inch (1/4 In) of metal on each pass. Thoroughly clean each individual pass with wire brush or hammer to remove dirt, slag or flux.

10. Do not weld under weather condition that would impair strength of weld, such as wet surface, rain or snow, dust or high winds, unless work is properly protected.
11. Make tack weld of same material and by same procedure as completed weld. Otherwise, remove tack welds during welding operation.
12. Remove dirt, scale and other foreign matter from inside piping before tying in sections, fittings or valves.
13. Welded Joints for Large Diameter Water Lines:
    a. Furnish pipe with trimmed spigots and interior welds for thirty-six inch (36 In) and larger pipe.
    b. Use exterior welds for thirty inch (30 In) and smaller.
    c. Only one (1) end may be miter cut. Miter end cuts of both ends of butt-welded joints may be used for joint deflections of up to two and one-half degrees (2-1/2°).
    d. For large diameter water lines, employ an independent certified testing laboratory, approved by the Project Manager, to perform weld acceptance tests on welded joints. Include cost of such testing and associated work to accommodate testing in contract unit price bid for water line. Furnish copies of test reports to the Project Manager for review. The Project Manager has the final decision as to suitability of welds tested.
        1) Weld acceptance criteria:
            a) Conduct in accordance with ASTM E165-Standard Test Method for Liquid Penetrant Examination and ASTM E709 Standard Guide for Magnetic Particle Examination. Use X-ray methods for butt welds, for one hundred percent (100%) of joint welds.
            b) Examine welded surfaces for the following defects:
                i) Cracking.
                ii) Lack of fusion/penetration.
                iii) Slag which exceeds one-third (1/3) of (t) where (t) equals material thickness.
                iv) Porosity/Relevant rounded indications greater than three-sixteenths inch (3/16 In); rounded indication is one (1) of circular or elliptical shape with length equal to or less than three (3) times its width.
                v) Relevant linear indications in which length of linear indication exceeds three (3) times its width.

vi) Four (4) or more relevant one-sixteenth inch (1/16 In) rounded indications in line separated by one-sixteenth inch (1/16 In) or less edge to edge.

14. After pipe is joined and prior to start of welding procedure, make spigot and bell essentially concentric by jacking, shimming or tacking to obtain clearance tolerance around periphery of joint except for deflected joints.
15. Furnish each welder employed steel stencil for marking welds, so work of each welder can be identified. Mark pipe with assigned stencil adjacent to weld. When welder leaves job, stencil must be voided and not duplicated. Welder making defective welds must discontinue work and leave project site. Welder may return to project site only after recertification.
16. Provide cylindrical corrosion barriers for epoxy lined steel pipe twenty-four inch (24 In) diameter and smaller, unless minimum wall thickness is one-half inch (1/2 In) or greater.
    a. In addition to welding requirements contained here in Paragraph 3.6, conform to protection fitting manufacturer's installation recommendations.
    b. Provide services of technical representative of manufacturer available on site at beginning of pipe laying operations. Representative to train welders and advise regarding installation and general construction methods. Welders must have twelve months (12 Mos) prior experience installing protection fittings.
    c. All steel pipe is to have cutback three-quarters inch (3/4 In) to not greater than one inch (1 In) of internal diameter coating from weld bevel.
    d. Furnish steel fittings with cylindrical corrosion barriers with shop welded extensions to end of fittings. Extension length to measure no less than diameter of pipe. Shop apply lining in accordance with AWWA C210 or AWWA C213.
    e. All steel pipe receiving field adjustments are to be cold cut using standard practices and equipment. No cutting using torch is to be allowed.

D. Harnessed Joints (Prestressed Concrete Cylinder Pipe (PCCP), Bar Wrapped Pipe):
    1. Use of snap-ring type restrained joints on pipe is limited to twenty inch (20 In) through forty-eight inch (48 In) diameters.
    2. Position snap-ring joint bolt on top [twelve (12) o'clock position]. Provide minimum one-half inch (1/2 In) joint recess. Use joint "diapers" minimum of twelve inches (12 In) wide.
    3. For field adjustments with deflections beyond manufacturer's

recommendations:

a. Field trim spigot.
b. Do not engage ring.

4. Harnessed joints shall not be permitted in areas defined on the Drawings as potentially petroleum contaminated material, in tunnels or at bend greater than five degrees (5°).
5. Install harness type joints including snap rings at straight sections of pipe.

E. Restrained Joints

1. For existing water lines and water lines less than sixteen inches (16 In) in diameter, restrain pipe joints with concrete thrust blocks.
2. Thrust restraint lengths shown on the Drawings are minimum anticipated lengths. These lengths are based on deflections indicated and on use of Prestressed Concrete Cylinder Pipe (PCCP) for large diameter lines and ductile Iron Pipe (DIP) for small diameter lines. Adjustments in deflections or use of other pipe material may result in reduction or increase of thrust lengths. Perform calculations by pipe manufacturer to verify proposed thrust restraint lengths. Submit calculations for all pipe materials sealed by a Professional Engineer licensed by the State of Texas for review by the Project Manager. Make adjustments in thrust restraint lengths at no additional cost to the City.
3. Passive resistance of soil shall not be permitted in calculation of thrust restraint.
4. For sixteen inch (16 In) lines and larger use minimum sixteen foot (16 Ft) length of pipe in and out of joints made up of beveled pipe where restraint joint lengths are not identified on the Drawings. Otherwise, provide restraint joints for a minimum length of sixteen feet (16 Ft) on each side of beveled joints.
5. Restraint Devices:
   a. Prestressed Concrete Cylinder Pipe (PCCP), bar wrapped pipe and steel pipe, that has either welded or flanged fittings or valves, shall not need to be further restrained.
   b. Mega-lug fittings are the acceptable and preferred method of restraint for all other piping with the exception of those listed in paragraph 3.7.E.5.d of this Section.
   c. Use of Ellison clamps and all-threaded rod is allowed with the approval of the Project Manager. Ellison clamps, all-threaded rod and other hardware shall be 316 stainless steel. Ellison clamp shall be a minimum of two feet (2 Ft) from edge of fitting.
   d. All offsets, even if Mega-lugs are used on the fittings, shall have Ellison clamps on the end and/or sides of the

offset and shall have stainless steel all-threaded rod connections in between fittings to prevent movement.

5. Installation:
   a. Install restrained joints mechanism in accordance with manufacturer's recommendations.
   b. Examine and clean mechanism; remove dirt, debris and other foreign material.
   c. Apply gasket and joint NSF 61 FDA food grade approved lubricant.
   d. Verify gasket is evenly seated.
   e. Do not over stab pipe into mechanism.
6. Prevent any lateral movement of thrust restraints throughout pressure testing and operation.
7. Place Class C, two thousand five hundred pounds per square inch (2500 psi) concrete conforming to Section 03300 – Structural Concrete, for blocking at each change in direction of existing water lines, to brace pipe against undisturbed trench walls. Finish placement of concrete blocking, made from Type I cement, four days (4 D) prior to hydrostatic testing of pipeline. Test may be made two days (2 D) after completion of blocking if Type II cement is used.

F. Joint Grout (Prestressed Concrete Cylinder Pipe (PCCP), Bar Wrapped Pipe, Steel Pipe):
1. Mix cement grout mixture by machine except when less than one-half cubic yard (1/2 Cy) is required. When less than one-half cubic yard (1/2 Cy) is required, grout may be hand mixed. Mix grout only in quantities for immediate use. Place grout within twenty minutes (20 Min) after mixing. Discard grout that has set. Retempering of grout by any means is not permitted.
2. Prepare grout in small batches to prevent stiffening before it is used. Do not use grout which has become so stiff that proper placement cannot be assured without retempering. Use grout for filling grooves of such consistency that it shall adhere to ends of pipe.
3. Surface Preparation: Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces with wire brush or hammer to sound, clean surface. Remove rust and foreign materials from metal surfaces in contact with grout.
4. Follow established procedures for hot and cold weather concrete placement.
5. Complete joint grout operations and backfilling of pipe trenches as closely as practical to pipe laying operations. Allow grouted exterior joints to cure at least one hour (1 Hr) before compacting backfill.
6. Grouting exterior joint space: Hold wrapper in place on both sides of joint with minimum five-eighths inch (5/8 In) wide steel

straps or bands. Place no additional bedding or backfill material on either side of pipe until after grout band is filled and grout has mechanically stiffened. Pull ends of wrapper together at top of pipe to form access hole. Pour grout down one side of pipe until it rises on other side. Rod or puddle grout to ensure complete filling of joint recess. Agitate for fifteen minutes (15 Min) to allow excess water to seep through joint band. When necessary, add more grout to fill joint completely. Protect gap at top of joint band from backfill by allowing grout to stiffen or by covering with structurally protective material. Do not remove band from joint. Proceed with placement of additional bedding and backfill material.

7. Interior Joints for Pipe twenty-four inches (24 In) and smaller: Circumferentially butter bell with grout prior to insertion of spigot, strike off flush surplus grout inside pipe by pulling filled burlap bag or inflated ball through pipe with rope. After joint is engaged, finish off joint grout smooth and clean. Use swab approved by the Project Manager for twenty inch (20 In) pipe and smaller.
8. Protect exposed interior surfaces of steel joint bands by metallizing, by other approved coatings or by pointing with grout. Joint pointing may be omitted on potable water pipelines if joint bands are protected by zinc metallizing or other approved protective coatings.
9. Remove and replace improperly cured or otherwise defective grout.
10. Strike off grout on interior joints and make smooth with inside diameter of pipe.
11. When installed in tunnel or encasement pipe and clearance within casing does not permit outside grout to be placed in normal manner, apply approved flexible sealer, such as Flex Protex or equal, to outside joint prior to joint engagement. Clean and prime surfaces receiving sealer in accordance with manufacturer's recommendations. Apply sufficient quantities of sealer to assure complete protection of steel in joint area. Fill interior of joint with grout in normal manner after joint closure.
12. Interior Joints for Water Lines thirty inches (30 In) and larger: Clean joint space, wet joint surfaces, fill with stiff grout and trowel smooth and flush with inside surfaces of pipe using steel trowel so that surface is smooth. Accomplish grouting at end of each work day. Obtain written acceptance from the Project Manager of inside joints before proceeding with next day's pipe laying operation. During inspection, insure no delamination of joint mortar has occurred by striking joint mortar lining with rubber mallet. Remove and replace delaminated mortar lining.
13. Work which requires heavy equipment to be over water line must be completed before mortar is applied to interior joints.

G. Large Diameter Water Main Joint Testing: In addition to testing individual joints with feeler gauge approximately one-half inch (1/2 In) wide and fifteen thousandths inch (0.015 In) thick, use other joint testing procedure approved or recommended by pipe manufacturer which shall help ensure watertight installation prior to backfilling. Perform tests at no additional cost to the City.

H. Make curves and bends by deflecting joints or other method as recommended by manufacturer and approved by the Project Manager. Submit details of other methods of providing curves and bends which exceed manufacturer's recommended deflection prior to installation.
   1. Deflection of pipe joints shall not exceed maximum deflection recommended by pipe manufacturer, unless otherwise indicated on the Drawings.
   2. If deflection exceeds that specified but is less than five percent (5%), repair entire deflected pipe section such that maximum deflection allowed is not exceeded.
   3. If deflection is equal to or exceeds five percent (5%) from that specified, remove entire portion of deflected pipe section and install new pipe.
   4. Replace, repair or reapply coatings and linings as required.
   5. Assessment of deflection may be measured by the Project Manager at location along pipe. Arithmetical averages of deflection or similar average measurement methods shall not be deemed as meeting the intent of this standard.
   6. When rubber gasketed pipe is laid on curve, join pipe in straight alignment and then deflect to curved alignment.

I. Closures Sections and Approved Field Modifications to Steel, Prestressed Concrete Cylinder Pipe (PCCP), Bar Wrapped Pipe and Fittings:
   1. Apply welded-wire fabric reinforcement to interior and exterior of exposed interior and exterior surfaces greater than six inches (6 In) in diameter. Welded-wire fabric: minimum W1; maximum spacing two inches by four inches (2 In x 4 In); three-eighths inch (3/8 In) from surface of steel plate or middle third (3rd) of lining or coating thickness for mortar thickness less than three-quarters inch (3/4 In).
   2. Fill exposed interior and exterior surfaces with nonshrink grout.
   3. For pipe diameters thirty-six inches (36 In) and greater, perform field welds on interior and exterior of pipe.
   4. For large diameter water lines, provide minimum overlap of four inches (4 In) of butt strap over adjacent piece on butt-strap closures.

3.7 CATHODIC PROTECTION APPURTENANCES

A. Conform to requirements of Section 02285 – Cathodic Protection.

B. Where identified on the Drawings, modify pipe for cathodic protection as

detailed on the Drawings and specified. Unless otherwise noted, provide insulation kits including test stations at connections to existing water system or at locations to isolate one (1) type of cathodic system from another type, between water line, access manhole piping and other major openings in water line or as shown on the Drawings.

C. Bond joints for pipe installed in tunnel or open cut, except where insulating flanges are provided. Weld strap or clip between bell and spigot of each joint or as shown on the Drawings. No additional bonding required where joints are welded for thrust restraint. Repair coatings as specified by appropriate AWWA standard, as recommended by manufacturer and as approved by the Project Manager.

D. Bonding Strap or Clip: Free of foreign material that may increase contact resistance between wire and strap or clip.

3.8 SECURING, SUPPORTING AND ANCHORING

A. Support piping as shown on the Drawings and as specified in this Section, to maintain line and grade and prevent transfer of stress to adjacent structures.

B. Where shown on the Drawings, anchor pipe fittings and bends installed on water line by welding consecutive joints of pipe together to distance each side of fitting. Restrained length, as shown on the Drawings, assumes that installation of pipe and subsequent hydrostatic testing begins upstream and proceed downstream, with respect to normal flow of water in pipe. If installation and testing differs from this assumption, submit for approval revised method of restraining pipe joints upstream and downstream of device used to test against (block valve, blind flange or dished head plug).

C. Use adequate temporary blocking of fittings when making connections to distribution system and during hydrostatic tests. Use sufficient anchorage and blocking to resist stresses and forces encountered while tapping existing water line.

3.9 POLYETHYLENE WRAP FOR DUCTILE IRON PIPE (DIP)

A. Double wrap pipe and appurtenances (except fire hydrants and fusion bond or polyurethane coated fittings) with eight (8) mil polyethylene film.

B. Do not use polyethylene wrap if pipe is cathodically protected.

C. Conform to requirements of Section 02260 – Polyethylene Wrap.

3.10 CLEANUP AND RESTORATION

A. Provide cleanup and restoration crews to work closely behind pipe laying crews and where necessary, during disinfection and hydrostatic testing, service transfers, abandonment of old water lines, backfill and surface restoration.

B. Unless otherwise approved by the Project Manager, comply with the following;

1. Once water line is installed to limits approved in layout

submitted, immediately begin preparatory work for disinfection effort.

2. Immediately after transfer of services, begin abandonment of old water lines and site restoration.
3. Do not exceed a total of fifty percent (50%) of total project linear feet of disturbed right-of-way and easement until site is restored in accordance with Section 01745 – Site Restoration.
4. Exceeding any of the above footage limitations shall be considered a material breach of the Contract and subject to termination in accordance with the General Conditions.

C. For large diameter water lines, do not install more than two thousand linear feet (2000 Lf) of water line, without previous two thousand linear feet (2000 Lf) being restored in accordance with Section 01745 – Site Restoration. Schedule paving crews so repaving work shall not lag behind pipe laying work by more than one thousand linear feet (1000 Lf). Failure to comply with this requirement shall be considered a material breach of the Contract and subject to termination in accordance with the General Conditions.

3.11 CLEANLINESS OF PIPING SYSTEMS

A. End Caps shall be used throughout storage of material and during installation as needed to assure dirt and debris does not enter the piping system. If there is Remove construction debris or foreign material and thoroughly broom clean and flush piping systems. Provide temporary connections, equipment and labor for cleaning.

3.12 DISINFECTION OF WATER LINES

A. Conform to requirements of Section 02455 – Disinfection of Waterlines.
   1. No later than three (3) days after completing disinfection preparatory work, submit to the City appropriate request for disinfection.
   2. Schedule City' Utilities Superintendent at least seventy-two hours (72 Hrs) before disinfection or blowing off of lines. The City Water personnel shall turn all valves on and off for the duration.
   3. Water Lines shall not be placed into service until all Bac-T testing has passed.

3.13 FIELD HYDROSTATIC TESTS

A. Conform to requirements of Section 02450 – Hydrostatic Testing of Waterlines.

END OF SECTION

SECTION 02400SP

WATER LINES

The following supplement modifies Section 02400 WATER LINES Standard Specification. Where a portion of the of the Specification is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

2.1 PIPE MATERIALS

A. ADD THE FOLLOWING IN SECTION 2.1 PIPE MATERIALS SUBSECTION A.

7. SECTION 02220 High Density Polyethylene (HDPE) Pipe.

3.6 JOINTS AND JOINTING

B. ADD THE FOLLOWING SUBSECTION IN SECTION 3.6 JOINTS AND JOINTING.

K. HDPE pipe shall be joined using butt fusion. All butt fusion welds shall be made as described in ASTM F2620**.** Electrofusion welding can be used for making pipe welds. Hot air and extrusion welding are NOT permitted for pipe joining**.**

3.11 CLEANLINESS OF PIPING SYSTEM

C. ADD THE FOLLOWING SUBSECTIONSECTIONS IN SECTION 3.11 CLEANLINESS OF PIPING SYSTEMS

B. The interior of all pipes shall be cleaned of all foreign matter before being installed and shall be kept clean until the work has been accepted. All lumps, blisters and excess coating shall be removed from pipe surfaces. Such surfaces shall be wire brushed and wiped clean, dry, and free from oil and grease. All joint contact surfaces shall be kept clean until the jointing process is completed.

C. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. No debris, tools, clothing, or other materials shall be placed in the pipe.

The following provisions modify Section 02400 – Water Lines Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraphs 1.2.A.1 thru 1.2.A.7.

END OF SPECIAL PROVISION

SECTION 02410
GATE VALVES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Gate valves.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for gate valves is on a unit price basis. The unit price includes cost of required box for gate valves and extensions.
  2. Payment for two inch (2 In) blow-off valve with box is on a unit price basis for each installation.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
  2. ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Casting.
  3. ASTM B763 – Standard Specification for Copper Alloy Sand Casting for Valve Application.
  4. ASTM D429 – Standard Test Methods for Rubber Property-Adhesion to Rigid Substrates.
- B. AWWA – American Water Works Association.
  1. AWWA C500 – Standard for Metal-Seated Gate Valves for Water Supply Service.
  2. AWWA C509 – Standard for Resilient-Seated Gate Valves for Water Supply Service.
  3. AWWA C515- Standard for Reduced Wall, Resilient- Seated Gate Valves for Water Supply Service.
  4. AWWA C550 – Standard for Protective Epoxy Interior Coatings for Valves and Hydrants.
- C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit manufacturer's product data for proposed valves for approval.
- C. Provide detailed drawings of gearing mechanism for twenty inch (20 In)

and larger gate valves.

1.5 QUALITY CONTROL

A. Submit manufacturer's affidavit that gate valves are manufactured in the United States and conform to stated requirements of AWWA C500, AWWA C509, AWWA C515 and this Section and that they have been satisfactorily tested in the United States in accordance with AWWA C500, AWWA C509 and AWWA C515.

PART II: PRODUCTS

2.1 MATERIALS

A. Gate Valves: AWWA C500, AWWA C509, AWWA C515 and additional requirements of this Section. Direct bury valves and those in subsurface vaults shall open counterclockwise (left hand).

B. If type of valve is not indicated on the Drawings, use gate valves as line valves for sizes twenty inches (20 In) and smaller. When type of valve is indicated, no substitute is allowed.

C. Gate Valves one and one-half inches (1-1/2 In) in diameter and smaller: one hundred twenty-five pounds per square inch (125 psi) pressure rating; bronze; rising-stem; singlewedge; disc type; screwed ends

D. Coatings for Gate Valves two inches (2 In) and larger: AWWA C550 non-toxic, imparts no taste to water, functions as physical, chemical and electrical barrier between base metal and surroundings, minimum eight (8) mil-thick, fusion-bonded epoxy. Prior to assembly of valve, apply protective coating to interior and exterior surfaces of body.

E. Gate Valves two inches (2 In) in diameter: Iron body, double disc or resilient-seated, non-rising stem, one hundred fifty pounds per square inch (150 psi) pressure rating, two inch (2 In) square nut operating to open counterclockwise (left hand).

F. Gate Valves three inches (3 In) to twelve inches (12 In) in diameter: Non-directional, standard-wall resilient seated (AWWA C509), parallel seat double disc (AWWA C500) or reduced-wall resilient seated gate valves (AWWA C515), two hundred pounds per square inch (200 psi) pressure rating, bronze mounting, push-on bell ends with rubber joint rings and nut-operated unless otherwise specified. Provide approved standard-wall resilient seated valves. Provide approved reduced-wall resilient seated valves. Provide approved double disc valves. Comply with following requirements unless otherwise specified in the Drawings:

1. Design: Fully encapsulated rubber wedge or rubber seat ring mechanically attached with minimum 304 stainless-steel fasteners or screws; threaded connection isolated from water by compressed rubber around opening.
2. Body: Cast or ductile iron, flange bonnet and stuffing box together with ASTM A307 Grade B bolts. Manufacturer's initials, pressure rating and year manufactured shall be cast in body.

3. Bronze: Valve components in waterway shall contain not more than fifteen percent (15%) zinc and not more than two percent (2%) aluminum.
4. Stems: ASTM B763 bronze, alloy number-995 minimum yield strength of forty thousand pounds per square inch (40,000 psi); minimum elongation in two inches (2 In) of twelve percent (12%), non-rising.
5. O-rings: For AWWA C500, Section 3.12.2. For AWWA C509, Sections 2.2.6 and 4.8.2. For AWWA C515, Section 4.2.2.5.
6. Stem Seals: Consist of three (3) O-rings, two (2) above and one (1) below thrust collar with anti-friction washer located above thrust collar for operating torque.
7. Stem Nut: Independent or integrally cast of ASTM B62 bronze.
8. Resilient Wedge: Molded, synthetic rubber, vulcanized and bonded to cast or ductile iron wedge or attached with 304 stainless steel screws tested to meet or exceed ASTM D429 Method B; seat against epoxy-coated surface in valve body.
9. Bolts: AWWA C500 Section 3.4, AWWA C509 Section 4.4 or AWWA C515 Section 4.4.4; stainless steel; cadmium plated or zinc coated.

G. Gate valves fourteen inch (14 In) and larger in Diameter: AWWA C500; parallel seat double disc gate valves; push-on bell ends with rubber rings and nut-operated unless otherwise specified. Provide approved double disc valves with one hundred fifty pounds per square inch (150 psi) pressure rating. Comply with following requirements unless otherwise specified on the Drawings:
   1. Body: Cast iron or ductile iron; flange together bonnet and stuffing box with ASTM A307 Grade B bolts. Cast following into valve body manufacturer's initials, pressure rating and year manufactured. When horizontally mounted, equip valves greater than twelve inches (12 In) in diameter with rollers, tracks and scrapers.
   2. O rings: For AWWA C500, Section 3.12.2. For AWWA C515, Section 4.2.2.5.
   3. Stems: ASTM B763 bronze, alloy number-995 minimum yield strength of forty thousand pounds per square inch (40,000 psi); minimum elongation in two inches (2 In) of twelve percent (12%), non-rising.
   4. Stem Nut: Machined from ASTM B62 bronze rod with integral forged thrust collar machined to size; non-rising.
   5. Stem Seals: Consist of three (3) O-rings, two (2) above and one (1) below thrust collar with antifriction washer located above thrust collar for operating torque.
   6. Bolts: AWWA C500 Section 3.4 or AWWA C515 Section 4.4.4; stainless steel; cadmium plated or zinc coated.
   7. Discs: Cast iron with bronze disc rings securely penned into

machined dovetailed grooves.

8. Wedging Device: Solid bronze or cast-iron, bronze-mounted wedges. Thin plates or shapes integrally cast into cast-iron surfaces are acceptable. Other moving surfaces integral to wedging action shall be bronze monel or nickel alloy-to-iron.
9. Provide bypass for valves sixteen inches (16 In) and larger.
10. Bronze Mounting: Built as integral unit mounted over or supported on, cast-iron base and of sufficient dimensions to be structurally sound and adequate for imposed forces.
11. Gear Cases: Cast iron; furnished on eighteen (18) inch and larger valves and of extended type with steel side plates, lubricated, gear case enclosed with oil seal or O-rings at shaft openings.
12. Stuffing Boxes: Located on top of bonnet and outside gear case.

H. Gate valves fourteen inches (14 In) to twenty-four inches (24 In): Provide AWWA C515; reduced-wall, resilient seated gate valves with 250 psi pressure rating. Furnish with spur or bevel gearing.

1. Mount valves horizontally if proper ground clearance cannot be achieved by normal vertical installation. For horizontally mounted gate valves, provide bevel operation gear mounted vertically for above ground operation.
2. Use valve body, bonnet, wedge and operator nut constructed of ductile iron. Fully encapsulate exterior of ductile iron wedge with rubber.
3. Ensure wedge is symmetrical and seals equally well with flow in either direction.
4. Provide ductile iron operator nut with four (4) flats at stem connection to apply even input torque to the stem.
5. Bolts: AWWA C515, Section 4.4.4, Stainless Steel; cadmium plated or zinc coated.
6. Provide high strength bronze stem and nut.
7. O-rings: AWWA C515, Section 4.2.2.5, pressure O-rings as gaskets.
8. Provide stem sealed by three (3) O-rings. Top two (2) O-rings are to be replaceable with valve fully open at full rated working pressure.
9. Provide thrust washers to the thrust collar for easy valve operation.

I. Gate Valves Extension Stem: When shown on the Drawings, provide non-rising, extension stem having coupling sufficient to attach securely to operating nut of valve. Upper end of extension stem shall terminate in square wrench nut no deeper than four feet (4 Ft) from finished grade or as shown on the Drawings. Support extension stem with an arm attached to wall of manhole or structure that loosely holds extension stem and allows rotation in the axial direction only.

J. Gate Valves in Factory Mutual (Fire Service) Type Meter Installations:

Conform to provisions of this specification; outside screw and yoke valves; carry label of Underwriters' Laboratories, Inc.; flanged, Class 125; clockwise to close.

K. Gate Valves for Tapping Steel Pipe: Provide double disc gate valve. Resilient wedge gate valve shall only be installed in a vertical position.

L. Provide flanged joints when valve is connected to steel or PCCP.

PART III: EXECUTION

3.1 INSTALLATION

A. Earthwork: Conform to applicable provisions of Section 02125 – Excavation and Backfill for Utilities.

B. Operation: Do not use valves for throttling without prior approval of the manufacturer.

3.2 SETTING VALVES AND VALVE BOXES

A. Remove foreign matter from within valves prior to installation. Inspect valves in open and closed positions to verify that parts are in satisfactory working condition.

B. Install valves and valve boxes where shown on the Drawings. Set valves plumb and as detailed. Center valve boxes on valves. Carefully tamp earth around each valve box for minimum radius of four feet (4 Ft) or to undisturbed trench face when less than four feet (4 Ft). Install valves completely closed when placed in water line.

C. For pipe section of each riser, use only six inch (6 In), ductile iron Class 51 or DR18 PVC pipe cut to proper length. Riser must be installed to allow complete access for operation of valve. Assemble and brace box in vertical position as indicated on the Drawings.

3.3 DISINFECTION AND TESTING

A. Contractor shall disinfect valves and appurtenances as required by Section 02455 – Disinfection of Waterlines and test as required by Section 02450 – Hydrostatic Testing of Waterlines.

B. Double-Disc Gate Valves: Apply hydrostatic test pressure equal to twice rated working pressure of valve between discs. Valve shall show no leakage through metal, flanged joints or stem seals. Test at rated working pressure, applied between discs. Valve shall show no leakage through metal, flanged joints or stem seals. Do not exceed leakage rate of one ounce per hour per inch (1 Oz/Hr/In) of nominal valve size.

C. Solid-Wedge Gate Valves: Apply hydrostatic pressure equal to twice rated working pressure of valve with both ends bulkheaded and gate open. Valve shall show no leakage through metal, flanged joints or stem seals. Test at rated working pressure, applied through bulkheads alternately to each side of closed gate with opposite side open for inspection. Valve shall show no leakage through metal, flanged joints or stem-seals. Do not exceed leakage rate of one ounce per hour per inch

(1 Oz/Hr/In) of nominal valve size.

D. Repair or replace valves which exceed leakage rate.

3.4 PAINTING OF VALVES

A. Paint valves in vaults, stations and above ground with approved paint.

END OF SECTION

SECTION 02420
TAPPING SLEEVES AND VALVES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Tapping sleeves and valves for connections to existing water system.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment is on a unit price basis for each tap installed.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
  3. For water lines four inches (4 In) and greater, no payment shall be made until coupon (cut out portion of pipe tapped) is delivered to the City.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM A240 – Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.
  2. ASTM A193 Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
  3. ASTM A194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service.
- B. AWWA – American Water Works Association.
  1. AWWA C110 – Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and other Liquids.
  2. AWWA C200 – Standard for Steel Water Pipe – 6 in. and Larger.
  3. AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service – Sizes 4 in. through 144 in.
  4. AWWA C223 – Standard for Fabricated Steel and Stainless Steel Tapping Sleeves.
  5. AWWA C500 – Standard for Metal Seated Gate Valves, for Water Supply Service.
- C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit results of tapping sleeves NPT test opening.

C. Submit manufacturer's affidavit as required in Section 02410 – Gate Valves.

1.5 DELIVERY, STORAGE AND HANDLING

A. Ship steel sleeves in wooden crates that provide protection from damage to epoxy coating during transport and storage.

PART II: PRODUCTS

2.1 MATERIALS

A. Tapping Sleeves:
   1. Tapping Sleeve Bodies: AWWA C223 stainless steel, full circumference to be bolted together with high-strength, corrosion-resistant, low-alloy steel bolts with mechanical joint ends.
   2. Branch Outlet of Tapping Sleeve:
      a. Flanged, machined recess, AWWA C207, Class D, ANSI 150 pound drilling.
      b. Gasket: Affixed around recess of tap opening to prevent rolling or binding during installation.

B. Stainless Steel tapping-sleeve bodies and flange shall be used for following sizes and with following restrictions:
   1. Flange: ASTM A240 Stainless Steel, Type 304, ANSI 150 pound drilling.
   2. Gasket: Full circumferential, affixed around recess of tap opening to prevent rolling or binding during installation, compounded for water and sewer service.
   3. Stainless Steel sleeves are restricted to use on pipe sizes four inches (4 In) and larger.
   4. Body: ASTM A240 Stainless Steel, Type 304.
   5. Bolts: ASTM A193 Stainless Steel, Type 304.
   6. Nuts: ASTM A194 Stainless Steel, Type 304.
   7. Branch Outlet: Heavy Stainless Steel Pipe
   8. Provide approved stainless steel tapping sleeves.
   9. Do not use stainless steel sleeves for taps greater than seventy-five percent (75%) of pipe diameter.

C. Welded-steel tapping-sleeve bodies may be used in lieu of cast or ductile iron bodies for following sizes and with following restrictions:
   1. Flange: AWWA C207, Class D, ANSI 150 pound drilling.
   2. Gasket: Affixed around recess of tap opening to prevent rolling or binding during installation.
   3. Steel sleeves are restricted to use on pipe sizes six inches (6 In) and larger.
   4. Body: Heavy, welded-steel construction; top half grooved to retain neoprene O-ring seal permanently against outside diameter of pipe.

5. Bolts: AWWA C500 Section 3.5; coated with one hundred percent (100%) vinyl resin or corrosive resistant material.
6. Steel Sleeves Finish: Fusion-bonded epoxy coated to minimum twelve (12) mil thickness.
7. Finished Epoxy Coat: Free of laminations and blisters; and remain pliant and resistant to impact with non-peel finish.
8. Provide approved steel tapping sleeves.
9. Tapping Sleeves: Provide with three-quarters inch (3/4 In) NPT test opening for testing prior to tapping. Provide three-quarters inch (3/4 In) bronze plug for opening.
10. Do not use steel sleeves for taps greater than seventy-five percent (75%) of pipe diameter.

D. Tapping Valves: Meet requirements of Section 02410 – Gate Valves with following exceptions:
   1. Inlet Flanges:
      a. AWWA C110; Class 125.
      b. AWWA C110; Class 150 and higher: Minimum eight (8) hole flange.
   2. Outlet: Standard mechanical or push-on joint to fit any standard tapping machine.
   3. Valve Seat Opening: Accommodate full-size shell cutter for nominal size tap without contact with valve body; double disc.
   4. Valves must be open left (counterclockwise).

F. Valve Boxes: Standard Type "A" valve boxes conforming to requirements of Section 02440 – Valve Boxes, Meter Boxes and Meter Vaults.

PART III: EXECUTION

3.1 APPLICATION

A. Install tapping sleeves and valves at locations and of sizes shown on the Drawings. Install sleeve so valve is in horizontally level position unless otherwise indicated on the Drawings or approved by the Project Manager.

B. Clean tapping sleeve, tapping valve and pipe prior to installation and in accordance with manufacturer's instructions.

C. When tapping concrete pressure pipe, size on size, use shell cutter one (1) standard size smaller than water line being tapped.

D. Do not use Large End Bell (LEB) increasers with next size tap unless existing pipe is asbestos-cement.

3.2 INSTALLATION

A. Verify outside diameter of pipe to be tapped prior to ordering sleeve.

B. Tighten bolts in proper sequence so that undue stress is not placed on pipe.

C. Align tapping valve properly and attach to tapping sleeve. Insert

insulation sleeves into flange holes of tapping valve and pipe. Make insertions of sleeves on pipe side of tapping valve. Do not damage insulation sleeves during bolt tightening process.

D. Make tap with sharp, shell cutter:
   1. For twelve inch (12 In) and smaller tap, use minimum cutter diameter one-half inch (1/2 In) less than nominal tap size.
   2. For sixteen inch (16 In) and larger tap, use manufacturer's recommended cutter diameter.

E. Withdraw coupon and flush cuttings from newly-made tap.

F. Wrap:
   1. For twelve inch (12 In) and smaller tap, wrap completed tapping sleeve and valve in accordance with Section 02260 – Polyethylene Wrap.
   2. For sixteen inch (16 In) and larger tap, apply coal tar epoxy around completed tapping sleeve and valve. The coal tar epoxy shall be applied with minimum of two (2) coats. Each coat of coal tar epoxy shall have minimum dry film thickness of sixteen (16) mils.

G. Place concrete thrust block behind tapping sleeve (not over tapping sleeve and valve).

H. Request inspection of installation prior to backfilling.

I. Backfill in accordance with Section 02125 – Excavation and Backfill for Utilities.

END OF SECTION

SECTION 02421

AIR RELEASE AND VACUUM RELIEF VALVES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air release and vacuum relief valves.

1.02 RELATED SECTIONS

A. Section 01015 – Measurement and Payment

B. Section 01000 – Submittal Procedures

C. Section 02305 – Precast Concrete Manholes

D. Section 02125 – Excavation and Backfill for Utilities

E. Section 02455 – Disinfection of Water Lines

F. Section 02450 – Hydrostatic Testing of Waterlines

1.03 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for air release and vacuum relief valves is on unit price basis for each valve installed.

2. Payment includes manhole or vault (when required), fittings, vent piping and bollard(s) and appurtenances necessary for complete installation of valve.

3. Payment for valve assembly on aerial crossing includes fittings, anti-vandalism protection, freeze protection, vent piping and appurtenances necessary for complete installation of valve.

4. Refer to Section 01015 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.04 REFERENCES

A. ASTM A 48 - Standard Specification for Gray Iron Castings.

B. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

C. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

D. ASTM A 276 - Standard Specification for Stainless Steel Bars and Shapes.

E. ASTM A 313 - Standard Specification for Stainless Steel Spring Wire.

F. ASTM B 584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

1.05 SUBMITTALS

A. Conform to requirements of Section 01000 - Submittal Procedures.

B. Submit manufacturer's product data for proposed valves for approval.

PART 2 PRODUCTS

2.01 DESCRIPTION

A. Provide combination air valves designed to fulfill functions of air release (permit escape of air accumulated in line at high point of elevation while line is under pressure) and vacuum relief.

B. Provide inlet and outlet connections, and orifice as shown on Drawings.

1. Valve exterior: Painted with shop-applied primer suitable for contact with potable water.

2.02 MATERIALS

A. Air Release Valves: Provide approved air release valves ASTM A 48, Class 30, cast iron; float and leverage mechanism with body and cover, ASTM A 240 or ASTM A 276 stainless steel; orifice and seat, stainless steel against Buna-N or Viton mechanically retained with hex head nut and bolt. Other valve internals shall be stainless steel or bronze.

B. Air Release and Vacuum Relief Valves: Provide single-body, standard combination valves or duplex-body custom combination valves as indicated on Drawings.

1. For 2-inch and 3 inch, single-body valves, provide inlet and outlet size as shown on Drawings and orifice sized for 100 psi working pressure.

a. Valve materials: body, cover, and baffle, ASTM A 48, Class 35, or ASTM A 126, Grade B cast iron; plug or poppet, ASTM A 276 stainless steel; float, ASTM A 240 stainless steel; seat, Buna-N; other valve internals, stainless steel.

2. For 3 inch and larger duplex body valves as shown on Drawings, provide approved air release valve.

a. Air and vacuum valve materials: body and cover, ASTM A 126, Class B, cast iron; float, ASTM A 240 stainless steel; seat, Type 304, stainless steel and Buna-N, for sanitary sewer, Garlock #3000 (non-asbestos),for water lines; other valve internals, stainless steel or bronze (for sanitary sewer).

b. Air release valve: Constructed as specified in paragraph above on Air Release Valves.

C. Vacuum Relief Valves: Provide approved air inlet vacuum relief valves with flanged inlet and outlet connections as shown on Drawings. Provide air release valves in combination with inlet and outlet, and orifice as shown on Drawings. Valve shall open under pressure differential not to exceed 0.25 psi.

1. Materials for vacuum relief valves: valve body, ASTM A 48, Class 35, cast iron; seat and plug, ASTM B 584 bronze, copper alloy 836; spring, ASTM A 313, Type 304, stainless steel; bushing, ASTM B 584 bronze, copper alloy 932; retaining screws, ASTM A 276, Type 304, stainless steel.

D. Additional Requirements for Wastewater Applications:

1. Air Release/Vacuum Relief Valves shall have a minimum seating pressure of at most 5 psi through a maximum operating pressure of 250 psi unless otherwise specified by the Engineer.

2. Valve bodies shall be constructed of 316 stainless steel.

3. Valves that require adjustment of a spring or nuts shall not be allowed.

4. Piping connections between dissimilar metals, e.g., ductile iron or cast iron and stainless steel, etc., shall be provided with dielectric insulating kits consisting of dielectric gaskets, bolt sleeves, and washers to prevent any galvanic action between the dissimilar metals.

5. The valves shall have an internal debris shield and debris screen or an alternative mechanism to prevent clogging of the orifice.

6. Rubber components used shall be suitable for wastewater application.

7. Float materials shall be ASTM A 240 stainless steel, polypropylene, polyurethane, or HDPE for wastewater applications.

E. Manholes: As shown on Drawings conforming to requirements of Section 02305 - Precast Concrete Manholes.

PART 3 EXECUTION

3.01 EARTHWORK

A. Conform to applicable provisions of Section 02125 - Excavation and Backfill for Utilities.

3.02 SETTING VALVES IN MANHOLES AND VAULTS

A. If required by Project Manager, provide services of technical representative of valve manufacturer available on site during installation of valves.

B. Prior to installing valves, remove foreign matter from within valves. Inspect valves in open and closed position to verify that parts are in satisfactory working condition.

C. Install valves and valve manholes and vaults where indicated on Drawings or as located by Project Manager. Set manholes and vaults plumb and as detailed. Center manholes on valves. Compact cement-stabilized sand around each manhole and vault for minimum radius of 4 feet, or to undisturbed trench face when less than 4 feet. Provide above-ground vents for manholes and vaults as indicated on Drawings.

3.03 DISINFECTION AND TESTING

A. Assist City with disinfection of valves and appurtenances as required by Section 02455 - Disinfection of Water Lines and test as required by Section 02450 - Hydrostatic Testing of Water Lines.

3.04 PAINTING OF PIPING AND VALVES

A. Paint piping and valves located in manholes, stations, and above ground using approved paint.

END OF SECTION

SECTION 02425
WATER METERS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Water meters, sub-meters, irrigation meters and fire service meters.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Measurement for water meters is on a unit price basis for installation of each meter type and size.
  2. Payment includes vault, piping and appurtenances necessary for complete installation of meter.
  3. Measurement for relocating and reinstalling meter with new box is on a unit price basis for each meter relocated and reinstalled.
  4. No separate payment for adjustment of meter or meter box unless otherwise shown in the Drawings.
  5. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work is in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASME – American Society of Mechanical Engineers.
  1. ASME B16.1 – Cast-Iron Pipe Flanges and Flanged Fittings.
- B. AWWA – American Water Works Association.
  1. AWWA C510 – Standard for Double Check Valve Backflow – Prevention Assembly.
  2. AWWA C700 – Standard for Cold-Water Meters – Displacement Type.
  3. AWWA C701 – Standard for Cold-Water Meters – Turbine Type for Customer Service.
  4. AWWA C702 – Standard for Cold-Water Meters – Compound Type.
  5. AWWA C703 – Standard for Cold-Water Meters – Fire Service Type.
  6. AWWA Manual M6 – Water Meters – Selection, Installation, Testing and Maintenance.
- C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit written certification of calibration and test results.
- C. Submit manufacturer's certification that meters meet applicable

requirements of this Specification Section.

D. Submit accuracy registration test certification from manufacturer for each three inch (3 In) through ten inch (10 In) diameter meter.

1.5 QUALITY CONTROL

A. Submit manufacturer's warranty against defects in materials and workmanship for one year (1 Yr) from date of Substantial Completion.

B. Provide vendor's unconditional guarantee that performance of each meter meets applicable AWWA standards and AWWA Manual M6 as follows:

1. Displacement type: Ten years (10 Yrs) from installation or register registration specified in TABLE 4.1 – GALLON REGISTRATION in this Section, whichever comes first.
2. Turbine type: One year (1 Yr) from date of installation.
3. Compound type: One year (1 Yr) from date of installation.
4. Fire service type: One year (1 Yr) from date of installation.
5. Operations of hermetically sealed register, one inch (1 In) to two inch (2 In) diameter, shall be unconditionally guaranteed for fifteen years (15 Yrs).

C. Provide manufacturer's unconditional guarantee for each sealed register against leakage, fogging, discoloration and stoppage for fifteen years (15 Yrs) from date of installation.

D. Vendor shall replace meters that become defective within guarantee period with meters that comply with this Technical Specification. The City shall return defective meters to vendor at vendor’s expense. Meters repaired or replaced under this guarantee must meet accuracy limits for new meters upon receipt and accuracy limits for remaining period of guarantee for the original meter.

1.6 EASEMENT REQUIREMENTS

A. Install water meters and shut-off valves (stop boxes) in the City right-of-way line when possible.

B. When not possible to install water meters and shut-off valves (stop boxes) in the right-of-way, then install in utility easement, if available.

PART II: PRODUCTS

2.1 GENERAL

A. Provide meters of size as indicated on the Drawings, unless otherwise indicated.

B. Meters shall be Neptune. NO EXCEPTIONS.

C. Provide bolted split casings. Main casings of meters and external fasteners: Copper alloy with minimum seventy-five percent (75%) copper for one inch (1 In) to two inches (2 In), bronze or cast iron, hot-dipped galvanized or epoxy coating for three inches (3 In) and larger.

D. Straightening Vanes: Non-corrosive material compatible with case

material.

E. Intermediate gear train shall not come into contact with water and shall operate in suitable lubricant.

F. Registers:
   1. Lens: impact resistant.
   2. Register box: tamper resistant by means of tamper screw or plug.
   3. Register capacity of meters:
      a. One inch (1 In) meters: nine million nine hundred ninety-nine thousand nine hundred and ninety gallons (9999990 Gal). There shall be six (6) mobile and one (1) stationary digits. The last digit shall be stationary, white on black background. The tens and hundreds digits shall be mobile and white on a black background. The first four digits (millions to thousands) shall be black on a white background.
      b. Two inch (2 In) meters and larger: ninety-nine million nine hundred ninety-nine thousand nine hundred gallons (99999900 Gal). There shall be six (6) mobile and two (2) stationary digits. The last two digits shall be stationary, white on black background. The hundreds digit shall be mobile and white on a black background. The first four digits (tens of millions to thousands) shall be black on a white background.
   4. If used, Automatic Meter Reading (AMR), shall adhere to the following: provides pulse, contact closure, piezo switch or encoder generated output signal, compatible with the City's radio and telephone AMR systems. Provide minimum twelve foot (12 ft) wire when permanently connected to register. Register box: tamper resistant by means of tamper screw or plug: Register: permanently sealed, straight-reading, center-sweep test hand, magnetic driven, U.S. gallons.

G. Connections: one inch (1 In: threads at each end; one and one-half inches (1-1/2 In) to two inches (2 In): two (2) bolt oval flanges each end; three inches (3 In) and larger: flange at each end.
   1. Connections three inches (3 In) or larger shall be in a vault and shall have a by-pass.

H. Stamp manufacturer's meter serial number on outer case. Stamp manufacturer's meter serial number on outside of register lid when provided. Manufacturer's serial numbers shall be individual and not duplicated.

I. Meters: Provide approved meters equipped with AMR type register to connect to the City of Friendswood's AMR system, when required.

J. Manufacturing quality control shall permit successful interchangeability from one (1) meter to another of same size including registers, measuring chambers and units, discs or pistons as units, change gears, bolts, nuts and washers without affecting accuracy of new meter.

K. For water meter vaults provide:
   1. One-quarter inch (1/4 In) steel or aluminum with stainless steel hinge pins. Door shall open to ninety degrees (90°) and automatically lock in that position.
   2. Provide approved meter vault covers.

2.2 METER APPLICATIONS
A. Sizes one inch (1 In) to two inch (2 In) Meters: Displacement type [except for constant flow where two inch (2 In) turbine may apply].
B. Sizes three inch (3 In) and above Meters:
   1. Turbines:
      a. Processing plants
      b. Manufacturing facilities
      c. Lawn sprinkler systems
      d. Effluent water in treatment plants
      e. Booster (pump) stations
      f. Level controlled tank filling operations
      g. Fire hydrants (transients)
      h. Inter-systems sale or transfer
      i. Sewer credit/sub-meter
   2. Compounds:
      a. Multi-family dwellings
      b. Motels and hotels
      c. Hospitals
      d. Schools
      e. Restaurants
      f. Office buildings
      g. Dormitories, nursing homes, department stores, shopping malls and other commercial establishments

      Note: Provide fire service type meter for sizes larger than six inches (6 In).
   3. Fire Service Type: For designated fire protection lines. Provide proportional or compound type fire service meter assembly (AWWA C703) when customer elects to use combination of potable and fire protection services in lieu of separate domestic meters and fire services.

2.3 MATERIALS
A. Cold-Water Meters:
   1. Displacement Type: AWWA C700; sizes one inch (1 In) up to and including two inches (2 In); oscillating disc or piston of magnetic drive type; bolted split-case design, with either being removable.
   2. Turbine Type: AWWA C701; Class II; sizes three inches (3 In) through ten inches (10 In); flanged; straight-through measuring chamber; rotor construction: polypropylene or similar non-rubber material with specific gravity of approximately 1.0,

equipped with near frictionless replaceable bearings in turbine working against rotor shaft positioned thrust bearing. Transient/Fire Hydrant Meter Inlet: Female fitting for attachment to hose nozzle with National Standard Fire hose thread. Outlet: two inch (2 In) nipple with National Pipe Thread. Include restriction plate to limit flow through meter to four hundred gallons per minute (400 gpm) at sixty-five pounds per square inch (65 psi).

3. Compound Type: AWWA C702; sizes two inches (2 In) through six inches (6 In). Measuring chambers: For use in continuous operation; separate units of copper alloy [minimum eighty-four percent (84%) copper] or approved polymer material, inert in corrosive potable water; with centering device for proper positioning. Measuring pistons: Non-pilot type with division plates of rubber covering vulcanized to stainless steel or other approved material of sufficient thickness to provide minimum piston oscillation noise. Measuring discs: Flat or conical type, one piece, mounted on monel or 316 stainless steel spindle. Measuring chamber strainer screen area: Twice area of main case inlet.
4. Fire-Service Type: sizes four inches (4 In) through ten inches (10 In); turbine-type, compound type, proportional type; AWWA C703, with separate check valve conforming to AWWA C510. Determine size of fire meter by adding fire flow and domestic flow.

2.4 STRAINERS

A. Displacement Potable Water Meters one inch (1 In) through two inches (2 In): Self-straining by means of annular space between measuring chamber and external case or with strainer screens installed in meter. Provide rigid screens which fit snugly, are easy to remove, with effective straining area at least double that of main case inlet.
B. Potable Water Meters two inch (2 In) diameter and larger: Equip with separate external strainer with bronze body for diameters less than eight inches (8 In). Eight inch (8 In) diameter and larger may be cast iron, hot-dipped galvanized or epoxy coating. Strainers: Bolted to inlet side of meter, detachable from meter, easily removable lid. Strainer screen: Made of rounded cast bronze, stainless steel wire, having nominal screen size of three and one half (3-1/2) mesh-per-inch (U.S. Series) not less than forty-five percent (45%) clear area.
C. Provide separate approved external strainers (when required by meter manufacturer) approved for use in fire service metered connections by Underwriters Laboratories. Bodies: Cast iron or copper alloy. Ends: Flanged in accordance with ASME B16.1, Class 125. Provide stainless steel basket. Strainers shall be detachable from meter.

2.5 CONNECTIONS AND FITTINGS

A. Provide pipe for connections in accordance with Section 02215 – Ductile Iron Pipe (DIP) and Fittings and Section 02235 – Polyvinyl Chloride (PVC) Pipe. Use restrained joints and flanged joints only.
B. Fittings:
    1. For meters two inches (2 In) and smaller: Same type of fittings as Outlet End fittings for Curb Stop in accordance with Section 02430 – Water Tap and Service Line Installation.
    2. For meters three inches (3 In) and larger: Restrained ductile iron; push-on bell joints or mechanical joint fittings between water line and meter vault; Class 125 flanged inside meter vaults; cement mortar lined and sealed.

2.6 LAYING LENGTHS
A. Minimum laying lengths for meter and standard strainer shall be as shown on the Drawings.

PART III: EXECUTION

3.1 TAPPING AND METER SERVICE INSTALLATION
A. Refer to Section 02420 – Tapping Sleeves and Valves for tapping requirements.
B. Meter Service Line:
    1. Use pipe and fittings conforming to requirements of Section 02215 – Ductile Iron Pipe (DIP) and Fittings or Section 02235 – Polyvinyl Chloride (PVC) Pipe.
    2. Limit pulling and deflecting of joints to limits recommended by manufacturer.
    3. Make vertical adjustments with offset bends where room shall permit. Minimize number of bends.
    4. Provide minimum of ten (10) pipe diameters of straight pipe length upstream and downstream of meter vault.

3.2 METER FITTING HOOKUP
A. Support meter piping and meter, level and plumb, during installation. Support meters three inches (3 In) and larger with concrete at minimum of two (2) locations.
B. Use round flanged fittings inside meter box or vault except for mechanical joint to flange adapter. Provide full-face one-eighth inch (1/8 In) black neoprene or red rubber gasket material on flanged joints. Provide bolts and nuts made from approved corrosion-resistant material.
C. Tighten bolts in proper sequence and to correct torque.
D. Visually check for leaks under normal operating pressure following installation. Repair or replace leaking components.

3.3 METER BOX AND VAULT INSTALLATION
A. Conform to requirements of Section 02440 – Valve Boxes, Meter Boxes and Meter Vaults.

B. Perform adjustment to existing meter in accordance with Section 02440 – Valve Boxes, Meter Boxes and Meter Vaults.

C. Meters three inches (3 In) and larger shall be installed in a meter vault conforming to requirements of Section 02440 – Valves Boxes, Meter Boxes and Meter Vaults, and shall have by-pass installed.

3.4 TESTING

A. Accuracy registration tests shall be conducted in accordance with latest revision of AWWA standard for type and size of meter.

1. Tests shall be run by manufacturer prior to shipping to the City of Friendswood. Meters may be tested at random at the City's discretion.
2. Accuracy of displacement meters during guarantee period shall be as follows:
    a. Initial period: Eighteen months (18 Mos) from date of shipment or twelve months (12 Mos) from date of installation: ninety-eight and one-half percent (98.5%) to one hundred one and one-half percent (101.5%) at standard and minimum flow rates; ninety-eight percent (98%) to one hundred and one percent (101%) at low flow rates.
    b. Second period: AWWA new meter accuracy tested as specified in TABLE 4.2 – METER TEST FLOW RATE – 2ND PERIOD in this Section.
    c. Third period: AWWA new meter accuracy for standard flow rates and AWWA repair meter accuracy for minimum flow rate tested in TABLE 4.3 – METER TEST FLOW RATE – 3RD PERIOD.
3. Minimal acceptable accuracy in percent of low flow registration for turbine meters shall be as specified in TABLE 4.4 – MINIMAL ACCEPTABLE ACCURACY FOR METERS in this Section.

PART IV: TABLES

4.1 – GALLON REGISTRATION

Size (inch)	Registration (million gallons)
5/8, 3/4	1.5
1	2.5
1-1/2	5.0
2	10.5

4.2 – METER TEST FLOW RATE

GUARANTEE PERIOD			TEST FLOW RATE
Meter Size (inches)	Age of Meter (years)	Or Gallons (million*)	Rate (gpm)
5/8	>1 to <5	0.5	1/4
1	>1 to <5	1.0	3/4
1-1/2	>1 to <5	2.5	1-1/2
2	>1 to <5	5.5	2

* Total Registration

4.3 – METER TEST FLOW RATE – 3RD PERIOD

GUARANTEE PERIOD			TEST FLOW RATE
Meter Size (inches)	Age of Meter (years)	Or Gallons (million*)	Rate (gpm)
5/8	>5 to <10	1.5	1/4
1	>5 to <10	2.5	3/4
1-1/2	>5 to <10	5.0	1-1/2
2	>5 to <10	10.0	2

* Total Registration

4.4 – MINIMAL ACCEPTABLE ACCURACY FOR METERS

Meter Size (inches)	Minimum Flow (gpm)	% Accuracy Required
2	3	95
3	5	95
4	15	95
6	20	95
8	20	95
10	30	95

END OF SECTION

SECTION 02430
WATER TAP AND SERVICE LINE INSTALLATION

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Tapping existing mains and furnishing and installing new service lines for water.

B. Relocation of existing small water meters.

C. The Technical Specifications identify requirements for both small-diameter [less than or equal to twenty inches (20 In)] water lines and large-diameter [greater than twenty inches (20 In)] water lines. When the Specifications for large-diameter water lines differ from those for small-diameter water lines, paragraphs for large-diameter water lines shall govern for large-diameter pipe.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for water taps and service lines three-quarters inch (3/4 In) through one inch (1 In) is on a unit price basis for each installation. Separate measurements shall be made for "short side", "long side" and "extra long side" connections as defined in Paragraph 1.4, Definitions.
2. Payment for water taps and service lines one and one-half inch (1-1/2 In) through two inch (2 In) is on a unit price basis for each installation. Separate measurements shall be made for "short side", "long side" and "extra long side" connections as defined in Paragraph 1.4, Definitions.
3. Payment for "short side", "long side" and "extra long side" includes locating water line, tap installation and connection to meter and restoring site.
4. Payment for each small meter includes labor, materials, and equipment to relocate existing small meter.
5. No additional payment shall be made for bedding, backfill, compaction, push under pavement, etc.
6. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES

A. AWWA – American Water Works Association.

1. AWWA C800 – Standard for Underground Service Line Valves and Fittings.

2. AWWA C900 – Standard for Polyvinyl Chloride (PVC) Pressure Pipe, four inch (4 In) through twelve inch (12 In), for Water Distribution.

B. CFTS – City of Friendswood Technical Specifications.

1.4 DEFINITIONS

A. Short Side Connection: Service line connecting proposed curb stop, located inside water meter box, to water line on same side of street.

B. Long Side Connection: Service line connecting proposed curb stop, located inside water meter box, to water line on opposite side of street or from center of streets where supply line is located in street center such as boulevards and streets with esplanades. Distance for long side connection shall not exceed sixty linear feet (60 Lf) at right angles to water line.

C. Extra-Long Side Connection: Service line connecting proposed curb stop, located inside water meter box, to water line on opposite side of street or from center of street where supply line is located in street center such as boulevards and streets with esplanades. Distance for extra-long side connection is greater than sixty linear feet (60 Lf) at right angles to water line.

PART II: PRODUCTS

2.1 MATERIALS

A. Service Lines:

1. Copper Tubing: In accordance with Section 02205 – Copper Tubing.
2. Polyethylene Tubing (PE): In accordance with Section 02230 – Polyethylene Plastic Tubing (PE).
3. Polybutylene tubing is not permitted.

B. Corporation Stops: AWWA C800 as modified in this Section:

1. Inlet End: AWWA standard thread.
2. Valve Body: Tapered plug type, O-ring seat ball type, or rubber seat ball type.
3. Outlet End: Compression connection for use with Type K, soft copper or compression type fitting.

C. Provide taps for water line types and sizes in as specified in TABLE 4.1 – PIPE TAPPING SCHEDULE in this Section.

D. Dual Strap Saddles: Red brass body and straps; ductile-iron; vinyl-coated body and straps; or ductile-iron, vinyl-coated body and stainless-steel straps.

E. Taps for PVC Water Lines: Use dual-strap or single, wide-band strap saddles which provide full support around circumference of pipe and bearing area of sufficient width along axis of pipe, two inches (2 In) minimum, ensuring that pipe shall not be distorted when saddle is

tightened. Provide approved stainless-steel tapping saddle with AWWA standard thread.

F. Taps for Steel Pipe: Not allowed.

G. Curb Stops and Brass Fittings: AWWA C800 as modified in this Section.
   1. Inlet End: Compression-type fitting
   2. Valve Body: Straight-through or angled, meter-stop design equipped with following:
      a. O-ring seal straight plug type.
      b. Rubber seat ball type.
   3. Outlet End: Female, iron-pipe thread or swivel-nut, meter-spud thread on three-quarters inch (3/4 In) and one inch (1 In) stops and two (2) hole flange on one and one-half inch (1-1/2 In) and two inch (2 In) sizes.
   4. Fittings: Provide approved fittings. Use same size open end wrenches and tapping machines as used with respective fittings.
   5. Factory Testing of Brass Fittings:
      a. Submerge in water for ten seconds (10 sec) at eighty-five pounds per square inch (85 psi) with stop in both closed and open positions.
      b. Reject fitting that shows air leakage: The Project Manager may confirm tests locally. Entire lot from which samples were taken shall be rejected when random sampling discloses unsatisfactory fittings.

H. Angle Stops: In accordance with AWWA C800; ground-key, stop type with bronze lockwing head stop cap; inlet and outlet threads conform to application tables of AWWA C800; and inlets flared connection or compression.
   1. Outlet for three-quarter inch (3/4 In) and one inch (1 In) size: Meter swivel nut with saddle support.
   2. Outlet for one and one-half inch (1-1/2 In) through two inch (2 In) size: O-ring sealed meter flange, iron pipe threads.

I. Fittings: In accordance with AWWA C800 and following:
   1. Castings: Smooth, free from burrs, scales, blisters, sand holes, and defects which would make them unfit for intended use.
   2. Nuts: Smooth cast and has symmetrical hexagonal wrench flats.
   3. Flare-Joint Fittings: Smooth cast. Machine seating surfaces for metal-to-metal seal to proper taper or curve, free from pits or protrusions.
   4. Thread fittings, of all types, shall have N.P.T. or AWWA threads, and protect male threaded ends in shipment by plastic coating, or approved equal.
   5. Compression tube fittings shall have Buna-N beveled gasket.
   6. Stamp of manufacturer's name or trademark and of fitting size shall be on the body.

PART III: EXECUTION

3.1 GENERAL

A. For service lines and lateral connections larger than those allowed in Pipe Tapping Schedule, branch connections and multiple taps may be used. Space corporation stops a minimum of two feet (2 Ft) apart.

B. Tapped collars of appropriate sizes: Approved in new construction only provided they are set at right angles to proposed meter location.

C. Use tapping machine manufactured for pressure tapping purposes for two inch (2 In) and smaller service taps on pressurized water lines.

D. For new meter or when existing meter is in conflict with proposed pavement improvements, locate water meters one foot (1 Ft) inside the City right-of-way, or when this is not feasible, one foot (1 Ft) on curb side of sidewalk if sufficient right-of-way is available. Contact the Project Manager when major landscaping or trees conflict with service line and meter box location. No additional payment shall be made for work on customer side of meter.

E. New location and installation of existing small meter shall conform to requirements of this Section.

3.2 SERVICE INSTALLATION

A. Set service taps at right angles to proposed meter location and locate taps in upper pipe segment within forty-five degrees (45°) of pipe springline.

B. Install service lines in open-cut trench in accordance with Section 02125 – Excavation and Backfill for Utilities. Install service lines under paved roadways, other paved areas and areas indicated on the Drawings in bored hole.

C. Lay service lines with minimum of thirty inches (30 In) of cover as measured from top of curb or in absence of curbs, from centerline elevation of crowned streets or roads. Provide minimum of eighteen inches (18 In) of cover below flow line of ditches to service lines.

D. Service lines across existing street (push-unders): Pull service line through prepared hole under paving. Use only full lengths of tubing. Take care not to damage copper tubing when pulling it through hole. Compression-type union shall be permitted only when span underneath pavement cannot be accomplished with a full standard length of tubing. Use only one (1) compression-type union for each full length of tubing.

E. Maintain service lines free of dirt and foreign matter.

F. Install service lines so that top of meter shall be eight inches (8 In) to twelve inches (12 In) below finished grade.

G. Anticipate existing sanitary sewers to have cement-stabilized sand backfill to bottom of pavement. Include cost of such crossings in the unit price for services.

3.3 CURB STOP INSTALLATION

A. Set curb stops or angle stops at outer end of service line inside of meter box. Secure opening in curb stop to prevent unwanted material from entering. In close quarters, make S-curve in field. Do not flatten tube. In three-quarter inch (3/4 In) and one inch (1 In) services, install meter coupling, swivel-nut, or curb stop ahead of meter. Install straight meter coupling on outlet end of meter.

3.4 SEQUENCE OF OPERATIONS

A. Open trench for proposed service line in accordance with Section 02125 – Excavation and Backfill for Utilities.
B. Install curb stop on meter end of service line.
C. With curb stop open and prior to connecting service line to meter in slack position, open corporation stop and flush service line thoroughly. Close curb stop, leaving corporation stop in full-open position.
D. Check service line for apparent leaks. Repair leaks before proceeding.
E. Schedule inspection with the Project Manager prior to backfilling. After inspection, backfill in accordance with Section 02125 – Excavation and Backfill for Utilities.
F. Install meter box centered over meter with top of lid flush with finished grade. Meter box: Refer to Section 02440 – Valve Boxes, Meter Boxes, and Meter Vaults.

PART IV: TABLES

TABLE 4.1 – PIPE TAPPING SCHEDULE

PIPE TAPPING SCHEDULE				
WATERLINE TYPE AND DIAMETER	SERVICE SIZE			
	3/4”	1”	1-1/2”	2”
4” Cast Iron or Ductile Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
4” Asbestos Cement	WBSS	WBSS	DSS, WBSS	DSS, WBSS
4” PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6” and 8” Cast Iron or Ductile Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6” and 8” Asbestos Cement	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6” and 8” PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
10” and 12” Cast Iron or Ductile Iron	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
10 “ and 12” Asbestos Cement	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
10” and 12” PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
16” and UP Cast Iron and Ductile Iron	DWBSS	DWBSS	DWBSS	DWBSS
16” and UP Asbestos Cement	DWBSS	DWBSS	DWBSS	DWBSS
16” and UP PVC (AWWA C900)	DWBSS	DWBSS	DWBSS	DWBSS

DSS – DUAL STRAP SADDLES
WBSS – WIDE BAND STRAP SADDLES
DWBSS – DUAL WIDE BAND STRAP SADDLES

END OF SECTION

SECTION 02435
FIRE HYDRANT ASSEMBLIES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Fire hydrants.
- B. Adjustment of fire hydrants and gate valves.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment is on a unit price basis for each fire hydrant assembly, including six inch (6 In) gate valve and box, installed regardless of barrel depth.
  2. Payment for fire hydrant branches (leads) is on linear foot basis for each branch installed. Separate pay items are used for open-cut and augered branches.
  3. No separate payment for salvaged fire hydrants returned to the City's Public Works yard.
  4. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AWWA – American Water Works Association.
  1. AWWA C550 – Standard for Protective Epoxy Interior Coatings for Valves and Hydrants
  2. AWWA C502 – Standard for Dry-Barrel Fire Hydrants
  3. AWWA C503 – Standard for Wet-Barrel Fire Hydrants
- B. CFTS – City of Friendswood Technical Specifications.
- C. Federal Standard A-A-2962A – Enamel, Alkyd, Solvent Based Low VOC.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit name of hydrant manufacturer, type of bonnet paint and engineering control drawing number for hydrant proposed for use.

PART II: PRODUCTS

2.1 HYDRANTS
- A. Provide approved fire hydrants.
- B. The Project Manager may, at any time prior to or during installation of hydrants, randomly select furnished hydrant for disassembly and

laboratory inspection, at the Contractor expense, to verify compliance with the Specifications. When hydrant is found to be non-compliant, replace, at the Contractor's expense, all hydrants with new hydrants that comply with the Specifications.

C. Provide lower hydrant barrel fabricated from Ductile Iron Pipe (DIP) as single piece, connected to upper hydrant barrel by means of joint coupling that shall provide three hundred sixty degree (360°) rotation of upper barrel.

D. Fire Hydrants shall be American Flow Control B-84-B-5 or Mueller Super Centurion 250, 3 nozzle fire hydrants (2 each 2 1/2" NST and 1 each 4 1/2" NST) Factory coated RED. NO EXCEPTIONS.

2.2 LEADS

A. Branches (Leads): Conform to requirements of Section 02501 – Ductile Iron Pipe (DIP) and Fittings, Section 02250 – Steel Pipe and Fittings and Section 02235 – Polyvinyl Chloride Pipe (PVC).

2.3 AUDITING

A. Cycle Fire Hydrant and Valve to seals, Plugs, etc.

B. Flow-test each hydrant in accordance with AWWA C502, AWWA C503, and AWWA Manual M17 – Installation, Field Testing and Maintenance of Fire Hydrants.

C. Lubricate hydrant internals and connections following manufacturers' specifications for maintenance and lubrication.

D. Top Coat Repair/Repaint hydrant as needed in accordance with 2.4 of this Specification.

2.4 HYDRANT PAINTING

A. New hydrants and refurbished hydrants shall be coated as specified herein.

B. Exterior Above Traffic Flange (Including Bolts & Nuts).

1. Thoroughly clean and wash off any dirt or lose debris.
2. Remove surface rust by wire brushing, sandblasting, or other approved method.
3. Roughen shinny surfaces with light sanding to improve adhesion.
4. Spot prime areas with one of the following spray primers:
   a. Rust-Oleum brand Clean Metal Primer;
   b. Rust-Oleum brand Profession Primer;
   c. Rust-Oleum brand Rusty Metal Primer;
   d. Rust-Oleum brand Rust Reformer Rust Converting Primer; or
   e. Krylon brand Rust Tough Rust Fix Converting Primers
   f. Primer color shall be Gray.
5. After recommended drying time for the Primer, the top coat shall be as follows:
   a. Hydrant Barrels – All hydrant barrels shall be painted

using Sherwin-Williams Polane SP Polyurethane Enamel Paint. Total dry film thickness (DFT) of two (2) mils to three (3) mils. Barrel color shall be: RED.

b. Bonnet – All hydrant bonnets shall be painted using Sherwin-Williams Polane SP Polyurethane Enamel Paint. Total dry film thickness (DFT) of two (2) mils to three (3) mils. Bonnet color shall be: SILVER

PART III: EXECUTION

3.1 INSTALLATION

A. Set fire hydrant plumb and brace at locations and grades as shown on the Drawings.

B. Place twelve inch by twelve inch (12 In x 12 In) yellow indicators (plastic, sheet metal, plywood or other material approved by the Project Manager) on pumper nozzles of new or relocated fire hydrants installed on new water lines not in service. Remove indicators after new water line is tested and approved by the Project Manager.

C. Do not cover drain ports when placing concrete thrust block.

D. Place pea gravel from top of pipe to six inches (6) above barrel connection as shown in the City of Friendswood Standard Details.

E. Obtain the Project Manager's approval in writing prior to installation of hydrants which require changes in bury depth due to obstructions not shown on the Drawings. Unit price adjustments shall not be allowed for changes in water line flow line or fire hydrant barrel length caused by obstructions.

F. Plug branch lines to valves and fire hydrants shown on the Drawings to be removed. Deliver fire hydrants designated for salvage to Public Works Facility.

G. Install branches (leads) in accordance with Section 02400 – Water Lines.

H. Coating Requirements:

1. Shall be Sherwin-Williams Polane SP Polyurethane Enamel Paint. NO EXCEPTIONS.
2. Apply coatings in strict accordance with manufacturer's recommendations. No requirements of this Technical Specification shall cancel or supersede written directions and recommendations of the specific manufacturer so as to not jeopardize the integrity of an applied system.
3. Furnish affidavit of compliance that coatings furnished complies with requirements of this Technical Specification and referenced standards, as applicable.

I. Remove and dispose of unsuitable materials and debris in accordance with requirements of Section 01580 – Waste Material Disposal.

END OF SECTION

SECTION 02440
VALVE BOXES, METER BOXES AND METER VAULTS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Valve boxes for water service.
- B. Meter boxes for water service.
- C. Meter vaults for water service.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for valve boxes under this Section. Include payment in the unit price for Section 02400 – Water Lines.
  2. No separate payment shall be made for meter boxes under this Section. Include payment in the unit price for Section 02430 – Water Tap and Service Line Installation.
  3. Payment for each size of meter vaults is on the unit price basis per vault. Payment shall be made for each vault installed, regardless of depth.
  4. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM A48 – Standard Specification for Gray Iron Castings.
  2. ASTM D256 – Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
  3. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
  4. ASTM D648 – Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
  5. ASTM D790 – Standard Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials.
  6. ASTM D2240 – Standard Test Method for Rubber Property-Durometer Hardness.
- B. CFTS – City of Friendswood Technical Specifications

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit manufacturers' product data for following items for approval:
   1. Each type of valve box and lid.
   2. Each type of meter box and cover.
   3. Each type of meter vault frame and cover.

C. Submit design calculations and shop drawings for precast vault elements, sealed by a Professional Engineer licensed by the State of Texas.

D. Submit shop drawings for cast-in-place meter vaults for approval if proposed construction varies from the Drawings.

E. Submit manufacturer's certification that plastic meter boxes meet requirements of Paragraph 2.5, Plastic Meter Boxes.

PART II: PRODUCTS

2.1 VALVE BOXES

A. Provide approved Type A, cast-iron/ductile-iron, slide-type, valve boxes. Design of valve box shall minimize stresses on valve imposed by loads on box lid.

B. Cast letter "W" into lid, one-half inch (1/2 In) in height and raised three-thirty-seconds inch (3/32 In), for valves serving potable water lines.

C. Unless otherwise specified, constructed of uncoated cast iron.

D. Riser Pipe:
   1. Provide six inch (6 In) PVC, Class 150, DR 18, riser pipes in accordance with Section 02235 – Polyvinyl Chloride Pipe (PVC) or
   2. Six inch (6 In) ductile-iron, thickness Class 51 riser pipes in accordance with Section 02215 – Ductile Iron Pipe (DIP) and Fittings.
   3. Provide single section of pipe.

E. Concrete for valve box placement:
   1. For locations in new concrete pavement, provide strength and mix design of new pavement.
   2. For other locations, provide concrete for sidewalks conforming to requirements of Section 02805 – Concrete Paving.

F. Valve box lids are to be painted blue.

2.2 METER BOXES

A. Provide meter boxes for five-eighths inch (5/8 In) through one inch (1 In) meters of the following materials:
   1. Non-traffic bearing locations: Cast iron, concrete or plastic.
   2. Traffic bearing locations: Cast iron or concrete.

B. Provide meter boxes for one and one-half inch (1-1/2 In) and two inch (2 In) meters of concrete.

C. Provide meter box with reading lid: Provide lids with spring-type latching devices. Lids shall contain sufficient metal that meter box can be easily

located with metal detector. Cast words “CITY OF FRIENDSWOOD” and "WATER METER" into lid with letters of one-half inch (1/2 In) height and raised three-thirty-seconds inch (3/32 In).

D. Meter box dimensions shall conform to the following approximate dimensions:
   1. Length: At top – fifteen and one-half inches (15-1/2 In); at bottom twenty inches (20 In).
   2. Width: At top – twelve and one-half inches (12-1/2 In); at bottom fourteen and three-quarters inches (14-3/4 In).
   3. Height: Twelve inches (12 In).

E. Extensions: Meter box extensions three (3 In) inches and six inches (6 In) in height shall be available from the manufacturer as a standard item.

2.3 CAST-IRON METER BOXES

A. Cast-Iron Boxes: Clean and free from sand blow-holes or other defects conforming to requirements of ASTM A48, Class 30B. Bearing surfaces shall be machined so that covers seat evenly in frames.

B. Boxes and lids shall have dipped, coal-tar-pitch, varnish finish.

C. Provide lock-type meter boxes when required by the Drawings. Lock mechanisms shall work with ease.

2.4 CONCRETE METER BOXES

A. Concrete Meter Boxes: Made of Class B concrete, with minimum four thousand pounds per square inch (4000 psi) compressive strength, conforming to requirements of Section 03300 – Structural Concrete. Construct to dimensions shown on the Drawings.

B. Castings: Free from fractures, large or deep cracks, blisters or surface roughness or any other defects that may affect serviceability.

2.5 PLASTIC METER BOXES

A. Plastic Meter Boxes: Made of high density polyethylene conforming to the following ASTM standards:
   1. ASTM REQUIREMENT:
      a. D256 Impact Strength = One and nine-tenths foot-pounds per inch (1.9 Ft-Lb/In) (Izod, Notched).
      b. D256 Impact Strength = Six and four-tenths foot-pounds per inch (6.4 Ft-Lb/In) (Izod, Un-Notched).
      c. D638 Tensile Strength (2.0 min.) = Three thousand four hundred pounds per square inch (3400 psi).
      d. D648 Deflection Temperature = One hundred seventy degrees Fahrenheit (170° F).
      e. D2240 Shore D, Hardness, fifty-five (55) to sixty-five (65) Impact Strength, Falling Dart Method: One hundred sixty inch-pounds (160 In-Lb).
      f. D790 Flexural Modulus = Ninety thousand pounds per square inch (90,000 psi).

B. Meter boxes shall meet the following test requirements:
   1. Static Load: Not less than two thousand five hundred pounds (2500 psi) using six inch (6 In) disc with direct compression exerted at center of top of meter box with solid plastic lid.
   2. Deflection: Not less than one thousand pounds (1000 Lbs) load required to deflect top edge of meter box one-eighth inch (1/8 In).

C. Meter box body, without lid, shall weigh approximately seven pounds (7 Lbs).

2.6 METER VAULTS

A. Meter vaults may be constructed of precast concrete or cast-in-place concrete unless a specific type of construction is required by the Drawings.

B. Concrete for Meter Vaults: Class B concrete, conforming to requirements of Section 03300 – Structural Concrete with minimum compressive strength of four thousand pounds per square inch (4000 psi) at twenty-eight days (28 D).

C. Reinforcing steel for meter vaults: Conform to requirements of Section 03200 – Reinforcing Steel.

D. Grates and Covers: Conform to requirements of Section 02315 – Frames, Grates, Rings and Covers.

PART III: EXECUTION

3.1 EXAMINATION

A. Obtain approval from the Project Manager for exact location of meter vault.

B. Verify lines and grade are correct.

C. Verify compacted subgrade shall support loads imposed by vaults.

D. At no time shall a valve box, meter box or meter vault be installed in a driveway, sidewalk or wheelchair ramp.

3.2 VALVE BOXES

A. Install riser pipe with suitable length for depth of cover indicated on the Drawings or to accommodate actual finish grade.
   1. Install with bell on top of valve.
   2. Place riser pipe in plumb, vertical position.

B. Install valve box and riser piping plumbed in a vertical position. Provide six inches (6 In) telescoping freeboard space between riser pipe top butt end and interior contact flange of valve box, for vertical movement damping. End of riser pipe resting on valve shall be notched out sufficiently to provide a snug fit around the valve bonnet and to center valve inside of pipe.

C. Set, align and adjust valve box so that lid is level with final grade.

D. Install twenty-four inch by twenty-four inch (24 In x 24 In) concrete valve collar using Class A concrete, conforming to requirements of Section 03300 – Structural Concrete with minimum compressive strength of three thousand pounds per square inch (3000 psi) at twenty-eight days (28 D).
E. Paint covers of new valve boxes in blue when installed for completion and acceptance by the City.

3.3 METER BOXES

A. Install cast iron or plastic boxes in accordance with manufacturer's instructions.
B. Construct concrete meter boxes to dimensions shown on the Drawings.
C. Adjust top of meter boxes to conform to cover elevations specified in Paragraph 3.5, Frame and Cover for Meter Vaults.
D. Do not locate under paved areas unless approved by the Project Manager. Use approved traffic type box with cast iron lid when meter must be located in paved areas.
E. Locate Meter Boxes in the City right-of-way, perpendicular to the centerline of the roadway.

3.4 METER VAULTS

A. Construct concrete meter vaults to dimensions shown on the Drawings. Do not cast in presence of water. Make bottom uniform. Verify lines and grades are correct and compacted subgrade shall support loads imposed by vaults.
B. Precast Meter Vaults:
    1. Install precast vaults in accordance with the manufacturer's recommendations. Set level on a minimum three inch (3 In) thick bed of sand conforming to requirements of Section 02140 – Utility Backfill Materials.
    2. Seal lifting holes with cement-sand mortar or non-shrink grout.
C. Meter Vault Floor Slab:
    1. Construct floor slabs of six inch (6 In) thick reinforced concrete. Slope floor one-quarter inch per foot (1/4 in/ft) toward sump. Make sump twelve inches (12 In) in diameter or twelve inches (12 In) square and four inches (4 In) deep, unless other dimensions are required by the Drawings. Install dowels at maximum of eighteen inches (18 In), center-to-center for keying walls to floor slab.
    2. Precast floor slab elements may be used for precast vault construction
D. Cast-in-Place Meter Vault Walls:
    1. Key walls to floor slab and form to dimensions shown on the Drawings. Minimum wall thickness shall be four inches (4 In).
    2. Cast walls monolithically: One (1) cold joint shall be allowed when vault depth exceeds twelve feet (12 ft).
    3. Set frame for cover in concrete.

3.5 FRAME AND COVER FOR METER VAULTS

A. Set cast iron frame in a mortar bed and adjust elevation of cover as follows:
   1. In unpaved areas, set top of meter box or meter vault cover two inches (2 In) to three inches (3 In) above natural grade.
   2. In paved areas, set top of meter box or meter vault cover flush with adjacent concrete but no higher than one-half inch (1/2 In).

3.6 BACKFILL

A. Provide bank run sand in accordance with Section 02140 – Utility Backfill Materials and backfill and compact in accordance with Section 02125 – Excavation and Backfill for Utilities.
B. In unpaved areas, slope backfill around meter boxes and vaults to provide a uniform slope one to five (1:5) slope from top to natural grade.
C. In paved areas, slope concrete down from meter box or vault to meet adjacent paved area.

END OF SECTION

SECTION 02445
CUT, PLUG AND ABANDONMENT OF WATERLINES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Cut, plug and abandonment of water lines.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for cut, plug and abandonment of water lines is on a unit price basis for each cut, plug and abandonment performed. Separate payment shall be made for each size of water line.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit product data for proposed plugs and clamps for approval.

1.4 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 MATERIALS
- A. Concrete for reaction blocks: Class C conforming to requirements of Section 03300 – Structural Concrete.
- B. Plugs and clamps: Applicable for type of pipe to be plugged.

PART III: EXECUTION

3.1 APPLICATION
- A. Do not begin cut, plug and abandonment operations until replacement water line has been constructed, disinfected, tested and service lines have been transferred to replacement water line.
- B. Install plug, clamp and concrete reaction block and make cut at location shown on the Drawings.
- C. Main to be abandoned shall not be valved off and shall not be cut or plugged other than at its supply water line or as shown on the Drawings.
- D. After water line to be abandoned has been cut and plugged, check for other sources feeding abandoned water line. When sources are found,

notify the Project Manager immediately. Cut and plug abandoned water line at point of other feed as directed by the Project Manager.

E. Plug or cap ends or openings in abandoned water line in manner approved by the Project Manager.

F. Remove and dispose of surface identifications such as valve boxes and fire hydrants. Valve boxes in improved streets, other than shell, may be filled with concrete after removing cap.

G. Backfill excavations in accordance with Section 02125 – Excavation and Backfill for Utilities.

H. Repair street surfaces in accordance with Section 02845 – Pavement Repair and Resurfacing.

END OF SECTION

SECTION 02450
HYDROSTATIC TESTING OF WATERLINES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Field hydrostatic testing of newly installed water waterlines.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for hydrostatic testing of waterlines under this Section. Include cost in the unit price of waterlines being tested.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS – NOT USED

PART III: EXECUTION

3.1 PROCEDURE
- A. Load the waterlines.
- B. Hydrostatically Test waterlines.
- C. If granular/tablet chlorine was not installed during the installation, then charge the line with either chlorine solution or chlorine gas and hold the super-chlorinated water in system for twenty-four (24) hours.
- D. Flush waterlines until the chlorine content meets Technical Specification 02455 – Disinfection of Waterlines section 3.3.A.4.

3.2 PREPARATION

- B. Charge the system via a water truck or equipment separate from the City water distribution system. Water for testing shall be at no cost to the Contractor in accordance with the City Ordinances. To obtain the water, the Contractor must obtain a transient meter from the City for use at a nearby fire hydrant. A deposit is required for a transient meter.
- C. Plan waterline tests in lengths between valves or plugs, of not more than

four thousand feet (4000 Ft).

D. Hydrostatic tests must be scheduled at least twenty-four (24) hours in advance for the Project Manager to witness.

3.3 TEST PROCEDURES

A. Furnish, install, and operate connections, pump, meter, and gages necessary for hydrostatic testing.

B. Allow pipeline to sit a minimum of twenty-four hours (24 Hrs) from time it is initially charged until testing begins, to allow pipe wall or lining material to absorb water. Periods of up to seven days (7 D) may be required for mortar lining to become saturated.

C. Expel air from all waterlines and apply a minimum test pressure of one hundred fifty pounds per square inch (150 psi) for a minimum of four hours (4 Hrs).

1. Fire line Testing is required to be two hundred pounds per square inch (200 psi) for a minimum of two hours (2 Hrs).

D. Begin pressure test by 9:00 a.m. unless otherwise approved by the Project Manager. Maintain test pressure for required amount of time. When large quantity of water is required to maintain pressure during test, discontinue testing until cause of water loss is identified and corrected.

1. At no time shall a hydrostatic test start after 1:00 P.M.

E. Keep valves inside pressure reducing stations closed during hydrostatic pressure test.

3.4 ALLOWABLE LEAKAGE FOR WATERLINES

A. During hydrostatic tests, no leakage shall be allowed for sections of water lines consisting of welded joints.

B. Maximum allowable leakage for water lines with rubber gasketed joints: Three and nineteen-hundredths gallons (3.19 Gal) per inch nominal diameter per mile of pipe per twenty-four hours (24 Hrs) while testing.

1. The following formula shall be used, either manually or electronically, for the amount of leakage:

$$L = \frac{NDP^2}{7400}$$

where: L = Allowable leakage, gallons per hour (Gal/Hr)
N = Number of joints in the length of the pipe
D = Nominal diameter of the pipe, in inches (In)
P = Average test pressure during the leakage test, pounds per square inch (psi)

C. For meter run installation, when work cannot be isolated and line fails pressure test, visual inspection of work by the Project Manager for leakage during pressure test may be used to fulfill requirements of this Section.

3.5 CORRECTION FOR FAILED TESTS

A. Repair joints showing visible leaks on surface regardless of total leakage shown on test. Check valves and fittings to ensure that no leakage occurs that could affect or invalidate test. Remove cracked or defective pipes, fittings and valves discovered during pressure test and replace with new items.

B. The Project Manager shall require failed lines to be disinfected after repair and prior to retesting. Conduct and pay for subsequent disinfection operations in accordance with requirements of Section 02455 – Disinfection of Waterlines. Pay for water required for additional disinfection and retesting.

C. After the second (2nd) failed test;

1. For City Projects, the Project Manager shall deduct the amounts of money from the Contract as stated in Section 01140 – Work Restrictions for each additional test taken.
2. For Private Development, the Contractor shall pay the City the amount stated in Section 01140 – Work Restrictions for each additional test, before the test is taken.

C. Repeat test until satisfactory results are obtained.

3.6 COMPLETION

A. Upon satisfactory completion of testing, remove risers remaining from disinfection and hydrostatic testing and backfill excavation promptly.

END OF SECTION

SECTION 02455
DISINFECTION OF WATERLINES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Disinfection of potable water lines.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for disinfection of water lines under this Section. Include cost in the unit price of water lines being disinfected.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Payment for Testing and Retesting.
  1. Subsequent disinfection operations which may be necessary due to nonconforming or incomplete construction shall be charged to the Contractor for each additional Bacterial Test.
  2. Charge shall consist of base charge of eighteen dollars ($18.00) per sample.
- C. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AWWA – American Water Works Association.
  1. AWWA B300 – Hypochlorites.
  2. AWWA B301 – Standard for Disinfecting Water Mains.
  3. AWWA C651 – Standard for Disinfecting Water Mains.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TCEQ – Texas Commission on Environmental Quality
  1. TCEQ – Approved Disinfection Methods and Products.

PART II: PRODUCTS

A. Liquid Chlorine (gas) conforming to AWWA B301.

B. Sodium Hypochlorite conforming to AWWA B300.

C. Calcium Hypochlorite conforming to AWWA B300.

PART III: EXECUTION

3.1 CONDUCTING DISINFECTION

A. Promptly disinfect water lines constructed before bacteriological tests are conducted on water lines and before water lines are connected to the City water distribution system.

B. Water for disinfection and flushing shall be furnished by the City without charge.

C. Unless otherwise provided in the Contract Documents, the Contractor shall be responsible for disinfection of water lines.

D. Coordinate chlorination operations through the Project Manager. A minimum of forty-eight hours (48 Hrs.) notice shall be given.

3.2 PREPARATION

A. Provide temporary blind flanges, cast-iron sleeves, plugs, necessary service taps, copper service leads, risers and jumpers of sizes, location and materials and other items needed to facilitate disinfection of new water lines prior to connection to the City water distribution system. Normally, each valved section of water line requires two (2) each three-quarter inch (3/4 In) taps. A two inch (2 In) minimum blow-off is required for water lines up to and including six inch (6 In) diameter.

B. Use fire hydrants as blow-offs to flush newly constructed water lines eight inch (8 In) diameters and above. Where fire hydrants are not available on newly constructed water lines, install temporary blow-off valves within ten feet (10 Ft.) of charging end and any dead end, and remove promptly upon successful completion of disinfection and testing.

C. Slowly fill each section of pipe with water in manner approved by the Project Manager.

1. For lines chlorinated with calcium hypochlorite (granular or tablet form) the average water velocity when filling pipeline should be less than one foot per second (1 ft./sec) and shall not, under any circumstance, exceed two feet per second (2 ft./sec). Before beginning disinfection operations, expel air from pipeline.

2. For lines chlorinated with either Liquid chlorine or sodium hypochlorite the average water velocity when filling pipeline should be less than three foot per second (3 ft./sec) as shown in Table 4.3 – Flow Rates and Openings. Where such flow rates are not possible, flushing the maximum expected flow rate for two to three (2-3) volumes of waterline may be acceptable. Before beginning disinfection operations, expel air from pipeline.

D. Backfill excavations immediately after installation of risers or blow-offs.

E. Install blow-off valves at end of water line to facilitate flushing of dead-end water lines. Install permanent blow-off valves according to the Drawings.

3.3 DISINFECTION BY THE CONTRACTOR

A. The following procedure shall be used when disinfection by the Contractor is required by the Contract Documents:

1. Use not less than one hundred parts of chlorine (100 CL) per million parts of water (1,000,000 H_2O).
2. Introduce chlorinating material to water lines in accordance with AWWA B300, AWWA B301, and AWWA C651. When using chlorine gas or sodium hypochlorite, chemicals shall be introduced into system at a point no farther than ten feet (10 Ft.) downstream of the beginning of the new water main. Calcium Hypochlorite materials shall be used in the quantities listed in Table 4.1 – Calcium Hypochlorite Granules Installation and Table 4.2 – Calcium Hypochlorite Tablets Installation.
3. After line has been charged with water, a chlorine test shall be taken and must be a minimum twenty-five parts free chlorine (25.0 CL) per million parts of water (1,000,000 H_2O) or greater for disinfection. After this level has been achieved, water shall stay in contact for a minimum of twenty-four hours (24 Hrs.). During this period all valves and fire hydrants shall be fully open and closed at least twice; once at the beginning and once at the end of the twenty-four hour (24 Hr.) period.
4. After contact period of twenty-four hours (24 Hrs.) a free chlorine residual test shall be taken and shall not be less than:
    a. two-tenths parts free chlorine (0.2 CL) per million parts of water (1,000,000 H_2O) for calcium hypochlorite. If the residual is less than two-tenths parts free chlorine (0.2 CL) per million parts of water (1,000,000 H_2O), then re-chlorinate the system starting over from 3.3.A.1; or
    b. ten parts free chlorine (10.0 CL) per million parts of water (1,000,000 H_2O) for calcium hypochlorite. If the residual is less than ten parts free chlorine (10.0 CL) per million parts of water (1,000,000 H_2O), then re-chlorinate the system starting over from 3.3.A.1; and
    c. if the residual passes then flush system with clean water using Fire Hydrants and approved blow-offs until chlorine is no less than two-tenths part of free chlorine (0.2 CL) per million parts of water (1,000,000 H_2O) or five-tenths part of total chlorine (0.5 CL) per million parts of water (1,000,000 H_2O) and not greater than three and nine-tenths parts free or total chlorine (3.9 CL) per million parts of water (1,000,000 H_2O).
5. Flush duration shall be until the furthest flushing outlet from the City water supply reaches the conditions of 3.3.A.4 and Table 4.3 – Flow Rates and Openings.
6. Open and close valves in lines being sterilized several times during contact period.
7. If chemical compound is used for sterilizing agent, place in pipes as directed by the Project Manager.

3.4 BACTERIOLOGICAL TESTING

A. All Bacteriological Testing shall be in accordance with Technical Specification 02465 – Procedure For Sampling Bacteriological Tests (BAC-T).

PART IV: TABLES

4.1 Calcium Hypochlorite Granules Installation:

A. Weight of calcium hypochlorite granules to be placed at the beginning of the main and at each 500 foot interval.

Pipe Diameter	Calcium Hypochlorite Granules
4”	1.7 oz.
6”	3.8 oz.
8”	6.7 oz.
10”	10.5 oz.
12”	1.5 oz.
14” and larger	D^2 x 1.5 oz.
Where D is the inside pipe diameter in feet, D= d/12.	

4.2 Calcium Hypochlorite Tablets Installation:

A. Number of 5 gram calcium hypochlorite tablets requires for dose of 25 ppm based on 3.25 grams available chlorine per tablet.

Pipe Diameter	Number of 5 gram tablets per length of pipe				
	13’ length or less	18’ length	20’ length	30’ length	40’ length
4”	1	1	1	1	1
6”	1	1	1	2	2
8”	1	2	2	3	4
10”	2	3	3	4	5
12”	3	4	4	6	7
16”	4	6	7	10	11

4.3 Flow Rates and Openings:

A. Required flow rates and openings to flush pipelines at 3.0 ft. /sec.

Number of 5 gram tablets per length of pipe						
Pipe Diameter	Velocity in (gpm)	Size of taps used / number taps required			Number of Hydrant Outlets	
		1”	1 ½”	2”	2 ½”	4 ½”
4”	120	1	–	–	1	1
6”	260	–	1	–	1	1
8”	470	–	2	–	1	1
10”	730	–	3	2	1	1
12”	1,060	–	–	3	2	1
16”	1,880	–	–	5	3	1

END OF SECTION

SECTION 02460
WET CONNECTIONS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Wet connections for new water lines and service lines to existing water lines.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for wet connections shown on the Drawings is on a unit price basis for each wet connection. Separate payment shall be made for each size of water line.
  2. No compensation shall be given for extra work or for damages occurring as result of incomplete shutoff.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum).
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AWWA – American Water Works Association.
  1. AWWA C800 – Standard for Underground Service Line Valves and Fittings.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 DEFINITIONS
- A. Wet connections consist of isolating sections of pipe to be connected with existing valves, draining isolated sections and completing connections.
- B. Connection of two inch (2 In) or smaller lines, which may be referred to on the Drawings as "two inch (2 In) standard connections" or "gooseneck connections" shall be measured as two inch (2 In) wet connections. This item is not to be used as part of two (2) inch service line.

PART II: PRODUCTS

2.1 MATERIALS
- A. Pipe shall conform to requirements of applicable portions of Sections 02200 through 02285 related to piping materials and to water distribution.
- B. Corporation cocks and saddles shall conform to requirements of Section 02430 – Water Tap and Service Line Installation.
- C. Valves shall conform to requirements of Section 02410 – Gate Valves.

D. Brass fittings shall conform to requirements of AWWA C800.

PART III: EXECUTION

3.1 CONNECTION OPERATIONS

A. Plan wet connections in manner and at hours with least inconvenience public. Notify the Project Manager at least seventy-two hours (72 Hrs) in advance of making connections.

B. Do not operate valves on water lines in use by the City. The City of Friendswood Public Works Department shall handle, at no cost to the Contractor, operations involving opening and closing valves for wet connections.

C. Conduct connection operations when the Project Manager is at job site. Connection work shall progress without interruption until complete once existing water lines have been cut or plugs have been removed for making connections.

3.2 TWO INCH (2 IN) WET CONNECTIONS

A. Tap water line: Use corporation cocks, saddles, copper tubing as required for line and grade adjustment and brass fittings necessary to adapt to existing water line. Use two inch (2 In) valves when indicated on the Drawings for two inch (2 In) copper gooseneck connections.

END OF SECTION

SECTION 02465
PROCEDURE FOR SAMPLING BACTERIOLOGICAL TESTS (BAC-T)

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. No water lines shall be opened to the existing City utilities until all bacteriological testing of those lines have passed.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. No separate payment shall be made for Bacteriological Testing of water lines under this Section. Include cost in the unit price of water lines being tested.
2. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Payment for Testing and Retesting.

1. Subsequent disinfection operations which may be necessary due to nonconforming or incomplete construction shall be charged to the Contractor for each additional Bacteriological Test.
2. If the City is taking the samples, the charge shall consist of base charge of eighteen dollars ($18.00) per sample. Note that each testing location will have two (2) samples therefore it is thirty-six dollars ($36.00) per testing location. Checks are to be made payable to Eastex Environmental.

C. Stipulated Price (Lump Sum):

If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES

A. AWWA – American Water Works Association.
AWWA C651 – Standard for Disinfecting Water Mains.
B. CFTS – City of Friendswood Technical Specifications.
C. TCEQ – Texas Commission on Environmental Quality
TCEQ – Approved Disinfection Methods and Products.

PART II: PRODUCTS – NOT USED

PART III: EXECUTION

3.1 UNDER NO CIRCUMSTANCES SHALL ANY PERSON, OTHER THAN AUTHORIZED CITY PERSONNEL, OPEN OR OPERATE ANY VALVE THAT

IS CONNECTED TO AN EXISTING CITY SERVICE MAIN, BE IT A TAPPING SLEEVE AND VALVE (TS&V) MADE BY THE CONTRACTOR OR AN EXISTING STUB OUT.

3.2 CONDUCTING DISINFECTION

A. Promptly disinfect water lines constructed before tests are conducted on water lines and before water lines are connected to the City water distribution system.

B. Water for disinfection and flushing shall be furnished by the City without charge for the first two (2) sets of tests. If additional testing is needed, please refer to Section 3.4.E.

C. Unless otherwise provided in the Contract Documents, the Contractor shall be responsible for disinfection of water lines.

D. Coordinate chlorination operations through the Project Manager. A minimum of forty-eight hours (48 Hrs) notice shall be given.

E. Chlorination procedures for new lines shall be performed in accordance with City of Friendswood Technical Specification 02455 – Disinfection of Waterlines.

3.3 SAMPLING STATIONS

A. Provide all necessary materials for Sampling Stations.

B. A testing station shall be two inch (2 In) minimum service lead or a one inch (1 In) meter service with a half inch (1/2 In) Hose Bib.

C. Location Requirements:

1. One (1) Sampling Station is required for every One Thousand Two Hundred Feet (1,200 Ft) of waterline.
2. One (1) Sampling Station is required at the end of the line.
3. One (1) Sampling Station is required at every branch of the line longer than one (1) joint of pipe (20 feet).

D. Use of Fire Hydrants for Sampling of Bacteriological Tests shall not be allowed.

E. Service lead with a hose bib connection shall be allowable.

3.4 PROCEDURE FOR SAMPLE TAKING

A. After disinfection and flushing of water lines, Bacteriological Tests shall be performed by the City at 10:00 A.M. Tuesdays and Thursdays. The Project Manager shall need to be informed of prospective testing forty-eight hours (48 Hrs.) before these times, no exceptions.

B. Only authorized City Personnel shall operate the valves that attach the waterline being tested to the existing City Infrastructure, NO EXCEPTIONS.

C. The following procedure shall be used when sampling waterlines for Bacteriological Testing (BAC-T):

1. All water lines shall have been disinfected in accordance with City of Friendswood Specification 02455 – Disinfection of Waterlines.

2. All water lines shall have been hydrostatically tested in accordance with City of Friendswood Specification 02450 – Hydrostatic Testing of Waterlines.
3. Waterlines shall have been flushed fully flushing chlorinated water from the waterline until normal residual chlorine is obtained at the end of the waterline.
4 Project Manager and Contractor identify and label the sampling locations.
5. If the Contractor is using another TCEQ accredited laboratory in lieu of the City's Laboratory, an authorized representative shall be onsite for chain of custody verification and witnessed by the Project Manager.
6. Test samples shall be taken in a sterile bottle treated with sodium thiosulfate, labeled for the location, and listed as "Construction Sample."
7. Before opening the sampling location, coat with a disinfection solution of sodium hypochlorite from a spray bottle on the inside and outside of the hose bib. If the sampling is reused for other locations, then each time the whole testing apparatus shall be disinfected inside and outside, before being reattached for sampling. Collector shall wear sterile gloves and block all possible wind.
8. Waterline is to sit for a minimum of sixteen hours (16 Hrs.) prior to samples being taken without flushing or in any way flowing the water in the line.
9. There shall be two (2) tests taken at each location. Collect one (1) sample at the location as soon as the hose bib is opened, and collect the second sample after fifteen minutes (15 Mins.) of the hose bib running.
10. Test results should be available within three days (3 Dys.) and shall be in written form only for acceptance. Verbal approval or disapproval is non-binding for testing purposes.
11. Any one (1) test that fails is a fail of all tests being taken, and the waterline that the tests represent.

D. After two (2) failed sets of tests, the line shall be re-chlorinated and flushed before any further tests can be taken. The Contractor shall be responsible for additional disinfection of water lines based upon Texas Commission on Environmental Quality (TCEQ) requirements.

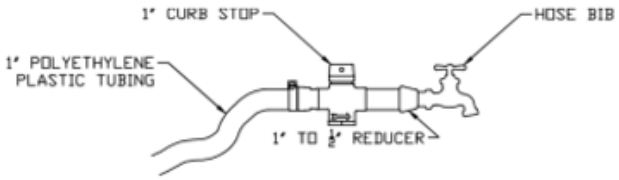
E. After two (2) failed samples, the c**ost of multiple re-testing will be charged at *$750.00 dollars per flushing point* for water usage and *$475.00 for labor costs* per set for each additional set of Bacteriological Tests taken.**

3.5 COMPLETION

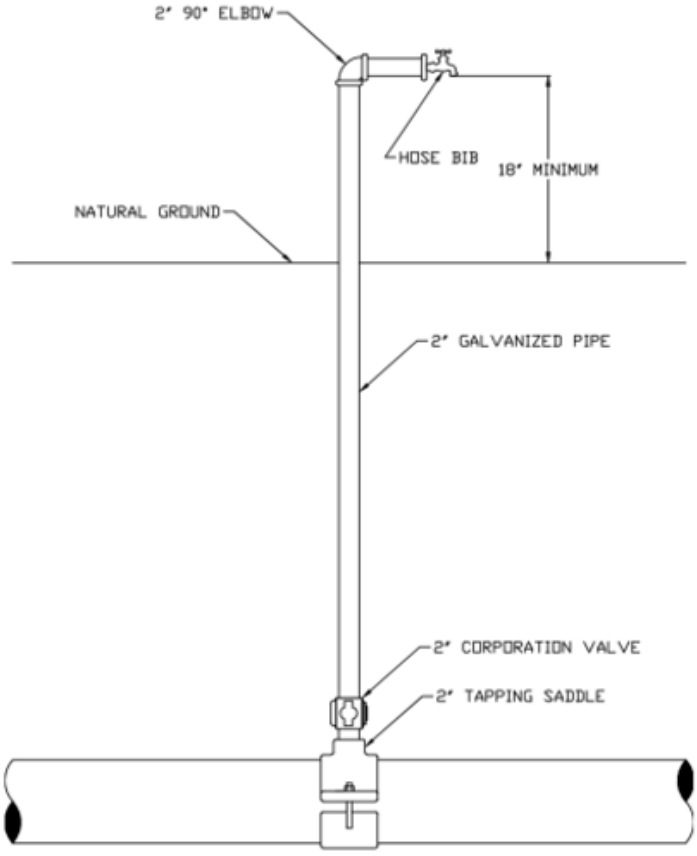
Upon passing test results having been received in writing, the waterline will be put in service as part of the City's Infrastructure and no one but

an authorized City Employee shall be able to operate any valves attached to the new line.

PART IV: SAMPLING STATIONS



1" METER SERVICE TESTING STATION



2" BLOW-OFF TESTING STATION

END OF SECTION

SECTION 02465SP

PROCEDURES FOR BACTERIOLOGICAL TESTING

The following provisions modify Section 02465 – Procedures for Bacteriological Testing Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

3.3 SAMPLING STATIONS

A. Prior to Bacteria Testing, contractor shall submit a Plan showing Bacteria Tests Sampling Locations for review and approval by the Engineer and the Owner. Bacteria Testing shall be according to AWWA C651 with one sample for every 1,000 feet of installed pipe and end of line connections. No such testing shall be performed until the Sampling Locations Plan has been duly approved.

B. Provide all necessary materials for Sampling Stations.

C. A testing station shall be two inch (2 In) minimum service lead or a one inch (1 In) meter service with a half inch (1/2 In) Hose Bib.

D. Location Requirements:
   1. One (1) Sampling Station is required for every One Thousand Two Hundred Feet (1,200 Ft) of waterline.
   2. One (1) Sampling Station is required at the end of the line.
   3. One (1) Sampling Station is required at every branch of the line longer than one (1) joint of pipe (20 feet).

E. Use of Fire Hydrants for Sampling of Bacteriological Tests shall not be allowed.

F. Service lead with a hose bib connection shall be allowable.

END OF SPECIAL PROVISION

SECTION 02500
GRAVITY SANITARY SEWERS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Gravity sanitary sewers and appurtenances, including stacks and service connections.

B. All connections to existing manholes shall be cored, no exceptions. Resilient connectors shall be supplied and used for all connections to manholes, new or existing.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. Payment for gravity sanitary sewers by open-cut or within Potentially Petroleum Contaminated Area (PPCA)is on a linear foot basis, complete in place, including sewer pipe, connections to existing manholes, post-installation television inspection and testing. Measurement shall be taken along centerline of pipe from centerline to centerline of manholes.
2. Payment for television inspection of existing gravity sanitary sewera shall be on a linear foot basis. Measurement shall be taken along centerline of pipe from centerline to centerline of manholes. See Section 02520 – Television Inspection of Sanitary Sewer Lines.
3. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit proposed methods, equipment, materials and sequence of operations for sanitary sewer construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.

C. Test Reports: Submit test reports and inspection videos as specified in Part III of this Section. DVD's become property of the City.

1.4 QUALITY ASSURANCE

A. Qualifications: Install sanitary sewer that is watertight both in pipe-to-pipe joints and in pipe-to-manhole connections. Perform testing in accordance with Section 02525 – Acceptance Testing for Gravity Sanitary Sewers Lines.

B. Regulatory Requirements.

1. Install sanitary sewer lines to meet minimum separation distance from potable water line, as scheduled below. Separation distance is defined as the distance between outside of water pipe and outside of sanitary sewer pipe. When possible, install new sanitary sewers no closer to water lines than nine feet (9 Ft) in all directions. Where this separation distance cannot be achieved, new sanitary sewers shall be installed as specified in this Section.
2. Make notification to the Project Manager when water lines are uncovered during sanitary sewer installation where the minimum separation distance cannot be maintained. The Project Manager shall prescribe the method to protect water lines from sanitary sewer lines.
3. Lay gravity sewer lines in straight alignment and grade.

1.5 PRODUCT DELIVERY, STORAGE and HANDLING

A. Inspect pipe and fittings upon arrival of materials at job site.
B. Handle and store pipe materials and fittings to protect them from damage due to impact, shock, shear or free fall. Do not drag pipe and fittings along ground. Do not roll pipe unrestrained from delivery trucks.
C. Use mechanical means to move or handle pipe. Employ acceptable clamps, rope or slings around outside barrel of pipe and fittings. Do not use hooks, bars or other devices in contact with interior surface of pipe to lift or move lined pipe.

1.6 REFERENCES

A. CTFS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 PIPE

A. Provide piping materials for gravity sanitary sewers of sizes and types indicated on the Drawings or as specified.
B. Unlined reinforced concrete pipe shall not be used for gravity sanitary sewer.

2.2 PIPE MATERIAL SCHEDULE

A. Unless otherwise shown on the Drawings, use pipe materials that conform to requirements specified in one (1) or more of following Sections:
   1. Section 02215 – Ductile Iron Pipe (DIP) and Fittings.
   2. Section 02220 – High Density Polyethylene Pipe (HDPE).
   3. Section 02235 – Polyvinyl Chloride Pipe (PVC).
B. Where shown on the Drawings, provide pipe meeting minimum class, dimension ratio or other criteria indicated.
C. Pipe materials other than those listed above shall not be used for gravity

sanitary sewers.

2.3 APPURTENANCES

A. Stacks: Conform to requirements of Section 02505 – Sanitary Sewer Service Stub-outs or Reconnections.
B. Service Connections: Conform to requirements of Section 02505 – Sanitary Sewer Service Stub-outs or Reconnections.
C. Roof, street or other type of surface water drains shall not be connected or reconnected into sanitary sewer lines.

2.4 BEDDING, BACKFILL and TOPSOIL MATERIAL

A. Bedding and Backfill: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities, Section 02140 – Utility Backfill Materials and Section 02145 – Cement-Stabilized Sand.
B. Topsoil: Conform to requirements of Section 02905 – Topsoil.

PART III: EXECUTION

3.1 PREPARATION

A. Prepare traffic control plans and set up street detours and barricades in preparation for excavation when construction shall affect traffic. Conform to requirements of Section 01555 – Traffic Control and Regulation.
B. Provide barricades, flashing warning lights and warning signs for excavations. Conform to requirements of Section 01555 – Traffic Control and Regulation. Maintain barricades and warning lights where work is in progress or where traffic is affected by work.
C. Perform the Work in accordance with OSHA standards. Employ trench safety system as specified in Section 02280 – Trench Safety System for excavations over five feet (5 Ft) deep.
D. Immediately notify agency or company owning any utility line which is damaged, broken or disturbed. Obtain approval from the Project Manager and agency or utility company for repairs or relocations, either temporary or permanent.
E. Remove old pavements and structures including sidewalks and driveways in accordance with requirements of Section 02105 – Removing Existing Pavements and Structures.
F. Install and operate dewatering and surface water control measures in accordance with Section 01585 – Control of Ground and Surface Water.
G. Do not allow sand, debris or runoff to enter sanitary sewer system.

3.2 DIVERSION PUMPING

A. Install and operate required bulkheads, plugs, piping and diversion pumping equipment to maintain sewage flow and to prevent backup or overflow. Obtain approval for diversion pumping equipment and procedures from the Project Manager.

B. Design piping, joints and accessories to withstand twice the maximum system pressure or fifty pounds per square inch (50 psi), whichever is greater.
C. No sewage shall be diverted into area outside of sanitary sewer.
D. In event of accidental spill or overflow, immediately stop overflow and take action to clean up and disinfect spillage. Promptly notify the Project Manager so that required reporting can be made to Texas Commission on Environmental Quality (TCEQ) by the Project Manager or the City.

3.3 EXCAVATION

A. Earthwork: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities. Use bedding as indicated on the Drawings.
B. Line and Grade: Establish required uniform line and grade in trench from benchmarks identified by the Project Manager. Maintain this control for minimum of one hundred feet (100 Ft) behind and ahead of pipe-laying operation. Use laser beam equipment to establish and maintain proper line and grade of the Work. Use of appropriately sized grade boards which are substantially supported is also acceptable. Protect boards and location stakes from damage or dislocation.
C. Trench Excavation: Excavate pipe trenches to depths shown on the Drawings and as specified in Section 02125 – Excavation and Backfill for Utilities.

3.4 PIPE INSTALLATION BY OPEN CUT

A. Install pipe in accordance with pipe manufacturer's recommendations and as specified in following paragraphs.
B. Install pipe only after excavation is completed, bottom of trench fine graded, bedding material is installed and trench has been approved by the Project Manager.
C. Install pipe to line and grade indicated. Place pipe so that it has continuous bearing of barrel on bedding material and is laid in trench so interior surfaces of pipe follow grades and alignment indicated. Provide bell holes where necessary.
D. Install pipe with spigot ends toward the downstream end of flow such that water flows out of the spigot and into the bell.
E. Form concentric joint with each section of adjoining pipe so as to prevent offsets.
F. Keep interior of pipe clean as installation progresses. Remove foreign material and debris from pipe.
G. Provide lubricant, place and drive home newly laid sections of pipe with come-along winches so as to eliminate damage to pipe. Install pipe to "home" mark where provided. Use of backhoes or similar powered equipment shall not be allowed unless protective measures are provided and approved in advance by the Project Manager.
H. Keep excavations free of water during construction and until final inspection.

I. When the Work is not in progress, cover exposed ends of pipes with approved plug to prevent foreign material from entering pipe.

J. Where gravity sanitary sewer is to be installed under existing water line with separation distance of at least two feet (2 Ft) and less than nine feet (9 Ft), install new sanitary sewer pipe so that one (1) full eighteen foot (18 Ft) long pipe is centered on water line crossing. Embed sanitary sewer pipe in cement stabilized sand for minimum distance of nine feet (9 Ft) on each side of crossing.

K. Where gravity sanitary sewer is to be installed under existing water line with separation distance of less than two feet (2 Ft), install new sanitary sewer using pressure-rated pipe as shown on the Drawings. Maintain minimum six inch (6 In) separation distance. Embed sanitary sewer pipe in cement stabilized sand for minimum distance of nine feet (9 Ft) on each side of crossing.

L. Where the length of a stub-out is not indicated, install the stub-out to the right-of-way line and seal the free end with an approved plug. If stub-out is perpendicular to the right-of-way line then install pipe to the right-of-way-line.

M. At no time shall any pipe be dropped into the trench or from a height great than twelve inches (12 In). Should a pipe be dropped as noted, the pipe shall be removed and marked with an “X” as defective.

3.5 PIPE INSTALLATION OTHER THAN OPEN CUT

A. For installation of pipe by augering, jacking or tunneling, conform to requirements of specification sections on tunneling augering, jacking and microtunneling work as appropriate.

3.6 INSTALLATION OF APPURTENANCES

A. Service Connections: Install service connections to conform to requirements of Section 2505 – Sanitary Sewer Service Stub-outs or Reconnections.

B. Stacks: Construct stacks to conform to requirements of 02505 – Sanitary Sewer Service Stub-outs or Reconnections.

C. Construct sanitary sewer manholes to conform to requirements of Section 02300 – Cast-in-Place Concrete Manholes and Section 02305 – Precast Concrete Manholes, as applicable. Install frames, rings and covers to conform to requirements of Section 02315 – Frames, Grates, Rings and Covers.

3.7 INSPECTION AND TESTING

A. Visual Inspection: Check pipe alignment in accordance with Section 02525 – Acceptance Testing for Gravity Sanitary Sewer Lines.

B. Mandrel Testing: Use Mandrel Test to test flexible pipe for deflection. Refer to Section 02525 – Acceptance Testing for Gravity Sanitary Sewer Lines.

C. Pipe Leakage Test: After backfilling line segment and prior to tie-in of

service connections, visually inspect gravity sanitary sewers where feasible and test for leakage in accordance with Section 02525 – Acceptance Testing for Gravity Sanitary Sewer Lines. Maintain piezometer installed to conform with Section 01585 – Control of Ground and Surface Water, until acceptance testing is completed.

3.8 BACKFILL AND SITE CLEANUP

A. Backfill and compact soil in accordance with Section 02125 – Excavation and Backfill for Utilities.

B. Backfill trench in specified lifts only after pipe installation is approved by the Project Manager.

C. Repair and replace removed or damaged pavement, curbs, gutters and sidewalks as specified in Section 02845 – Pavement Repair and Resurfacing.

D. Provide hydromulch seeding in areas of commercial, industrial or undeveloped land use over surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at uniform slope to natural grade as indicated on the Drawings. Provide minimum of four inches (4 In) of topsoil as specified in Section 02905 – Topsoil and apply hydromulch according to requirements of Section 02910 – Hydromulch Seeding.

E. Provide sodding in areas of residential land use over surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at uniform slope to natural grade as indicated on the Drawings. Provide minimum of four inches (4 In) of topsoil per Section 02905 – Topsoil. Sod disturbed areas in accordance with Section 02915 – Sodding.

3.9 POST-INSTALLATION TELEVISION INSPECTION

A. Prior to final acceptance of newly constructed gravity sanitary sewers, perform cleaning and closed circuit television inspection.

1. Cleaning of sanitary sewer lines and manholes shall conform to Section 02530 – Sanitary Sewer Line Cleaning.
2. Television inspection shall be performed after sanitary sewer line has been cleaned. Television inspection shall conform to Section 02520 – Television Inspection of Sanitary Sewer Lines.

B. Upon completion of television inspection reviews by the Project Manager, the Contractor shall be notified regarding final acceptance of sanitary sewer segment.

END OF SECTION

SECTION 02520
TELEVISION INSPECTION OF SANITARY SEWER LINES

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Post-installation television inspection.
- B. Existing installation television inspection.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No payment will be made for cleaning and television inspection of new gravity sanitary sewer lines under this Section. Include payment in unit price for work requiring cleaning and television inspection.
  2. Payment for television inspection of existing gravity sanitary sewer will be on a linear foot basis. Measurement will be taken along centerline of pipe from centerline to centerline of manholes.
  3. Payment shall be full compensation for all material, equipment and labor required for complete abandonment grouting, including air venting, testing, temporary plugs, PVC pipes and incidentals.
  4. No separate payment shall be made for television inspection that is required in Section 02525 – Acceptance Testing for Gravity Sanitary Sewer Lines.
  5. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Standards.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. The Contractor shall submit the following:
  1. Manufacturers brochures and specifications for TV equipment.
  2. Recording media shall be DVD.
  3. Test report and project summary.

PART II: PRODUCTS

2.1 RECORDING DEVICE
- A. Recording device shall be high quality color recording device capable of

recording DVD's.

B. The following information shall be available as follows:
   1. Each DVD media shall be permanently labeled with the following information:
      a. Project Name
      b. Project Number
      c. Manhole to Manhole Designation
      d. Name of the Contractor
      e. Date Televised
   2. The following information shall be recorded and visible on screen for ten seconds (10 Sec) immediately before the start of televising each line segment:
      a. Project Name
      b. Project Number
      c. Upstream Manhole Designation
      d. Downstream Manhole Designation
      e. Pipe Material
      f. Pipe Size
      g. Name of the Contractor
      h. Date Televised
      i. Street and/or Easement Location
   3. A continuous uninterrupted recording of distance from the insertion manhole shall be visible at the lower left corner of the screen at all times during inspection.
   4. The following information shall be provided in a hard copy report to accompany each DVD media:
      a. Project Name
      b. Project Number
      c. Name of the Contractor
      d. Date Televised
      e. Street and/or Easement Location
      f. Upstream Manhole Designation
      g. Downstream Manhole Designation
      h. Pipe Material
      i. Pipe Diameter
      j. Location of Service Connections

C. When the reports and DVD media are complete they shall be given to the Project Manager. DVD media and reports shall become the property of the City of Friendswood.

2.2 CLOSED CIRCUIT TELEVISION CAMERA

A. Television inspection cameras shall be required to adhere to the following specifications:
   1. Camera must be equipped with rotating head capable of ninety degree (90°) rotation from horizontal and three hundred sixty degree (360°) rotation about its centerline.

2. Minimum Camera Resolution: Four Hundred (400) vertical lines and four hundred sixty (460) horizontal lines.
3. Camera Lens: Not less than two hundred seventy-five degree (275°) viewing angle with automatic or remote focus and iris controls.
4. Focal Distance: Adjustable through range of six inches (6 In) to infinity.
5. Camera shall be intrinsically safe and operative in one hundred percent (100%) humidity conditions.
6. Lighting Intensity: Remote controlled and adjusted to minimize reflective glare.
7. Lighting and Camera Quality: Provide clear in-focus picture of the entire inside periphery of line being televised.
8. Camera must have height adjustment so that the camera lens is always centered at one-half (1/2) the diameter of the pipe.

B. Footage Counter: Camera shall have an accurate footage counter which displays on the monitor the exact distance from the starting manhole.

C. Camera shall be self-propelled.

PART III: EXECUTION

3.1 PREPARATION

A. Pipes to be inspected shall be cleaned as specified in Section 02530 – Sanitary Sewer Line Cleaning. Pipes shall be televised immediately following the cleaning of the pipes done in accordance with Section 02530 – Sanitary Sewer Line Cleaning.

B. If the depth of flow exceeds the specifications listed in TABLE 4.1 – MAXIMUM DEPTH OF FLOW in this Section, then bypass pumping shall be required at no additional cost to the City.

C. Move camera through the pipe from upstream manhole to downstream manhole stopping when necessary to permit proper documentation of pipe conditions. Upon entrance and exit of manholes, the camera shall pan to demonstrate that debris has been removed. At no time shall the camera be pulled at a rate faster than thirty feet per minute (30 Ft/Min). Use manual winches, power winches, TV cable and powered rewinds or other devices that do not obstruct the camera view or interfere with the documentation of pipe conditions to move the camera through the pipe. **Under no circumstances shall the camera be tethered to a hydraulically propelled or high-velocity jet cleaning device while the cleaning device is on.**

D. If the television camera will not pass through an entire section, set up equipment so that inspection can be performed from the opposite manhole. If the camera still cannot pass through the section, then the obstruction shall be cleared by cleaning, removal or point repair as directed by the Project Manager at no additional cost to the City and

reinspected.

E. Measurement for location of defects shall be aboveground by means of a meter device. Marking the cable, or similar method, which would require the interpolation of the depth of the manhole shall not be allowed. Check accuracy of the distance meter by use of a walking meter, roll-a-tape or other suitable device. The accuracy shall be satisfactory to the Project Manager.

F. The camera image shall be down the center axis of the pipe when the camera is in motion. The contractor is required to provide a three hundred sixty degree (360°) radial view of the pipe interior using a camera with pan and tilt capabilities for eight inch (8 In) diameter pipe and larger.

G. Points of interest shall also be digitally recorded and shall include, but not limited to, defective joints, ovality, debris, sediments, cracked pipes, holes, blockages, bellies and service connections.

3.2 DOCUMENTATION AND REPORTING

A. Television Inspection Logs: Develop and keep printed location records that clearly show the location in relation to an adjacent manhole of each infiltration point observed during inspection. In addition record any other points of significance or concern and other discernible features.

B. Photographs: Take digital photographs or digital DVD stills of any defect or points of interest recorded on the inspection report.

C. Each report on each segment shall use the Television Inspection Codes in Tables 4.2 to 4.12. The final report shall also give a total value of the section pipe that has been inspected.

D. Provide the City with two (2) copies of each DVD and two (2) copies of each report.

E. The Project Manager shall review the DVD media and documentation to ensure compliance listed in this specification.

PART IV: TABLES

4.1 – MAXIMUM DEPTH OF FLOW

Nominal Pipe Diameter	**Maximum Depth of Flow**
6” to 10”	1 inch
12” to 14”	2 inches
15” to 24”	3 inches
Over 24”	4 inches

4.2 TELEVISION INSPECTION CODES – LOCATION

LOCATION	CODE
Alley, Good Access	A
Alley, Poor Access	B
Easement, Good Access	C
Easement, Poor Access	D
Open Area, Good Access	E
Open Area, Poor Access	F
Parking Lot, Good Access	G
Parking Lot, Poor Access	H
ROW, Light Traffic	I
ROW, Medium Traffic	J
ROW, Heavy Traffic	K
Street, Light Traffic	L
Street, Medium Traffic	M
Street, Heavy Traffic	N

4.3 TELEVISION INSPECTION CODES – SURFACE COVER

SURFACE COVER	CODE
Asphalt Street	A
Concrete Street	B
Sidewalk	C
Trees/Shrubs	D
Close to Fence	E
Open Area	F
Moveable Structure	G
Unmovable Structure	H
Overhead Utilities	I
Pipe Above Ground	J

4.4 TELEVISION INSPECTION CODES – PIPE TYPE

SURFACE COVER	CODE
Cast Iron Pipe	CIP
Corrugated Metal Pipe	CMP
Concrete Pipe Poured in Place	CON
Cured in Place Pipe	CPP
Ductile Iron Pipe	DIP
Fiberglass Reinforced Pipe	FRP
High Density Polyethylene Pipe	HDP
Plastic Lined Concrete Pipe	PLP
Polyvinylchloride Pipe	PVC
Reinforced Concrete Pipe	RCP
Vitrified Clay Pipe	VCP

4.5 TELEVISION INSPECTION CODES – ALIGNMENT

Description	CODE
Begin 1/4 Pipe of Water	A
Begin 1/2 Pipe of Water	B
Begin Camera Underwater	C
End Camera Underwater	D
End 1/2 Pipe of Water	E
End 1/4 Pipe of Water	F

4.6 TELEVISION INSPECTION CODES – CRACKS

DESCRIPTION[1]	CODE	VALUE
< 1/2" W, < 1/2' L	A	1
< 1/2" W, < 1' – 2' L	B	2
< 1/2" W, > 2' L	C	3
> 1/2" W, < 1/2' L	D	4
> 1/2" W, < 1' – 2' L	E	5
> 1/2" W, > 2' L	F	6
Hole in Pipe – Small	G	7
Pipe Missing < 60°	H	8
Pipe Missing > 60°	I	9

[1]Use prefix of RC for Radial Cracks and LC for Longitudinal cracks.

4.7 TELEVISION INSPECTION CODES – JOINTS

DESCRIPTION	CODE	VALUE
Dropped Joint > 90% Clear	A	3
Dropped Joint 80% – 90% Clear	B	6
Dropped Joint < 80% Clear	C	9
Shifted Joint > 90% Clear	D	3
Shifted Joint 80% – 90% Clear	E	6
Shifted < 80% Clear	F	9
Withdrawn Joint 2" – 3"	G	1
Withdrawn Joint 3" – 4"	H	2
Withdrawn Joint > 4"	I	3
Visible Gasket	J	0
Leaking at Joint	K	0
Broken Joint – Light	L	2
Broken Joint – Medium	M	4
Broken Joint – Heavy	N	6

4.8 TELEVISION INSPECTION CODES - LATERALS

DESCRIPTION	CODE	VALUE
Private Service 0” – 1”	A	1
Private Service 1” – 2”	B	2
Private Service 2” – 3”	C	3
Private Service 3” – 4”	D	4
Private Service 0 > 4”	E	5
Defective Service Connection	F	6
Dead/Unused Service	G	7
Factory Service	H	8
Plumber Service	I	0

4.9 TELEVISION INSPECTION CODES - ROOTS

DESCRIPTION	CODE	VALUE
Roots, Light	A	1
Roots, Medium	B	2
Roots, Heavy	C	3

4.10 TELEVISION INSPECTION CODES - DEBRIS

DESCRIPTION	CODE	VALUE
Debris, Light	A	1
Debris, Medium	B	2
Debris, Heavy	C	3
Grease, Light	D	4
Greasy, Medium	E	5
Grease, Heavy	F	6

4.11 TELEVISION INSPECTION CODES – INFLOW/INFILTRATION

DESCRIPTION	CODE	VALUE
I/I – Light (0-1 GPM)	A	3
I/I – Medium (1-5 GPM)	B	6
I/I – Heavy (>5 GPM)	C	9
I/I – Some Evidence	D	2
I/I – Considerable Evidence	E	4
I/I – Great Evidence	F	6
I/I – No Evidence	G	0

4.12 TELEVISION INSPECTION CODES – STRUCTURAL

DESCRIPTION	CODE	VALUE
Line Deterioration, Light	A	3
Line Deterioration, Medium	B	6
Line Deterioration, Heavy	C	9
Line Deterioration, None	D	0
Oval < 5%	E	3
Oval > 5% and <10%	F	6
Oval > 10%	G	9
Collapsed	H	9
Pipe Deterioration, Light	I	0
Pipe Deterioration, Medium	J	0
Pipe Deterioration, Heavy	K	0
Pipe Deterioration, None	L	0
At Manhole	M	0

END OF SECTION

SECTION 02525
ACCEPTANCE TESTING FOR GRAVITY SANITARY SEWERS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Acceptance testing of sanitary sewers including:
  1. Visual inspection of sewer pipes.
  2. Mandrel testing for flexible sewer pipes.
  3. Leakage testing of sewer pipes.
  4. Leakage testing of manholes.
  5. Smoke testing of point repairs.
  6. Cleaning of Sanitary Sewer Systems.
  7. Television inspection of sewer pipes.
- B. All tests listed in this Section are not necessarily required on this Project. Required tests are named in other Sections which refer to this Section for testing criteria and procedures.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for acceptance testing under this Section. Include payment in the unit price for work requiring acceptance testing.
  2. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C924 - Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
  2. ASTM D3034 - Standard Specification for Type PSM Polyethylene (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  3. ASTM F794 - Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
  4. ASTM F1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 GRAVITY SANITARY SEWER PERFORMANCE REQUIREMENTS
- A. Gravity flow sanitary sewers are required to have straight alignment and uniform grade between manholes.

B. Flexible pipe, including "semi-rigid" pipe, is required to show no more than five percent (5%) deflection. Test pipe no sooner than thirty days (30 D) after backfilling of line segment but prior to final acceptance using standard mandrel to verify that installed pipe is within specified deflection tolerances.

C. Maximum allowable leakage for Infiltration or Exfiltration:
   1. The total exfiltration, as determined by hydrostatic head test, shall not exceed fifty gallons (50 Gal) per inch diameter per mile of pipe per twenty-four hours (24 Hrs) at minimum test head of two feet (2 Ft) above crown of pipe at upstream manhole or two feet (2 Ft) above groundwater elevation, whichever is greater.
   2. When pipes are installed more than two feet (2 Ft) below groundwater level, use infiltration test in lieu of exfiltration test. Total infiltration shall not exceed fifty gallons (50 Gal) per inch diameter per mile of pipe per twenty-four hours (24 Hrs). Groundwater elevation must be at least two feet (2 Ft) above crown of pipe at upstream manhole.
   3. Refer to TABLE 4.1 WATER TEST ALLOWABLE LEAKAGE in this Section, for measuring leakage in sewers. Perform leakage testing to verify that leakage criteria are met.

D. Perform air testing in accordance with requirements of this Section and Texas Commission on Environmental Quality (TCEQ) requirements. Refer to TABLE 4.2 – TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 PSI TO 4.0 PSI and TABLE 4.3 MINIMUM TESTING TIMES FOR LOW PRESSURE AIR TEST in this Section.

E. Perform vacuum testing of manholes in accordance with requirements of this Section and Texas Commission on Environmental Quality (TCEQ) requirements. Refer to TABLE 4.4 – VACUUM TESTING TIMETABLE in this Section.

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Test Plan: Before testing begins and in adequate time to obtain approval through submittal process, prepare and submit test plan for approval by the Project Manager. Include testing procedures, methods, equipment, and tentative schedule. Obtain advance written approval for deviations from the Drawings and the Specifications.

C. Test Reports: Submit test reports for each test on each segment of sanitary sewer.

1.6 GRAVITY SANITARY SEWER QUALITY ASSURANCE

A. Repair, correct, and retest manholes or sections of pipe which fail to meet specified requirements when tested.

B. Provide testing reports and DVD media of television inspection as directed by the Project Manager and as specified in Section 02520 – Television Inspection of Sanitary Sewer Lines.

C. Upon completion of DVD media reviews by the Project Manager, the Contractor shall be notified regarding final acceptance of the gravity sanitary sewer segment.

1.7 SEQUENCING AND SCHEDULING

A. Perform testing as work progresses. Schedule testing so that no more than one thousand linear feet (1000 Lf) of installed gravity sanitary sewer remains untested at one (1) time.

B. Coordinate testing schedules with the Project Manager. Perform testing under observation of the Project Manager.

PART II: PRODUCTS

2.1 DEFLECTION MANDREL

A. Mandrel Sizing: Rigid mandrel shall have outside diameter (O.D.) equal to ninety-five percent (95%) of inside diameter (I.D.) of pipe. Inside diameter of pipe, for purpose of determining outside diameter of mandrel, shall be average outside diameter minus two (2) minimum wall thicknesses for O.D. controlled pipe and average inside diameter for I.D. controlled pipe, dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.

B. Mandrel Design: Rigid mandrel shall be constructed of metal or rigid plastic material that can withstand two hundred pounds per square inch (200 psi) without being deformed. Mandrel shall have nine (9) or more "runners" or "legs" as long as total number of legs is odd number. Barrel section of mandrel shall have length of at least seventy-five percent (75%) of inside diameter of pipe. Rigid mandrel shall not have adjustable or collapsible legs which would allow reduction in mandrel diameter during testing. Provide and use proving ring for verifying each size of mandrel.

C. Proving Ring: Furnish "proving ring" with each mandrel. Fabricate ring of one-half inch (1/2 In) thick, three inch (3 In) wide bar steel to diameter 0.02 inches larger than approved mandrel diameter.

D. Mandrel Dimensions [five percent (5%) allowance]: Average inside diameter and minimum mandrel diameter are specified in TABLE 4.5 – PIPE VS. MANDREL DIAMETER in this Section. Mandrels for higher strength, thicker wall pipe or other pipe not listed in table may be used when approved by the Project Manager.

2.2 EXFILTRATION TEST

A. Water Meter: Obtain transient water meter from the City for use when water for testing shall be taken from the City system. Conform to the City requirements for water meter use.

B. Test Equipment:

1. Pipe plugs.

2. Pipe risers where manhole cone is less than two feet (2 Ft) above highest point in pipe or service lead.

2.3 INFILTRATION TEST
A. Test Equipment:
1. Calibrated ninety degree (90°) V-notch weir.
2. Pipe plugs.

2.4 LOW PRESSURE AIR TEST
A. Minimum Requirement for Equipment:
1. Control panel.
2. Low-pressure air supply connected to control panel.
3. Pneumatic plugs: Acceptable size for diameter of pipe to be tested; capable of withstanding internal test pressure without leaking or requiring external bracing.
4. Air hoses from control panel to:
a. Air supply.
b. Pneumatic plugs.
c. Sealed line for pressuring.
d. Sealed line for monitoring internal pressure.

B. Testing Pneumatic Plugs: Place pneumatic plug in each end of length of pipe on ground. Pressurize plugs to a minimum of twenty-five pounds per square inch (25 psi); then pressurize sealed pipe to five pounds per square inch (5 psi). Plugs are acceptable when they remain in place against test pressure without external aids.

2.5 GROUND WATER DETERMINATION
A. Equipment: Pipe probe or small diameter casing for ground water elevation determination.

2.6 SMOKE TESTING
A. Equipment:
1. Pneumatic plugs.
2. Smoke generator as supplied by Superior Signal Company, or approved equal.
3. Blowers producing two thousand five hundred Standard Cubic Feet per Minute (2500 Scfm) minimum.

PART III: EXECUTION

3.1 PREPARATION
A. Provide labor, equipment, tools, test plugs, risers, air compressor, air hose, pressure meters, pipe probe, calibrated weirs, or any other device necessary for proper testing and inspection.
B. Determine selection of test methods and pressures for gravity sanitary

sewers based on ground water elevation. Determine ground water elevation using equipment and procedures conforming to Section 01585 - Control of Ground and Surface Water.

3.2 VISUAL INSPECTION OF GRAVITY SANITARY SEWERS

A. Check pipe alignment visually by flashing light between structures. Verify if alignment is true and no pipes are misplaced. In case of misalignment or damaged pipe, remove and relay or replace pipe segment.

3.3 MANDREL TESTING FOR GRAVITY SANITARY SEWERS

A. Perform deflection testing on flexible and semi-rigid pipe to confirm pipe has no more than five percent (5%) deflection. Mandrel testing shall conform to ASTM D3034. Perform testing no sooner than thirty days (30 D) after backfilling of line segment, but prior to final acceptance testing of line segment.

B. Pull approved mandrel by hand through gravity sanitary sewer sections. Replace any section of gravity sanitary sewer not passing mandrel. Mandrel testing is not required for stub-outs.

C. Retest repaired or replaced gravity sanitary sewer sections.

3.4 LEAKAGE TESTING FOR GRAVITY SANITARY SEWERS

A. Test Options:

1. Test gravity sanitary sewer pipes for leakage by either exfiltration or infiltration methods, as appropriate, or with low pressure air testing.
2. Test new, replacement or rehabilitated gravity sanitary sewer manholes with water or low-pressure air. Manholes tested with low pressure air shall undergo physical inspection prior to testing.
3. Perform leakage testing after backfilling of line segment, and prior to tie-in of service connections.
4. If no installed piezometer is within 500 feet of gravity sanitary sewer segment, provide temporary piezometer for this purpose.

B. Compensating for Ground Water Pressure:

1. Where ground water exists, install pipe nipple at same time gravity sanitary sewer line is placed. Use one-half inch (1/2 In) capped pipe nipple approximately ten inches (10 In) long. Make installation through manhole wall on top of gravity sanitary sewer line where line enters manhole.
2. Immediately before performing line acceptance test, remove cap, clear pipe nipple with air pressure, and connect clear plastic tube to nipple. Support tube vertically and allow water to rise in tube. After water stops rising, measure height in feet of water over invert of pipe. Divide this height by two and three-tenths feet/pounds per square inch (2.3 Ft/psi) to determine ground water pressure to be used in line testing.

C. Exfiltration test:
   1. Determine ground water elevation.
   2. Plug sewer in downstream manhole.
   3. Plug incoming pipes in upstream manhole.
   4. Install riser pipe in outgoing pipe of upstream manhole when highest point in service lead (house service) is less than two feet (2 Ft) below bottom of manhole cone.
   5. Fill gravity sanitary sewer pipe and manhole or pipe riser, when used, with water to point two and one-half feet (2-1/2 Ft) above highest point in gravity sanitary sewer pipe, house lead, or ground water table, whichever is highest.
   6. Allow water to stabilize for one hour (1 Hr) to two hours (2 Hrs). Take water level reading to determine drop of water surface, in inches, over one hour (1 Hr) period, and calculate water loss [one inch (1 In) of water in four feet (4 Ft) diameter manhole equals eight and twenty-two hundredths gallons (8.22 Gal)] or measure quantity of water required to keep water at same level. Loss shall not exceed that calculated from allowable leakage according to TABLE 4.1 WATER TEST ALLOWABLE LEAKAGE in this Section.

D. Infiltration test: Ground water elevation must be not less than two feet (2 Ft) above highest point of gravity sanitary sewer pipe or service lead (house service).
   1. Determine ground water elevation.
   2. Plug incoming pipes in upstream manhole.
   3. Insert calibrated ninety-degree (90°) V-notch weir in pipe on downstream manhole.
   4. Allow water to rise and flow over weir until it stabilizes.
   5. Take five (5) readings of accumulated volume over period of two hours (2 Hrs) and use average for infiltration. Average must not exceed that calculated for two hours (2 Hrs) from allowable leakage according to TABLE 4.1 WATER TEST ALLOWABLE LEAKAGE in this Section.

E. Low Air Pressure Test: When using this test conform to ASTM C924 or ASTM F1417, as applicable, with holding time not less than that listed in TABLE 4.2 – TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 PSI TO 4.0 PSI.
   1. Air testing for sections of pipe shall be limited to lines less than thirty-six inch (36 In) average inside diameter.
   2. Lines thirty-six inch (36 In) average inside diameter and larger shall be tested at each joint. Minimum time allowable for pressure to drop from five pounds per square inch (5.0 psi) to four pounds per square inch (4.0 psi) during joint test shall be ten seconds (10 Sec), regardless of pipe size.
   3. For pipe sections less than thirty-six inch (36 In) average inside diameter:

a. Determine ground water level.
b. Plug both ends of pipe.
c. After manhole-to-manhole section of gravity sanitary sewer main has been sliplined and prior to any service lines being connected to new liner, plug liner at each manhole with pneumatic plugs.
d. Pressurize pipe to five pounds per square inch (5.0 psi). See TABLE 4.2 – TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 TO 4.0 PSI in this Section.
e. To determine air loss, measure time interval for pressure to drop to four pounds per square inch (4.0 psi). Time must exceed that listed in TABLE 4.2 – TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 TO 4.0 PSI in this Section for pipe diameter and length. For sliplining, use diameter of carrier pipe.

F. Retest: Repair and retest any section of pipe which fails to meet requirements.

3.5 TEST CRITERIA TABLES

A. Exfiltration and Infiltration Water Tests: Refer to TABLE 4.1 WATER TEST ALLOWABLE LEAKAGE in this Section.

B. Low Pressure Air Test:

1. TABLE 4.2 – TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 TO 4.0 PSI in this Section, are based on equation from Texas Commission on Environmental Quality (TCEQ) Design Criteria 317.2(a)(4)(B).

$$T = 0.0850(D)(K)/(Q)$$

Where:
- T = time for pressure to drop one (1.0) pound per square inch gauge in seconds
- K = 0.000419 DL, but not less than one (1.0)
- D = average inside diameter in inches
- L = length of line of same size pipe
- Q = rate of loss, 0.0015 ft^3/min./sq. ft. internal surface

2. Since K value of less than one (1.0) shall not be used, there are minimum testing times for each pipe diameter as given in TABLE 4.3 – MINIMUM TESTING TIMES FOR LOW PRESSURE AIR TEST in this Section.

Notes:

1. When two (2) sizes of pipe are involved, compute time by ratio of lengths involved.
2. Lines with twenty-seven inch (27 In) average inside diameter and larger may be air tested at each joint.
3. Lines with average inside diameter greater than thirty-six inches (36 In) shall be air tested for leakage at each joint.
4. If joint test is used, perform visual inspection of joint

immediately after testing.

5. For joint test, pipe is to be pressurized to four (4.0) psi greater than pressure exerted by groundwater above pipe. Once pressure has stabilized, minimum times allowable for pressure to drop from five (5.0) pounds per square inch to four (4.0) pounds per square inch shall be ten (10) seconds.

3.6 LEAKAGE TESTING FOR MANHOLES

A. After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures.

B. Plug influent and effluent lines, including service lines, with suitably sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendations. Place plugs minimum of six inches (6 In) outside of manhole walls. Brace inverts to prevent lines from being dislodged when lines entering manhole have not been backfilled.

C. Vacuum testing:

1. Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure. Following manufacturer's instructions and safety precautions, inflate sealing element to recommended maximum inflation pressure; do not over-inflate.
2. Evacuate manhole with vacuum pump to ten inches (10 In) of mercury (Hg), disconnect pump, and monitor vacuum for time period specified in Table 4.3 VACUUM TESTING TIMETABLE in this Section.
3. If drop in vacuum exceeds one inch of mercury(1 In/Hg) over specified time period tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

D. Perform hydrostatic exfiltration testing as follows:

1. Seal wastewater lines coming into manhole with internal pipe plug. Then fill manhole with water and maintain it full for at least one hour (1 Hr).
2. The maximum leakage for hydrostatic testing shall be twenty-five thousandths gallons (0.025 Gal) per foot diameter per foot of manhole depth per hour.
3. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

3.7 SMOKE TEST PROCEDURE FOR POINT REPAIRS

A. Application: Perform smoke test to:

1. Locate points of line failure for point repair.

2. Determine when point repairs are properly made.
3. Determine when service connections have been reconnected to rehabilitated sewer.
4. Check integrity of connections to newly replaced service taps to liners and to existing private service connections.

B. Limitations: Do not backfill service taps until completion of this test. Test only those taps in single manhole-to-manhole section at one (1) time. Keep number of open excavations to minimum.

C. Preparation: Prior to smoke testing, give written notices to area residents no fewer than two days (2 D), nor more than seven days (7 D), prior to proposed testing. Also give notice to the City of Friendswood Police, Fire Departments and Public Works twenty-four hours (24 Hrs) prior to actual smoke testing.

D. Isolate Section: Isolate manhole section to be tested from adjacent manhole sections to keep smoke localized. Temporarily seal annular space at manhole for sliplined sections.

E. Smoke Introduction:
1. Operate equipment according to manufacturer's recommendation and as approved by the Project Manager.
2. Conduct test by forcing smoke from smoke generators through gravity sanitary sewer main and service connections. Operate smoke generators for minimum of five minutes (5 Min).
3. Introduce smoke into upstream and downstream manhole as appropriate. Monitor taps/connections for smoke leaks. Note sources of leaks.

F. Repair and Retest: Repair and replace taps or connections noted as leaking and then retest. Taps and connections may be left exposed in only one (1) manhole-to-manhole section at time. When repair or replacement, testing or retesting, and backfilling of excavation is not completed within one (1) workday, properly barricade, and cover each excavation as approved by the Project Manager.

G. Service Connections: On houses where smoke does not escape from plumbing vent stacks to confirm reconnection of sewer service to newly installed liner pipe, perform dye test to confirm reconnection has been made. Introduce dye into service line through plumbing fixture inside structure or sewer cleanout immediately outside structure and flush with water. Observe flow at service reconnection or downstream manhole. Detection of dye confirms reconnection.

PART IV: TABLES

4.1 – WATER TEST ALLOWABLE LEAKAGE

Diameter of Riser or Stack in Inches	**Volume per Inch of Depth**		**Allowance Leakage***	
	Inch	**Gallons**	**Pipe Size in Inches**	**Gal./Min. per 100 ft.**
1	0.7854	0.0034	6	0.0039
2	3.1416	0.0136	8	0.0053
2.5	4.9087	0.0212	10	0.0066
3	7.0686	0.0306	12	0.0079
4	12.5664	0.0306	15	0.0099
5	19.6350	0.0544	18	0.0118
6	28.2743	0.1224	21	0.0138
8	50.2655	0.2176	24	0.0158
			27	0.0177
			30	0.0197
			36	0.0237
			42	0.0276
For other diameters, multiply square of diameters by value for 1” diameter.			Equivalent to 50 gallons per inch of inside diameter per mile per 24 hours.	
* Allowable leakage rate shall be reduced to ten gallons (10 Gal) per inch of inside diameter per mile per twenty-four hours (24 Hrs)when sewer is identified as located above twenty-five year (25 Yr) flood plain.				

4.2 TIME ALLOWED FOR PRESSURE LOSS FROM 5.0 PSI TO 4.0 PSI

Pipe Dia. In.	Min. Time mm:ss	Length for Min. Time	Time for Longer Length	Specification Time for Length (L) shown in MM:SS				
				100’	150’	200’	250’	300’
6	5:40	398	0.8548	5:40	5:40	5:40	5:40	5:40
8	7:33	298	1.5196	7:33	7:33	7:33	7:33	7:36
10	9:27	239	2.3743	9:27	9:27	9:27	9:54	11:52
12	11:20	199	3.4190	11:20	11:20	11:20	14:15	17:06
15	14:10	159	5.3423	14:10	14:10	17:48	22:16	26:43
18	17:00	133	7.6928	17:00	19:14	25:39	32:03	38:28
21	19:50	114	10.4708	19:50	26:11	34:54	43:38	52:21
24	22:40	99	13.6762	22:48	34:11	45:35	56:59	68:23
27	25:30	88	17.3089	28:51	43:16	57:42	72:07	86:33
30	28:20	80	21.3690	35:37	53:25	71:14	89:02	106:51
33	31:10	72	25.8565	43:06	64:38	86:11	107:44	129:17

Pipe Dia. In.	Min. Time mm:ss	Length for Min. Time	Time for Longer Length	Specification Time for Length (L) shown in MM:SS					
				350’	400’	450’	500’	550’	600’
6	5:40	398	0.8548	5:40	5:42	6:25	7:07	7:50	8:33
8	7:33	298	1.5196	8:52	10:08	11:24	12:08	13:56	15:12
10	9:27	239	2.3743	13:51	15:50	17:48	19:47	21:46	23:45
12	11:20	199	3.4190	19:57	22:48	25:39	28:30	31:20	34:11
15	14:10	159	5.3423	31:10	35:37	40:04	44:31	48:58	53:25
18	17:00	133	7.6928	44:52	51:17	57:42	64:06	70:31	76:56
21	19:50	114	10.4708	61:05	69:48	78:32	87:15	95:59	104:42
24	22:40	99	13.6762	79:47	91:10	102:34	113:58	125:22	136:46
27	25:30	88	17.3089	100:58	115:24	129:49	144:14	158:40	173:05
30	28:20	80	21.3690	124:39	142:28	160:16	178:05	195:53	213:41
33	31:10	72	25.8565	150:50	172:23	193:55	215:28	237:01	258:34

4.3 MINIMUM TESTING TIMES FOR LOW PRESSURE AIR TEST

Pipe Diameter (Inches)	Minimum Time (seconds)	Length of Pipe for Minimum Time (feet)	Time for Longer Length (seconds)
6	340	398	0.855 (L)
8	454	298	1.520 (L)
10	567	239	2.374 (L)
12	680	199	3.419 (L)
15	850	159	5.342 (L)
18	1020	133	7.693 (L)
21	1190	114	10.471 (L)
24	1360	99	13.676 (L)
27	1530	88	17.309 (L)
30	1700	80	21.369 (L)
33	1870	72	258.856 (L)

4.4 – VACUUM TESTING TIME TABLE

TIME ALLOWED FOR VACUUM LOSS FROM 10.0 Hg TO 9.0 Hg			
	TIME IN SECONDS BY DIAMETER OF MANHOLES		
Manhole Depth in Feet	48” Diameter	60” Diameter	72” Diameter
8’ and less	14	18	23
10	17	23	28
12	21	28	34
14	25	32	40
16	28	37	45
18	23	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

4.5 – PIPE VS. MANDREL DIAMETER

PIPE VERSUS MANDREL DIAMETER			
Material and Wall Construction	Nominal Size (Inches)	Average I.D. (Inches)	Minimum Mandrel Diameter (Inches)
PVC - Solid (SDR 26)6	6	5.764	5.476
	8	7.715	7.329
	10	9.646	9.162
PVC – Solid (SDR 35)12	12	11.737	11.150
	15	14.374	13.655
	18	17.629	16.748
	21	20.783	19.744
	24	23.381	22.120
	27	26.351	25.033
PVC – Truss	8	7.750	7.363
	10	9.750	9.263
	12	11.790	11.201
	15	14.770	14.032
PVC – Profile (ASTM F794)	12	11.470	11.153
	15	14.370	13.652
	18	17.650	16.768
	21	20.750	19.713
	24	23.500	22.325
	27	26.500	25.175
	30	29.500	28.025
	36	35.500	33.725
	42	41.500	39.425
	48	47.500	45.125
HDPE – Profile	18	18.000	17.100
	21	21.000	19.950
	24	24.000	22.800
	27	27.000	25.650
	30	30.000	28.500
	36	36.000	34.200
	42	42.000	39.900
	48	48.000	45.600
	54	54.000	51.300
	60	60.000	57.00
Fiberglass (Class SN-46)	12	12.85	11.822
	18	18.66	17.727
	20	20.68	19.646
	24	24.72	23.484
	30	30.68	29.146
	36	36.74	34.903
	42	42.70	40.565
	48	48.76	46.322
	54	54.82	52.079
	60	60.38	57.361

END OF SECTION

SECTION 02600
STORM SEWERS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. New storm sewers and appurtenances, modifications to existing storm sewer system and installation of roadside ditch culverts.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for storm sewers, including elliptical pipe or box sections, installed by open-cut or augering with or without casing is on a linear foot basis. Measurement for storm sewers and roadside ditch culverts shall be taken along the center line of pipe from center line to center line of manholes or from end to end of culverts. Payment shall be made for each linear foot installed complete in place, including connections to existing manholes and inlets.
  2. Payment for storm sewer leads, including elliptical, round or box leads, is on a linear foot basis.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit manufacturer's literature for product specifications and installation instructions.
- C. Submit proposed methods, equipment, materials and sequence of operations for storm sewer construction. Plan operations to minimize disruption of utilities serving occupied facilities or adjacent property.

1.5 QUALITY ASSURANCE
- A. The condition for acceptance shall be a watertight storm sewer that is watertight both in at all joints and at connections to manholes or inlets.
- B. Provide manufacturer's certification to Specifications.

1.6 PRODUCT DELIVERY, STORAGE and HANDLING
- A. Comply with manufacturer's recommendations.

B. Handle pipe or boxes, fittings and accessories carefully with approved handling devices. Do not drop or roll pipe or boxes off trucks or trailers. Do not use sections that are cracked, gouged, chipped, dented or otherwise damaged for installation.
C. Store pipe or boxes and fittings on heavy timbers or platforms to avoid contact with ground.
D. Unload pipe or boxes, fittings and appurtenances as close as practical to location of installation to avoid unnecessary handling.
E. Keep interiors of pipe or boxes and fittings free of dirt and foreign matter.

PART II: PRODUCTS

2.1 PIPE

A. Provide pipe or boxes for storm sewers in the sizes and types specified, unless otherwise indicated on the Drawings.
B. In diameters where material alternatives are available, and such alternatives have been approved by the City, provide pipe or boxes from single manufacturer for each pipe or box size, unless otherwise approved by the Project Manager or otherwise shown on the Drawings.
C. Existing pipe or boxes that have been removed during construction shall not be reused unless approved the Project Manager.

2.2 PIPE MATERIAL SCHEDULE

A. Storm Sewer Pipe or Boxes: Use pipe or boxes that conform to requirements specified in one (1) or more of the following Sections as shown on the Drawings. Polyvinyl Chloride Pipe shall not be used for storm sewers.
   1. Section 02240 – Reinforced Concrete Box (RCB).
   2. Section 02245 – Reinforced Concrete Pipe (RCP).
B. Driveway Culvert Pipe for Streets with Open Ditches: Use pipe or boxes that conform to requirements specified in one (1) or more of the following Sections as shown on the Drawings.
   1. Section 02240 – Reinforced Concrete Box (RCB).
   2. Section 02245 – Reinforced Concrete Pipe (RCP).
C. Provide pipe or boxes meeting minimum class, dimension ratio or other criteria indicated.
D. Pipe or boxes other than those listed above shall not be used for storm sewers.

2.3 BEDDING, BACKFILL and TOPSOIL MATERIAL

A. Bedding and Backfill Material: Conform to requirements of Sections 02125 – Excavation and Backfill for Utilities, Section 02140 – Utility Backfill Material and Section 02145 – Cement-Stabilized Sand.
B. Topsoil: Conform to requirements of Section 02905 – Topsoil.
C. Use cement-stabilized sand material for bedding and backfill in the pipe or box zone for all storm sewers.

D. For storm sewer pipes forty-two inches (42 In) in diameter and larger or boxes larger than four feet by four feet (4 Ft x 4 Ft); use suitable on-site material or select backfill from twelve inches (12 In) above the pipe to twelve inches (12 In) below the pavement for backfill.

PART III: EXECUTION

3.1 PREPARATION

A. Prepare traffic control plans and set up street detours and barricades in preparation for excavation when construction shall affect traffic. Conform to requirements of Section 01555 – Traffic Control and Regulation.

B. Provide barricades, flashing warning lights and signs for excavations. Conform to requirements of Section 01555 – Traffic Control and Regulation. Maintain barricades and warning lights for streets and intersections while the Work is in progress or where traffic is affected by the Work.

C. Immediately notify agency or company owning utility lines which are damaged, broken or disturbed. Obtain approval from the Project Manager and agency for repairs or relocations, either temporary or permanent.

D. Remove old pavements and structures, including sidewalks and driveways, in accordance with requirements of Section 02105 – Removing Existing Pavements and Structures.

E. Install and operate dewatering and surface water control measures in accordance with Section 01585 – Control of Ground and Surface Water.

3.2 EXCAVATION

A. Earthwork: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities. Use bedding as indicated on the Drawings.

B. Line and Grade: Establish required uniform line and grade trench from benchmarks identified by the Project Manager. Maintain this control for minimum of one hundred feet (100 Ft) behind and ahead of pipe-laying operation. Use laser beam equipment to establish and maintain proper line and grade of the Work or use of appropriately sized grade boards which are substantially supported.

C. Trench Excavation: Excavate trenches to the level indicated on the City's Standard Construction Details. Backfill excavation with specified bedding material to level of lower one-third (1/3) of pipe barrel or box. Tamp and compact backfill to provide bedding at indicated grade. Form bedding foundation to a minimum depth of one-eighth (1/8) of pipe diameter or box height, but not less than six inches (6 In).

3.3 PIPE INSTALLATION

A. Install in accordance with pipe or boxes manufacturer's recommendations and as specified in this Section.

B. Install pipe or boxes only after excavation is completed, bottom of trench is shaped, bedding material is installed and trench has been approved by the Project Manager.
C. Install pipe or boxes to line and grade indicated on the Drawings. Place pipe or boxes so that it has continuous bearing of barrel or box bottom on bedding material with no voids and is laid in the trench so interior surfaces of pipe or boxes follows grades and alignments indicated.
D. Install pipe or boxes with bells of pipe facing upstream of anticipated flow.
E. Join each section of adjoining pipe or boxes to prevent offsets.
F. Place and drive home newly laid sections with a sling or come-a-long winches to eliminate damage to sections. Unless otherwise approved by the Project Manager, provide end protection to prevent damage while using back hoes or similar powered equipment to drive home newly laid sections.
G. Keep interior of pipe or boxes clean as installation progresses.
H. Keep excavations free of water during construction and until final inspection.
I. When Work is not in progress, cover exposed ends of pipes or boxes with plugs specifically designed to prevent foreign material from entering pipe.
J. Storm sewers identified on the Drawings to be abandoned shall be abandoned in general conformance with Section 2515 – Abandonment of Sanitary Sewers.

3.4 PIPE OR BOX INSTALLATION OTHER THAN OPEN CUT

A. Conform to requirements of Section 02275 – Pipe and Casing Augering for Sanitary Sewers where required.

3.5 INSTALLATION OF APPURTENANCES

A. Construct manholes to conform to requirements of Sections 02300 – Cast-in-place Concrete Manholes, Section 02305 – Precast Concrete Manholes and Section 02615 – Concrete Brick Manholes for Storm Sewers. Install frames, grate rings and covers to conform to requirements of Section 02315 – Frames, Grates, Rings and Covers.
B. Install inlets, headwalls and wingwalls to conform to requirements of Section 02605 – Cast-in-place Inlets, Junction Boxes, Headwalls and Wingwalls and Section 02610 – Precast Concrete Inlets, Junction Boxes, Headwalls and Wingwalls.
C. Rehabilitate existing manholes and inlets to conform to requirements of Section 02320 – Manhole Rehabilitation. Adjust manhole covers and inlets to grade conforming to requirements of Section 02310 – Adjusting Manholes, Inlets and Valve Boxes to Grade.
D. Dimension for Type C and Type E manholes shall be as shown on the Drawings.

3.6 INSPECTION AND TESTING

A. Perform post-installation television inspection in accordance with Section 02520 – Television Inspection of Sanitary Sewer Lines. Hand held cameras may be used in storm sewers in lieu of requirements of Section 02520 – Television Inspection of Sanitary Sewer Lines. Clearly stencil distance markings on each joint of pipe or box to indicate distance from starting manhole when using hand-held cameras.

3.7 BACKFILL AND SITE CLEANUP

A. Backfill trench after pipe or box installation is inspected and approved by the Project Manager.
B. Backfill and compact soil in accordance with Section 02125 – Excavation and Backfill for Utilities.
C. Repair and replace removed or damaged pavement and sidewalks as specified in Section 02845 – Pavement Repair and Resurfacing.
D. In unpaved areas, grade surface as uniform slope to natural grade as indicated on the Drawings. Provide minimum of four inches (4 In) of topsoil and seed according to requirements of Section 02910 – Hydromulch Seeding or Section 02915 – Sodding, as required.

END OF SECTION

SECTION 02605
CAST-IN-PLACE INLETS, JUNCTION BOXES, HEADWALLS AND WINGWALLS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Cast-in-place inlets for storm sewers, including cast iron frame and plate or grate.
- B. Cast-in-place headwalls including wingwalls for storm sewers.
- C. Cast-in-place junction box with lid or grate top.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for cast-in-place inlets is on a unit price basis for each inlet installed.
  2. Payment for cast-in-place headwalls including wingwalls is on a unit price basis for each headwall including wingwall installed.
  3. Payment for cast-in-place junction box with lid or grate top is on a unit price basis for each junction box installed.
  4. Payment for inlets, including wingwalls and junction boxes includes connection of lines and furnishing and installing frames, grates, rings and covers.
  5. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit shop drawings for approval of design and construction details for cast-in-place units which differ from units shown on the Drawings.
- C. Submit manufacturers' data and details for frames, grates, rings and covers.

1.5 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that material was manufactured in compliance with standards and Technical Specifications referenced in this Section.

PART II: P R O D U C T S

2.1 MATERIALS

A. Concrete: Class A concrete with a minimum compressive strength of four thousand pounds per square inch (4000 psi) conforming to requirements of Section 03300 – Structural Concrete, unless otherwise indicated on the Drawings.

B. Reinforcing Steel: Conform to requirements of Section 03300 – Structural Concrete.

C. Mortar and Hydraulic Cement – Conform to requirements of Section 03100 – Mortar.

D. Miscellaneous metals: Cast-iron frames, grates, rings and covers conforming to requirements of Section 02315 – Frames, Grates, Rings and Covers.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify lines and grades are correct.

B. Verify compacted subgrade shall support loads imposed by inlets, junction boxes, headwalls and wingwalls.

3.2 INSTALLATION

A. Construct units complete in place to dimensions, lines and grades as shown on the Drawings.

B. Excavate in accordance with requirements of Section 02125 – Excavation and Backfill for Utilities.

C. Construct box section of inlets, junction boxes, headwalls and wingwalls of Class A concrete.

D. Forms required for both outside and inside faces of concrete inlet, junction box, headwall or wingwall walls; however, when nature of material excavated for inlet or junction box can be hand trimmed to smooth outside vertical face, outside forms may be omitted with approval of the Project Manager. When nature of material excavated for headwall or wingwall walls can be hand trimmed to a smooth backside vertical face, backside forms may be omitted with approval of the Project Manager.

E. Place reinforcing steel to conform to details shown on the Drawings. Provide positive means for holding steel cages in place during concrete placement. Welding of reinforcing steel is not permitted unless noted on the Drawings. A maximum variation in reinforcement position is plus or minus ten percent (10%) of wall thickness or plus or minus one-half inch (±1/2 In), whichever is less. Regardless of variation, maintain a minimum cover of concrete over reinforcement as shown on the Drawings.

F. Chamfer exposed edges unless otherwise indicated on the Drawings.

3.3 FINISHES

A. Cut off inlet or junction box leads neatly at inside face of inlet or junction box wall, or at outside face of headwall. Point up with mortar.

B. When box section of inlet or junction box complete, shape floor of inlet junction box with mortar to conform to detailed the Drawings.

C. Finish all concrete surfaces in accordance with requirements of Section 03300 – Structural Concrete.

3.4 QUALITY CONTROL

A. Verify that inlets and junction boxes are free of leaks. Repair leaks in approved manner.

3.5 CONNECTIONS

A. Connect storm sewer leads to inlets and junction boxes as shown on the Drawings. Seal all connections inside and outside with hydraulic cement. Make connections watertight.

3.6 BACKFILL

A. Backfill area of excavation surrounding each completed inlet, junction box, headwall and wingwalls according to requirements of Section 02125 – Excavation and Backfill for Utilities.

END OF SECTION

SECTION 02610
PRECAST CONCRETE INLETS, JUNCTION BOXES, HEADWALLS AND WINGWALLS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Precast concrete inlets for storm sewers, including cast iron frame and plate or grate.
- B. Precast concrete headwalls and wingwalls for storm sewers.
- C. Precast junction box with lid or grate top.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for precast concrete inlets is on a unit price basis for each inlet installed.
  2. Payment for precast concrete headwalls and wingwalls is on a unit price basis for each headwall and wingwall installed.
  3. Payment for precast concrete junction box with lid or grate top is on a unit price basis for each junction box installed.
  4. Payment for inlets, junction boxes, headwalls, and wingwalls includes connection of lines and furnishing and installing frames, grates, rings and covers.
  5. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
- B. CFTS – City of Friendswood Technical Specifications..

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit shop drawings for approval of design and construction details for precast concrete inlets, junction box headwalls and wingwalls. Precast units differing from standard designs shown on the Drawings shall be rejected unless shop drawing submittals are approved. Clearly show proposed substitution is equal or superior in every aspect to standard designs.
- C. Submit manufacturers' data and details for frames, grates, rings and covers.

1.5 STORAGE AND SHIPMENT

A. Store precast units on level blocking. Do not place loads until design strength is reached. Shipment of acceptable units may be made when twenty-eight day (28 D) strength requirements have been met.

1.6 QUALITY ASSURANCE

A. Provide manufacturer's affidavits that material was manufactured in compliance with standards and Technical Specifications referenced in this Section.

PART II: PRODUCTS

2.1 MATERIALS

A. Concrete: Provide concrete for precast machine-made units meeting requirements of ASTM C76 regarding reinforced concrete, cement, aggregate, mixture and concrete test. A minimum twenty-eight day (28 D) compressive strength shall be four thousand pounds per square inch (4000 psi).

B. Reinforcing Steel: Place reinforcing steel to conform to details shown on the Drawings and as follows:

1. Provide positive means for holding steel cages in place throughout production of concrete units. A maximum variation in reinforcement position is plus or minus ten percent (±10%) of wall thickness or plus or minus one-half inch (±1/2 In), whichever is less. Regardless of variation, maintain a minimum cover of concrete over reinforcement as shown on the Drawings.
2. Welding of reinforcing steel is not permitted unless noted on the Drawings.

C. Mortar and Hydraulic Cement: Conform to requirements of Section 03100 – Mortar.

D. Miscellaneous Metal: Cast-iron frames and plates conforming to requirements of Section 02315 – Frames, Grates, Rings and Covers.

2.2 SOURCE QUALITY CONTROL

A. Tolerances: Allowable casting tolerances for concrete units are plus or minus one-quarter inch (1/4 In) from dimensions shown on the Drawings. Concrete thickness in excess of that required shall not constitute cause for rejection provided that excess thickness does not interfere with proper jointing operations.

B. Precast Unit Identification: Mark date of manufacture and name or trademark of manufacturer clearly on inside of inlet, headwall or wingwall.

C. Rejection: Precast units rejected for non-conformity with these specifications and for following reasons:

1. Fractures or cracks passing through shell, except for single end crack that does not exceed depth of joint.
2. Surface defects indicating honeycombed or open texture.

3. Damaged or misshaped ends, where damage would prevent making satisfactory joint.

D. Replacement: Immediately remove rejected units from the Work site and replace with acceptable units.

E. Repairs: Occasional imperfections resulting from manufacture or accidental damage may be repaired if, in opinion of the Project Manager, repaired units conform to requirements of these specifications.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify lines and grades are correct.

B. Verify compacted subgrade shall support loads imposed by inlets, junction boxes, headwalls and wingwalls.

3.2 INSTALLATION

A. Install units complete in place to dimensions, lines and grades as shown on the Drawings.

B. Excavate in accordance with requirements of Section 02125 – Excavation and Backfill for Utilities.

C. Bed precast concrete units on foundations of firm, stable material shaped to conform to shape of unit bases.

D. Provide adequate means to lift and place concrete units without damage.

3.3 FINISHES

A. Use hydraulic cement to seal joints, fill lifting holes and as otherwise required.

B. When box section of inlet or junction box has been completed, shape floor of inlet or junction box with mortar to conform to the Drawing details.

C. Adjust cast iron inlet plate frames to line, grade and slope shown on the Drawings. Grout frame in place with mortar conforming to Section 03000 – Mortar.

3.4 QUALITY CONTROL

A. Verify that inlets and junction boxes are free of leaks. Repair leaks in approved manner.

3.5 CONNECTIONS

A. Connect storm sewer leads to inlets as shown on the Drawings. Seal connections inside and outside with hydraulic cement. Make connections watertight.

3.6 BACKFILL

A. Backfill area of excavation surrounding each completed inlet, junction box, headwall or wingwall according to requirements of Section 02125 – Excavation and Backfill for Utilities.

END OF SECTION

SECTION 02620
STORM SEWER LINE CLEANING AND TELEVISING

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Cleaning of Storm Sewer Lines of foreign materials and complete a closed-circuit television (CCTV) inspection of all lines and facilities in this project to include all the equipment, labor and materials necessary to perform all work for sewer line cleaning and televising.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:
   1. No separate payment shall be made outside of those listed in Document 00300-Unit Price Bid Form.
   2. Refer to Section 01270 - Measurement and Payment for unit price procedures.

1.3 REFERENCES

A. CFTS – City of Friendswood Technical Specifications.
B. NASSCO – National Association of Sewer Service Companies.
   1. Jetter Code of Practice.
   2. Pipe Line Assessment and Certification Program (PACP).
   3. TV inspection form and sewer condition codes.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.
B. The Contractor shall submit all manufacturer's brochures and specifications for the cleaning equipment.
C. Methods of cleaning and clearing lines shall submit for review and approval by the Project Manager.
D. The Contractor shall provide a safety plan and identify designated safety supervisory personnel. The plan shall include confined space entry provisions and training, listing of personnel protective equipment (PPE), and a Traffic Control Plan (TCP).
E. CCTV Technician NASSCO PACP Certification – The Contractor shall provide certification documentation for all technicians on this project.

1.5 QUALITY ASSURANCE

A. The Contractor shall comply with all codes, laws, ordinances and regulations of the governmental authorities having jurisdiction over this work.
B. The Contractor shall comply with the latest revision of the Occupational Safety and Health Administration manuals for construction and confined spaces.

D. The storm sewer line cleaning shall remove foreign materials from the lines and restore the sanitary sewer to a minimum of ninety-five percent (95%) of the original carrying capacity or as required for proper seating of an internal pipe line. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the Contractor shall immediately notify the Project Manager and the Contractor shall not be required to clean that section of pipe.

1.6 COORDINATION

A. The Contractor shall completely remove and dispose of all dirt, rubbish and surplus, and unsuitable materials at the end of each work day at no additional cost to the City and in accordance of Section 01580 – Waste Material Disposal.

B. The Contractor shall be allowed to use the City water supply for filling the tanks. The Contractor shall go to the Public Works Department and obtain, by leaving a deposit, a meter for fire hydrants. There shall be no charge for the water used during this operation. There shall be either an RPZ or and an air gap for filling of the tanks. All filling operations are to be reviewed by the Project Manager.

PART II: PRODUCTS

2.1 HIGH VELOCITY JET (HYDRO CLEANING) EQUIPMENT

A. All high-velocity sanitary sewer cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two (2) or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from fifteen degrees (15°) to forty-five degrees (45°) in all sizes of pipe designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floors. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, hydraulically driven hose reel and recovery tank.

1. The equipment shall have a minimum of six hundred feet (600 Ft) of one inch (1 In) I.D. high pressure hose.
2. The nozzles shall have a capacity of sixty gallons per minute (60 GPM).
3. The minimum working pressure shall be one thousand pounds per square inch (1000 psi).

2.2 CCTV EQUIPMENT

A. The CCTV digital cameras used for inspection shall be specifically designed and constructed for such inspection. The cameras shall be operative in one hundred percent (100%) humidity conditions and

capable of withstanding exposure to concentrations of pollutants typically found in sewage.

B. The view seen by the camera shall be transmitted to a monitor greater than or equal to (≥) fifteen inches (15") as measured on a diagonal dimension.

C. The view seen by the camera shall be transmitted to a monitor greater than or equal to (≥) fifteen inches (15") as measured on a diagonal dimension.

D. Camera systems shall be able to navigate minor objects, roots, and debris. The system used to move the camera through the storm sewer pipes shall not obstruct the camera's view or interfere with the proper documentation of the storm sewer conditions. The camera shall be capable of traversing the storm sewer line for a minimum distance of one thousand feet (1,000').

E. The Contractor shall provide all ancillary wheels, crawlers, tracks, or other adjustment plates, skids, arms, axles, etc. as may be necessary or dictated by flow conditions, pipe diameter, etc. These accessories shall be utilized to stabilize the camera in the pipeline, provide adequate propulsion in the pipeline for the camera, and/or to raise the camera above the flow to provide a quality picture during CCTV inspection.

F. Cameras shall record all images digitally in color. Cameras shall have pan and tilt capabilities and shall have a minimum of three hundred sixty-degree (360º) by one hundred eighty-degree (180º) rotation capability. Illumination sensitivity shall be three (3) lux or less and provide a minimum of four hundred sixty (460) lines of resolution. The focal distance shall be an adjustable range from one inch (1") to infinity. There shall be no geometric distortion of image.

G. Cameras shall also provide ancillary or supplemental lighting packs or units to provide sufficient light and illumination in larger diameter pipes or pipes where additional lighting may be necessary. Lighting intensity shall be adjustable to minimize glare. Lighting and picture quality shall be adjustable to provide a clear picture of the entire periphery of the pipeline for all conditions encountered.

H. The distances traveled by the camera shall be measurable to one-tenth of a foot (0.1') by an onboard measuring device and shall provide video display readout of said distances in units of one-tenth of a foot (0.1'). The cable footage counter shall be accurate to plus or minus one foot (±1.0') per one hundred feet (100').

2.2 RECORDING DEVICE

A. Recording device shall be high quality color recording device capable of recording DVD's.

B. The following information shall be available as follows:

1. Each DVD media shall be permanently labeled with the following information:

a. Project Name.

b. Project Number.
c. Manhole to manhole designation.
d. Name of Contractor.
e. Date Televised.

2. The following information shall be recorded and visible on screen for ten seconds (10s) immediately before the start of televising each segment:
   a. Project Name.
   b. Project Number.
   c. Upstream manhole number designation.
   d. Downstream manhole number designation.
   e. Pipe Material.
   f. Pipe Size.
   g. Name of Contractor.
   h. Date Televised.
   i. Street and/or Easement Location.
3. A continuous uninterrupted recording of distance from the insertion manhole shall be visible at the lower left-hand corner of the screen.
4. Video shall be formatted as Window Media Video v9 (.WMV) with a minimum compression of one (1) mb/sec, a resolution of six hundred forty (640) by four hundred eighty (480), and a NTSC format.

PART III: EXECUTION

3.1 CLEANING PRECAUTIONS

A. During storm sewer cleaning operations, satisfactory precautions shall be taken in the use of the cleaning equipment to ensure that the water pressure does not create damage to public or private property. Extraordinary care shall be taken to prevent the nozzle from causing damage to people, vehicles or other property that are in the vicinity of or around the equipment.

B. The Contractor shall be responsible to make notification to all residents and businesses with back-yard or side-yard storm sewer systems where work will be taking place. Notifications shall be no less than forty-eight (48) hours nor no more that two (2) weeks prior to commencing work.

3.2 STORM SEWER LINE CLEANING

A. Water required for jetting and cleaning shall be furnished by the City at no charge, however the Contractor shall be required to supply a deposit for the fire hydrant meter. The Contractor shall provide a backflow protection device to prevent cross contamination of the City's water distribution system.

B. The designated storm sewer sections shall be cleaned using high-velocity jet equipment. The equipment shall be capable of removing roots, dirt, grease, sand, rocks and other materials and obstructions from

storm sewer lines and manholes. There shall be a debris catcher on the downstream manhole. If cleaning of an entire section cannot be successfully performed from one (1) manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If again successful cleaning cannot be performed or the equipment fails to transverse the entire section, it shall be assumed that a major blockage exists, and the cleaning effort shall be abandoned after notification to and approval by the Project Manager.

C. The Contractor shall dewater and remove all sludge, dirt, sand, rocks, and other solid material and debris resulting from the cleaning operations from the downstream segment being cleaned.
D. Passing material from sewer segment to sewer segment shall not be permitted.
E. All removed material shall be dumped at an acceptable and approved location to receive the waste. The Contractor shall be responsible for all handling, hauling, and disposal of all debris, silt, and other accumulated solids removed from the storm sewers. All loads SHALL be weighed, and weigh tickets given to the Project Manager for verification.
F. Cleaning of Storm Sewer lines from the last manhole to outfall shall be done in such a manner that the debris, silt, etc. shall not fall into detention ponds, drainage swales, or waterways.

3.2 ROOT REMOVAL

A. All roots (with the exception of “fine roots” as defined in PACP) shall be cut to within one inch (1”) or closer of the pipe wall.
B. All lines requiring root cutting shall have roots cut by mechanical means from the downstream manhole to the mass. No “reverse cutting” from the upstream side shall be permitted.
C. Televising may be stopped, and root cutting executed while the video recording is paused.
D. Storm Sewer Structures are not required to be inspected as part of the contract, however the Contractor shall make note and communicate to the Project Manager any structure appearing to be structurally deficient which may cause a safety hazard or flooding risk.

3.4 MATERIAL REMOVAL

A. Sludge, dirt, rocks, sand, grease, roots and other solid or semi-solid material resulting from cleaning operation shall be captured and removed at the downstream manhole of the section being cleaned, loaded in a suitable container, transported to the nearest wastewater treatment facility and disposed of at that facility in accordance with all requirements and charges and as specified in Section 01580 – Waste Material Disposal.
B. UNDER NO CIRCUMSTANCES SHALL SEWAGE OR SOLIDS OR ANY OTHER TYPE OF WASTE MATERIAL FROM THIS OPERATION THAT HAS BEEN REMOVED FROM THE CITY STORM SEWER SYSTEM,

BE DUMPED ONTO STREETS OR INTO DITCHES, CATCH BASINS, STORM DRAINS, EXISTING SANITARY SEWER MANHOLES, ON THE GROUND OR INTO STREAMS.

3.5 CLEANING WATER DISPOSAL

A. Water used to clean the sewer lines shall be discharged into the sanitary sewer system downstream of the cleaning operation or as otherwise directed by the Project Manager.

B. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR DISCHARGE WATER USED TO CLEAN THE SEWER LINES ONTO STREETS OR INTO DITCHES, CATCH BASINS, STORM DRAINS, EXISTING SANITARY SEWER MANHOLES, ON THE GROUND OR INTO STREAMS. Water discharge shall only be allowed to downstream manholes.

3.7 FINAL ACCEPTANCE

A. Acceptance of storm sewer line cleaning shall be made upon completion of the television inspection Storm Sewer Lines. The DVD media and reports shall be reviewed and approved by the Project Manager. Any television inspection that shows the cleaning to be unsatisfactory shall require the process of re-cleaning and re-inspecting to be repeated until the sanitary sewer line cleaning is satisfactory to the Project Manager. Re-cleaning and re-inspection shall be done at no additional cost to the City.

END OF SECTION

SECTION 02705
CRUSHED CONCRETE BASE COURSE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Crushed concrete base course.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for Crushed Concrete Base Course is on a per ton basis furnished and compacted in place.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C150 – Standard Specification for Portland Cement.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TxDOT – Texas Department of Transportation.
  1. TxDOT Tex-101-E – Preparing Soil and Flexible Base Materials for Testing.
  2. TxDOT Tex-106-E – Calculating the Plasticity Index of Soils.
  3. TxDOT Tex-110-E – Determining Particle Size Analysis of Soils.
  4. TxDOT Tex-113-E – Laboratory Compaction Characteristics and Moisture-Density Relationship of Base Materials.
  5. TxDOT Tex-115-E – Field Method for Determining In-place Density of Soils and Base Materials.
  6. TxDOT Tex-120-E – Soil-Cement Testing.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit representative samples of crushed concrete for testing.
- C. Submit weight tickets, certified by supplier, for each delivery of recycled crushed concrete, gravel and soil binder.
- D. Submit manufacturer's description and characteristics for pug mill and associated equipment, mixer trucks, spreading and compaction equipment for approval.

1.5 TESTS
- A. Follow Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.
- B. Test and analyze aggregate and binder products per TxDOT Tex-110-E.

1.6 DELIVERY, STORAGE AND HANDLING
- A. Provide materials from stockpiles that are protected during storage from contaminates detrimental to concrete base.
- B. Load material from same area of stockpile to maintain uniformity of each successive delivery to the Project site.
- C. Store cement in weatherproof enclosures. Protect from ground dampness.

1.7 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that material was manufactured in compliance with standards and Technical Specifications referenced in this Section.

PART II: PRODUCTS

2.1 SYSTEM DESCRIPTION
- A. Provide Crushed Concrete Base Course with following performance:
  1. Minimum seven percent (7%) cement content.
  2. Minimum compressive strength: Six hundred fifty pounds per square inch (650 psi) at fourteen days (14 D) following TxDOT Tex-120-E.
  3. Prepare concrete product in on-site or off-site pug mill or in on-site or off-site portable concrete mixer.
- B. Preliminary Design: Prepare preliminary mix with minimum cement to crushed concrete ratios of five percent (5%) by dry mass of materials.
  1. Designate source of concrete for crushing. Follow Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures for tests of concrete from source.
  2. Results of laboratory and compression tests shall be used by the Project Manager to select final mix design.

2.2 PORTLAND CEMENT
- A. ASTM C150 Type I, II or III; bulk or sacked.

2.3 WATER
- A. Potable.

2.4 AGGREGATE
- A. Recycled Crushed Concrete: Material retained on No. 40 Sieve and durable coarse particles of crusher-run reclaimed cured Portland cement concrete, obtained from approved source. Organic material of any kind is prohibited in crushed concrete. The crushed concrete shall be substantially free of foreign matter including, but not limited to, asphalt, base and dirt.
- B. Soil Binder (classified below): Meeting following requirements when tested following TxDOT Tex-106-E:
  1. Maximum liquid limit: thirty-five (35).
  2. Maximum plasticity index: ten (10).

C. Mixed Aggregate and Soil Binder: Grading following TxDOT Tex-101-E and Tex-110-E as specified in TABLE 4.1 – MIXED AGGREGATE AND SOIL BINDER in this Section.
   2. Bank sand may be added to mix at pug mill.

2.5 ASPHALTIC SEAL CURE
A. Acquire written approval from the Project Manager before curing and before proceeding with curing.
B. Use following as option to curing by sprinkling:
   1. Cut-back asphalt: MC30 following Section 02730 – Prime Coat.
   2. Emulsified petroleum resin: EPR-1 Prime following Section 02730 – Prime Coat.

2.6 MATERIAL MIX
A. Design mix for a minimum compressive strength of six hundred fifty pounds per square inch (650 psi) at fourteen days (14 D) following TxDOT Tex-120-E unconfined compressive strength.
B. Cement Ratio: Follow paragraph 2.1.A. Increase cement content in two percent (2%) steps up to nine percent (9%) maximum when compressive strength of design mix samples fail TxDOT Tex-120-E test.

2.7 MIXING EQUIPMENT
A. Mix following Paragraph 2.1.A, with metering devices adding specified quantities of crushed concrete, cement and water into mixer. Dry mix crushed concrete and cement prior to adding water. Produce homogeneous and uniformly mixed product.

2.8 SOURCE QUALITY CONTROL
A. Test following Sections 01470 -Testing Laboratory Services and 01475 – Quality Control Testing Procedures.
B. When directed by the Project Manager, test for unconfined compressive strength following Test Method TxDOT Tex-120-E as follows:
   1. Mold a minimum of three (3) samples each day or three (3) for each five hundred tons (500 Tn) of production or one (1) for each day.
   2. Compressive strength: shall be the average of the minimum three (3) samples or three (3) for each production lot.

PART III: EXECUTION

3.1 EXAMINATION
A. Follow Section 01455 – Inspection Services.
B. Verify buried utility work is complete.
C. Verify lime treatment of base is complete.
D. Verify subgrade is ready to support imposed loads.
E. Verify flatwork, foundations, projecting reinforcement and similar work interfacing with base is in place.

F. Verify lines and grades are correct.

3.2 PREPARATION

A. Complete backfill of new utilities below future grade.
B. Prepare subgrade in accordance with requirements of Section 02115 – Embankment and Section 02135 – Excavation for Roadway or Section 02720 – Lime-Stabilized Base Subgrade and Section 02725 – Portland Cement-Stabilized Base Subgrade.
C. Correct subgrade deviations in excess of plus or minus one-quarter inch (1/4 In) in cross section or in sixteen foot (16 Ft) length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.
D. Prepare sufficient subgrade in advance of base course for efficient operations.
E. Have sufficient products and equipment on hand to expeditiously apply base.

3.3 MIXING

A. Maintain moisture content of between optimum and five percent (5%) above optimum.

3.4 PLACEMENT

A. Place mixture with approved spreading equipment. Spread to eliminate planes of weakness or pockets of nonuniformly graded material resulting from hauling and dumping operations.
B. Provide approximately vertical construction joints between fresh base and base-in-place four hours (4 Hrs) or longer. Form joint with temporary header or make vertical cut of in-place base immediately before placing fresh base.
C. Make cold joints at center line of head-to-head parking stalls.
D. Place base so that projecting reinforcing steel from curbs remain at approximate center of base. Ensure proper bond between reinforcement and base.
E. Transverse and longitudinal joints shall be vertical.
F. Unless noted otherwise, place recycled crushed concrete base in courses not to exceed eight inches (8 In) in depth. All courses shall be placed on same working day unless approved by the Project Manager. Construction joints between new base and base previously placed shall be wetted and coated with dry cement prior to addition of new base.
G. Complete finishing operations within period of six hours (6 Hrs) after cement is added to base materials.

3.5 COMPACTION

A. Start compaction a maximum three hours (3 Hrs) after start of mixing. Compact loose mixture with approved tamping rollers until entire depth is uniformly compacted. Do not allow base to mix with underlying material.

1. Do not rework uncompacted material that has set up for more than thirty minutes (30 Min).
2. Complete placement and compaction work within six hours (6 Hrs) from start of moist mixing.

B. Correct irregularities or weak spots immediately by replacing material and recompacting.
C. Apply water to maintain moisture between optimum and five percent (5%) above optimum moisture.
D. Remove and reconstruct sections where average moisture content exceeds ranges specified at time of final compaction.
E. Finish by blading surface to final grade after compacting final course. Seal with approved pneumatic tired rollers or flat wheel rollers which are sufficiently light to prevent surface hair line cracking.
F. Compact to a minimum density of ninety-five percent (95%) of dry density, following TxDOT Tex -113-E, at moisture content of treated material between optimum and five percent (5%) above optimum.
G. Test roadway base course compaction in accordance with TxDOT Tex-115-E.
H. Maintain surface to required lines and grades throughout operation.

3.6 CURING

A. Moist cure for a minimum of seventy-two hours (72 Hrs) before adding pavement courses.
B. Use sprinkling or, at option, apply following curing membrane as soon as initial set begins, using approved light-weight self-propelled pressure distributor:
   1. MC30: One tenth gallon per square yard (0.1 Gal/Sy).
   2. EPR-1 Prime: Fifteen hundredths gallon of asphalt residual per square yard (0.15 Gal/Sy).
C. Do not use cut-back asphalt during period of April 16th through September 15th.

3.7 TOLERANCES

A. Completed Surface: Smooth and conform to typical section and established lines and grades.
B. Top Surface of Base Course: Plus or minus one-quarter inch (±1/4 In) in cross section or in sixteen feet (16 Ft) of length.

3.8 FIELD QUALITY CONTROL

A. Test following Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.
B. Perform compaction tests following TxDOT Tex-113-E at randomly selected locations. Remove and replace areas failing compaction requirements at no additional cost to the City.

3.9 PROTECTION

A. Maintain base in proper condition until surface is placed. Surface must

be placed within fourteen days (14 D) after final mixing and compaction unless otherwise approved by the Project Manager. Repair unacceptable base course immediately by replacing base to full depth.

B. Curing membrane may remain in place at areas where surface courses or other base courses are applied.

C. Prevent construction traffic on base for a minimum three days (3 D). Light vehicles, used to maintain proper cure, are permitted on base after initial set or as permitted by the Project Manager.

PART IV: TABLES

4.1 MIXED AGGREGATE AND SOIL BINDER

Sieve	**Percent Crushed Concrete Retained**
1 3/4 inch	0 to 10
No. 4	45 to 75
No. 40	55 to 85*
* Classified as Soil Binder	

END OF SECTION

SECTION 02710
FLEXIBLE BASE COURSE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Foundation course of crushed concrete or stone.

1.2 MEASUREMENT AND PAYMENT
- A. UNIT PRICES:
  1. Measurement for flexible base is on a square yard basis. Separate measurement shall be made for each different required thickness of base course.
  2. Refer to Section 01290 – Payment Procedures for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D1556 – Density of Soil in Place by the Sand-Cone Method.
  2. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12.44 ft-lbf/ft3).
  3. ASTM D2922 – Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  4. ASTM D361 – Test Method for Water Content of Soils and Rock in Place by Nuclear Methods (shallow depth).
  5. ASTM D3017 – Test Method for Water Content of Soils and Rock in Place by Nuclear Methods.
  6. ASTM D4318 – Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TxDOT – Texas Department of Transportation.
  1. TxDOT Tex-101-E – Preparation of Soil and Flexible Base Materials for Testing.
  2. TxDOT Tex-110-E – Determination of Particle Size Analysis of Soils.

1.4 SUBMITTALS
- A. Submittals shall conform to requirements of Section 01330 – Submittals Procedures.
- B. Submit samples of flexible base course and soil binder for testing.

1.5 TESTS

A. Tests and analysis of soil materials shall be performed in accordance with ASTM C131, ASTM D698, ASTM D4318, Tex-101-E and Tex-110-E under provisions of Sections 01470 – Testing Laboratory Services and 01475 Quality Control Testing Procedures.

1.6 DELIVERY, STORAGE and HANDLING

A. Provide materials from stockpiles that are protected during storage from contaminates that would be detrimental to the flexible base course.
B. Load materials from same area of stockpile to maintain uniformity of each successive delivery to the project site.

1.5 QUALITY ASSURANCE

A. Provide manufacturer's affidavits that material was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 MATERIALS

A. Crushed Stone or Concrete: Material retained on the No. 40 sieve meeting the following requirements:
   1. Durable particles of crusher-run broken limestone, crushed concrete, crushed sandstone or granite obtained from an approved source.
B. Soil Binder: Material passing the No. 40 sieve meeting the following requirements when tested in accordance with ASTM D4318:
   1. Maximum Liquid Limit: forty (40).
   2. Maximum Plasticity Index: twelve (12).
   3. Maximum Lineal Shrinkage: seven (7) (when calculated from volumetric shrinkage at liquid limit).
C. Mixed Materials shall meet the following requirements:
   1. Minimum compressive strength of thirty-five pounds per square inch (35 psi) at zero pounds per square inch (0 psi) lateral pressure and one hundred seventy-five pounds per square inch (175 psi) at fifteen pounds per square inch (15 psi) lateral pressure using triaxial testing procedures.
   2. Grading in accordance with Tex-101-E and Tex-110-E within the limits specified in TABLE 4.1 – SIEVE ANALYSIS in this Section.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify compacted subgrade is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Complete backfill of new utilities below future grade.
B. Prepare subgrade in accordance with requirements of Section 02115 – Embankment and Section 02135 – Excavation for Roadway or Section 022720 – Lime-Stabilized Base Subgrade.
C. Correct subgrade deviations in excess of plus or minus one-half inch (1/2 In) in cross section or in sixteen foot (16 Ft) length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.
D. Prepare sufficient subgrade in advance of base course operations.

3.3 PLACEMENT

A. Spread and shape in lifts to compacted thickness not to exceed six inches (6 In) in depth. Complete spreading, shaping and compacting on same day material is deposited.
B. Place base so that projecting reinforcing steel from curbs remain at approximate center of base. Secure a firm bond between reinforcement and base.
C. Start rolling operations as soon as possible after placement. Use sheepsfoot, steel or pneumatic rollers as approved. Roll longitudinally with subgrade starting from sides. Overlap successive strips by one-half (1/2) width of each rear wheel.
D. Maintain moisture between optimum and three percent (3%) above optimum moisture.
E. Compact to ninety-five percent (95%) of Proctor density in accordance with ASTM D698, unless otherwise indicated on the Drawings.
F. Finish to grade and compact lift before placing successive lift.
G. Maintain shape by grading throughout operation.
H. Provide total thickness indicated on the Drawings.

3.4 TOLERANCES

A. Completed surface shall be smooth and conform to typical section and established lines and grades.

3.5 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.
B. Compaction Testing shall be performed in accordance with ASTM D698 or ASTM D2922 and ASTM 3017 at a random location near each depth determination core.
C. Rework and recompact areas that do not conform to compaction requirements.

3.6 PROTECTION

A. Sprinkle to prevent excessive loss of moisture.
B. Restrict construction traffic on finished base to equipment required to complete the work.

PART IV: TABLES

4.1 SIEVE ANALYSIS

Sieve	Percent Retained
1-3/4 inch	0 to 10
No. 4	45 to 75
No. 40	60 to 85

END OF SECTION

SECTION 02715
HOT-MIX ASPHALT BASE COURSE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Foundation course of compacted mixture of coarse and fine aggregates and asphalt binder (Black Base).

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for hot-mix asphalt base is on a per ton basis.
  2. Payment for hot-mix asphalt base for transitions and base repairs is on a per ton basis.
  3. Payment for hot-mix asphaltic base for temporary driveway, roadway shoulders, etc., is on a per ton basis.
  4. Measurement for utility projects:
     a. Actual pavement replaced but not beyond the maximum pavement replacement limits shown on the Drawings.
     b. Include installed hot-mix asphalt base course material that extends one foot (1 Ft) beyond outside edge of pavement to be replaced, except where proposed pavement section shares common edge with existing pavement section.
  5. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHO – American Association of State Highway and Transportation Officials.
  1. AASHTO T201 – Standard Specification for Kinematic Viscosity of Asphalts (Bitumens).
  2. AASHTO T202 – Standard Specification for Viscosity of Asphalt by Vacuum Capillary Viscometer.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM C33 – Standard Specifications for Concrete Aggregate.
  2. ASTM C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  3. ASTM C136 – Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
  4. ASTM D4402 – Standard Test Method for Viscosity

Determination of unfilled Asphalt Using the Broolfield Thermal Apparatus.

C. CFTS – City of Friendswood Technical Specifications.
D. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-106-E – Calculating the Plasticity Index of Soils.
   2. TxDOT Tex-126-E – Molding, Testing and Evaluating Bituminous Black Base Material.
   3. TxDOT Tex-200-F – Sieve Analysis of Fine and Coarse Aggregates.
   4. TxDOT Tex-203-F – Sand Equivalent Test.
   5. TxDOT Tex-204-F – Design of Bituminous Mixtures.
   6. TxDOT Tex-207-F – Determining Density of Compacted Bituminous Mixtures.
   7. TxDOT Tex-208-F – Test for Stabilometer Value of Bituminous Mixtures.
   8. TxDOT Tex-227-F – Theoretical Maximum Specific Gravity of Bituminous Mixtures.

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit certificates that asphalt materials and aggregates meet requirements of Paragraph 2.1, Materials.
C. Submit proposed mix and test data for each type of base course in Work.
D. Submit manufacturer's description and characteristics of mixing plant for approval.
E. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

1.5 QUALITY ASSURANCE
A. Provide manufacturer's affidavits that material was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 MATERIALS
A. Coarse Aggregate:
   1. Use crushed gravel or crushed stone or combination retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious material occurring either free or as coating on aggregate. Conform aggregate to ASTM C33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed forty percent (40%) by weight when tested in accordance with ASTM C131.
   2. Reclaimed asphalt pavement (RAP) or reclaimed Portland cement concrete pavement (RPCCP) are permitted as aggregates for hot-mix asphalt base course if combined

aggregate criteria, gradation and mixture properties are met.

B. Fine Aggregate: Sand or stone screenings or combination thereof, passing No. 10 sieve. Conform aggregate to ASTM C33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other deleterious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than six (6) when tested by TxDOT Tex-106-E. Sand equivalent shall have a minimum value of forty-five (45) when tested by TxDOT Tex-203-F.

C. Composite Aggregate: Conform to limits specified in TABLE 4.1 – GRADATION OF COMPOSITE AGGREGATE in this Section when graded in accordance with ASTM C136. Provide either coarse or fine aggregate where designated on the Drawings.

D. Asphalt Binder: Moisture-free homogeneous material meeting requirements as specified in TABLE 4.2 – ASPHALT BINDERS in this Section.

E. Reclaimed asphalt pavement (RAP) and reclaimed Portland cement concrete pavement (RPCCP) may be used at a rate no greater than twenty percent (20%).

2.2 EQUIPMENT

A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing continuous mixtures meeting specifications. With exception of a drum mix plant, the plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins and dust collectors.

B. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:
   1. Cold aggregate bins and proportioning device.
   2. Dryer.
   3. Screens.
   4. Aggregate weight box and batching scales.
   5. Mixer.
   6. Asphalt storage and heating devices.
   7. Asphalt measuring devices.
   8. Truck scales.

C. Bins: Separate aggregate into a minimum of four (4) bins to produce consistently uniform grading and asphalt content in completed mix. One (1) cold feet bin per stockpile is required.

2.3 MIXES

A. Employ certified testing laboratory to prepare design mixes.
   1. Test in accordance with TxDOT Tex-126-E, TxDOT Tex-204-F, TxDOT Tex-208-F and TxDOT Tex-227-F.

2. Verify mixture design properties for plant-produced mixture. Demonstrate that asphalt plant is capable of producing mixture meeting design volumetric and stability requirements before placement begins.

B. Density, Stability and Air Voids Requirements: Select asphalt binder content for base courses to result in three percent (3%) to five percent (5%) air voids in laboratory molded specimens, while meeting a minimum VMA requirement for selected mixture classification as specified in TABLE 4.3 – MINIMUM VMA REQUIREMENTS in this Section.

PART III: EXECUTION

3.1 PREPARATION

A. Complete backfill of new utilities below future grade.

B. Verify lines and grades are correct.

C. Prepare subgrade in accordance with requirements of Section 02115 – Embankment and Section 02135 – Excavation for Roadway or Section 02720 – Lime-Stabilized Base Subgrade and Section 02725 – Portland Cement-Stabilized Base Subgrade. Subgrade preparation may also refer to Section 02145 – Cement-Stabilized Sand or Section 02705 – Crushed Concrete Base Course.

D. Correct subgrade deviations in excess of plus or minus one-quarter inch (1/4 In) in cross section or in sixteen foot (16 Ft) length by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.

3.2 PLACEMENT

A. Place base when the surface temperature taken in the shade and away from artificial heat is above forty degrees Fahrenheit (40° F) and rising. Do not place asphalt base when temperature of surface to receive base course is below fifty degrees Fahrenheit (50° F) and falling.

B. Haul prepared and heated asphalt base mixture to project in tight vehicles previously cleaned of foreign material. Mixture shall be at temperature between two hundred fifty degrees Fahrenheit (250° F) and three hundred thirty-five degrees Fahrenheit (325° F) when laid.

C. Place hot-mix asphalt base course in compacted lifts no greater than four inches (4 In) thick, unless permitted by the Project Manager.

D. Place courses as nearly continuously as possible: Place material with approved mechanical spreading and finishing machine of screeding or tamping type. Spread lifts to attain smooth course of uniform density to section, line and grades as indicated on the Drawings.

E. In areas with limited space where use of paver or front-end loader is impractical, spread by hand and compact asphalt by mechanical means. Carefully place materials to avoid segregation of mix; do not broadcast material. Remove lumps that do not break down readily.

3.3 JOINTS

A. Transverse Joints: Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back placed material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.

B. Existing pavement: When new asphalt is laid against existing asphalt pavement, saw cut existing asphalt to full depth creating vertical face. Clean joint and apply tack coat before placement.

3.4 COMPACTION

A. Construct test strip to identify correct type, number and sequence of rollers necessary to obtain specified in-place density or air-voids. Prepare test strip at least five hundred feet (500 Ft) in length, comparable to placement and compaction conditions for the Project.

B. Begin rolling while pavement is still hot and as soon as it shall bear roller without undue displacement or hair line cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water; do not use petroleum by-products.

C. Compact surface thoroughly and uniformly with power-driven equipment capable of obtaining required compaction. Ensure subsequent compaction by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half (1/2) width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compaction can be obtained and rolling marks are eliminated. Complete rolling before mat temperature drops below one hundred seventy-five degrees Fahrenheit (175° F).

D. Along walls, curbs, headers, similar structures and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.

E. Compact base course to a minimum density of ninety-one percent (91%) (TxDOT Tex-227-F).

3.5 TOLERANCES

A. Furnish templates for checking surface of finished sections. Maximum deflection of templates, when supported at center, shall not exceed one-quarter inch (1/4 In).

B. Completed surface, when tested with a ten foot (10 Ft) straight edge laid parallel to center line of pavement, shall show no deviation in excess of one-quarter inch (1/4 In) in ten feet (10 Ft). Correct surface not meeting this requirement.

3.6 FIELD QUALITY CONTROL

A. Perform testing under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. For in-place depth and density, take a minimum of two (2) cores at random locations for each one thousand feet (1000 Ft) of single lane of

pavement. On a two (2) lane pavement, take cores at random every five hundred feet (500 Ft) from alternating lanes. Take cores for parking lots every five hundred square yards (500 Sy) of base to determine in-place depth and density. If cul-de-sac or streets are less than five hundred feet (500 Ft), a minimum of two (2) cores [one (1) per lane] shall be taken. On small projects, take a minimum of two (2) cores for each day's placement. For first days placement and prior to coring, a minimum of five (5) nuclear gauge readings shall be performed at each core location to establish correlation between nuclear gauge (wet density reading) and core (bulk density). This process shall continue for each day's placement until the Testing Laboratory's Engineer determines that a good basis has been established for the nuclear gauge.

C. Determine in-place density in accordance with TxDOT Tex-207-F and Tex-227-F from cores or sections of asphaltic base located near each core. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by the Project Manager.

D. Three (3) additional cores within a five foot (5 Ft) radius of core indicating nonconforming in-place depth may be requested by the Project Manager at no additional cost to the City. In-place depth at these locations shall be average depth of four (4) cores.

E. Fill cores and density test sections with new compacted asphalt base or cold patch material.

3.7 NONCONFORMING PAVEMENT

A. Re-compact and retest nonconforming street sections not meeting surface test requirements. Patch asphalt pavement sections in accordance with procedures established by Asphalt Institute. Retesting is at no cost to the City.

B. Remove and replace areas of asphalt base found deficient in thickness by more than ten percent (10%). Remove and replace areas of asphalt base found deficient in density. Use new asphalt base of thickness shown on the Drawings.

C. Replace or correct nonconforming pavement sections at no additional cost to the City.

3.8 PROTECTION

A. Do not open base to traffic until at least twelve hours (12 Hrs) after completion of rolling or as noted on the Drawings.

B. Maintain asphalt base in good condition until completion of the Work.

C. Repair defects immediately by replacing base to full depth.

PART IV: TABLES

4.1 GRADATION OF COMPOSITE AGGREGATE

GRADATION OF COMPOSITE AGGREGATE Percent Passing by Weight or Volume		
Sieve Size	Type A Coarse Base	Type B Fine Base
1 1/2”	100	-
1 1/4”	95 to 100	-
1”	-	100
7/8”	70 to 90	95 to 100
5/8”	-	75 to 95
1/2”	50 to 70	-
3/8”	-	60 to 80
#4	30 to 50	40 to 60
#10	30 to 34	27 to 40
#40	5 to 20	10 to 25
#80	2 to 12	3 to 13
#200	1 to 6*	1 to 6*
VMA % Minimum	11	12
*2 to 8 when Test Method Tex-200-F, Part II (Washed Sieve Analysis) is used.		

4.2 ASPHALT BINDERS

SPECIFICATION	PG 64 – 22
Average 7-day Maximum Pavement Design Temperature, degrees C[a]	<64
Minimum Pavement Design Temperature, degrees C [a]	>-22
Original Binder	
Flash Point Temperature, T48, Minimum degrees C	230
Viscocity, ASTM D4402, [b] Maximum 3 Pa.s (3000cP), Test Temperature, degrees C	135
Dynamic Shear, TP5, [c] G*/sine[], Minimum, 1.00kPa Test Temperature @ 10rad/sec, degrees C	64
Rolling Thin Film Oven (T240) or Thin Film Oven (T179) Residue	
Mass Loss, Maximum, %	-1.00
Dynamic Shear T5; G*sine[], Minimum, 2.20 kPa Test Temperature @ 10 rad/sec, degrees C	64
Pressure Aging Vessel Residue (PPI)	
PAV Aging Temperature, degrees C [d]	100
Dynamic Shear, TP5; G*/sine[], Maximum 5000 kPa Test Temperature @ 10 rad/sec, degrees C	25
Physical Hardening [e]	Report
Creep Stiffness, TP1; [f] S, Maximum, 300 Mpa; m-value, Minimum, 0.300 Test Temperature @ 60 sec, degrees C	-12
Direct Tension, TP3; [f] Failure Strain, Minimum, 1.0%; Test Temperature @ 1.0 mm/min, degrees C	-12

NOTES:

[a] Pavement temperature can be estimated from air temperature using algorithm contained in TxDOT testing procedures.

[b] The requirement may be waived at the discretion of the Project Manager if supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet the applicable safety standards.

C For quality control of unmodified asphalt cement production, measurement of viscosity of original asphalt cement may be substituted for dynamic shear measurements of G*/sine[] at test temperature where asphalt is Newtonian fluid. Any suitable standard means of viscosity measurement may be used, including capillary of rotational viscometry (AASHTO T 201 or T 202).

[d] The PAV aging temperature is based on simulated climatic conditions and is one of three (3) temperatures: ninety Centigrade (90° C), one hundred degrees Centigrade (100° C) or one hundred ten degrees Centigrade (110° C). The PAV aging temperature is one hundred

degrees Centigrade (100° C) for PG64 and PG70.

[e] Physical Hardening – TP 1 is performed on a set of asphalt beams according to Section 13.1, except conditioning time is extended to twenty-four hours (24 Hrs) plus or minus ten minutes (±10 Min) at ten degrees Centigrade (10° C) above minimum performance temperature. The twenty-four hour (24 Hr) stiffness and m-value are reported for information purposes only.

[f] If creep stiffness is below three hundred Mega Paschals (300 MPa), the direct tension test is not required. If creep stiffness is between three hundred Mega Paschals (300 Mpa) and six hundred Mega Paschals (600 MPa) the direct tension failure strain requirement can be used in lieu of creep stiffness requirement. The m-value requirement must be satisfied in both cases.

4.3 MINIMUM VMA REQUIREMENTS

Percent Density		Percent Optimum	HVEEM Stability Percent Not Less Than	Percent Asphalt Content	
Min.	Max.			Min.	Max.
94.5	97.5	96	35	3.5	7

END OF SECTION

SECTION 02715SP

HOT-MIX ASPHALT BASE COURSE

The following provisions modify Section 02715 – Hot-Mix Asphaltic Base Course Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.2 in its entirety.

2. Delete paragraph 1.2.A.3 and replace with the following:

   "If approved by the City and Engineer, payment for hot-mix asphaltic base for temporary roadway and roadway shoulders is on a per ton basis."

END OF SPECIAL PROVISION

SECTION 02720
LIME-STABILIZED BASE SUBGRADE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Foundation course of lime-stabilized subgrade material.
  1. Application of lime slurry to subgrade.
  2. Mixing, compaction and curing of lime slurry, water and subgrade into a stabilized foundation.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Measurement and payment for lime-stabilized subgrade is on a square yard basis compacted in place to proper density. Separate measurement shall be made for each required thickness of subgrade course.
     - a. Limits of measurement shall be actual pavement replaced, but not beyond the maximum pavement replacement limits shown on the Drawings. Limits for measurement shall be extended to include installed lime-stabilized subgrade material that extends two feet (2 Ft) beyond outside edge of pavement to be replaced, except where proposed pavement section shares common longitudinal or transverse edge with existing pavement section. No payment shall be made for lime-stabilized subgrade in areas beyond these limits.
     - b. Limits of measurement and payment shall match pavement replacement limits shown on the Drawings, except as noted in Paragraph 1.2.A.1.a or as approved by the Project Manager.
  2. Measurement and payment for lime is by ton of two thousand pounds (2000 Lbs) dry weight basis. Calculate weight of dry solids for lime slurry based on percentage by dry weight solids.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 DEFINITION
- A. Moist Cure: Curing soil and lime to obtain optimum hydration.
- B. One Thousand Foot (1000 Ft) Roadway Section: One thousand feet (1000 Ft) per lane width or approximately five hundred square yards (500 Sy) of compacted subgrade for other than full-lane-width roadway

sections.

1.4 REFERENCES

A. ASTM – American Society for Testing and Materials
   1. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3).
   2. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   3. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

B. CFTS – City of Friendswood Technical Specifications.

C. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-101-E (Part III) – Preparation of Soil and Flexible Base Material for Testing. TxDOT Tex-140-E – Measuring Thickness of Pavement Layer.
   2. TxDOT Tex-600-J – Sampling and Testing Hydrated Lime, Quicklime and Commercial Lime Slurry.

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit certification that hydrated lime, quicklime or commercial lime slurry complies with the specifications.

C. Submit weight tickets, certified by supplier, with each bulk delivery of lime to work site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Bagged lime shall bear manufacturer's name, product identification and certified weight. Bags varying more than five percent (5%) of certified weight may be rejected; average weight of fifty (50) random bags in each shipment shall not be less than certified weight.

B. Store lime in weatherproof enclosures. Protect lime from ground dampness.

1.7 QUALITY ASSURANCE

A. Provide manufacturer's affidavits that material was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 WATER

A. Use clean, clear water, free from oil, acids, alkali or vegetation.

2.2 LIME

A. Type A – Hydrated Lime: Dry material consisting essentially of calcium hydroxide or mixture of calcium hydroxide and an allowable percentage of calcium oxide as listed in chemical composition chart.

B. Type B – Commercial Lime Slurry: Liquid mixture consisting essentially of lime solids and water in slurry form. Water or liquid portion shall not contain dissolved material in sufficient quantity to be injurious or objectionable for purpose intended.
C. Type C – Quicklime: Dry material consisting essentially of calcium oxide. Furnish quicklime in either of the following grades:
   1. Grade DS: Pebble quicklime of gradation suitable for use in preparation of slurry for wet placing.
   2. Grade S: Finely-graded quicklime for use in preparation of slurry for wet placing. Do not use grade S quicklime for dry placing if dry placing is permitted.
D. Conform to the requirements in Table 4.1 – QUICKLIME PROPERTY SPECIFICATIONS in this Section.
E. Deliver lime slurry to job site as commercial lime or prepare at job site by using hydrated lime or quicklime. Provide slurry free of liquids other than water and of consistency that can be handled and uniformly applied without difficulty.
F. Lime containing magnesium hydroxide is prohibited.
G. Lime containing fly ash is prohibited.

2.3 SOIL
A. Soil to receive lime treatment may include borrow or existing subgrade material, existing pavement structure or combination of all three (3). Where existing pavement or base material is encountered, pulverized or scarify material so that one hundred percent (100%) of sampled material passes two inch (2 In) sieve.

PART III: EXECUTION

3.1 EXAMINATION
A. Verify compacted subgrade shall support imposed loads.
B. Verify subgrade lines and grades.

3.2 PREPARATION
A. Complete backfill of utilities prior to stabilization.
B. Cut material to bottom of subgrade using an approved cutting and pulverizing machine meeting following requirements:
   1. Cutters accurately provide smooth surface over entire width of cut to plane of secondary grade.
   2. Provide cut to depth as specified or shown in the Drawings.
C. Alternatively, scarify or excavate to bottom of stabilized subgrade. Remove material or windrow to expose secondary grade. Obtain uniform stability.
D. Correct wet or unstable material below secondary grade by scarifying, adding lime and compacting as directed by the Project Manager.
E. Pulverize existing material so that one hundred percent (100%) passes

a one and three-quarters inch (1-3/4 In) sieve.

3.3 LIME SLURRY APPLICATION

A. Apply slurry with distributor truck equipped with an agitator to keep lime and water in consistent mixture. Make successive passes over measured section of roadway to attain proper moisture and lime content. Limit spreading to an area where preliminary mixing operations can be completed on same working day.
B. Minimum lime content shall be six percent (6%) of dry unit weight of subgrade as determined by ASTM D698.

3.4 PRELIMINARY MIXING

A. Use approved single-pass or multiple-pass rotary speed mixers to mix soil, lime and water to required depth. Ensure homogeneous friable mixture free of clods and lumps.
B. Shape mixed subgrade to final lines and grades.
C. Eliminate following operations and final mixing if pulverization requirements of Paragraph 3.5.C can be met during preliminary mixing:
    1. Seal subgrade as precaution against heavy rainfall by rolling lightly with light pneumatic rollers.
    2. Cure soil lime material for twenty-four hours (24 Hrs) to seventy-two hours (72 Hrs) or as required to obtain optimum hydration. Keep subgrade moist during cure.

3.5 FINAL MIXING

A. Use approved single-pass or multiple-pass rotary speed mixers to uniformly mix cured soil and lime to required depth.
B. Add water to bring moisture content of soil mixture to optimum or above.
C. Mix and pulverize until all material passes one and three-quarters inch sieve (1-3/4 In); a minimum of eighty-five percent (85%), excluding non-slacking fractions, passes three-quarters inch (3/4 In) sieve; and a minimum of sixty percent (60%) excluding non-slacking fractions passes No. 4 sieve. Test according to TxDOT Tex-101-E, Part III using dry method. Sieve analysis shall conform to the requirements of TABLE 4.2 – LIME-STABILIZED SUBRADE SIEVE ANALYSIS in this Section.
D. Shape mixed subgrade to final lines and grades.
E. Do not expose hydrated lime to open air for six hours (6 Hrs) or more during interval between application and mixing. Avoid excessive hydrated lime loss due to washing or blowing.

3.6 COMPACTION

A. Aerate or sprinkle to attain optimum moisture content to three percent (3%) above optimum, as determined by ASTM D698 on material sample from roadway after final mix with lime.
B. Start compaction immediately after final mixing.
C. Spread and compact in two (2) or more equal layers where total

compacted thickness is greater than equipment manufacturer's recommended range of mixing and compaction.

D. Compact with approved heavy pneumatic or vibrating rollers or combination of tamping rollers and light pneumatic rollers. Begin compaction at bottom and continue until entire depth is uniformly compacted.

E. Do not allow stabilized subgrade to mix with underlying material. Correct irregularities or weak spots immediately by replacing material and re-compacting.

F. Compact subgrade to a minimum density of ninety-five percent (95%) of a maximum dry density, according to ASTM D698, at moisture content of optimum to three percent (3%) above optimum, unless otherwise indicated on the Drawings.

G. Seal with approved light pneumatic tired rollers. Prevent surface hair line cracking. Rework and recompact at areas where hairline cracking develops.

3.7 CURING

A. Moist cure for a minimum of three days (3 D) before placing base or surface course or opening to traffic. Subgrade may be opened to traffic after two days (2 D) when adequate strength has been attained to prevent damage. Restrict traffic to light pneumatic rollers or vehicles weighing less than ten tons (10 Tn).

B. Keep subgrade surface damp by sprinkling. Roll with light pneumatic roller to keep surface knit together.

C. Place base or surface within fourteen days (14 D) after final mixing and compaction. Restart compaction and moisture content of base material when time is exceeded.

3.8 TOLERANCES

A. Completed surface: smooth and conforming to typical section and established lines and grades.

B. Top of compacted surface: Plus or minus one-quarter inch (±1/4 In) in cross section or in sixteen feet (16 Ft) of length.

C. Depth of lime stabilization shall be a minimum specified depth for each one thousand foot (1000 Ft) roadway section, unless otherwise noted on the Drawings.

3.9 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. Test soils, lime and mixtures as follows:

1. Tests and analysis of soil materials shall be performed in accordance with ASTM D4318, using the wet preparation method.
2. Sampling and testing of lime slurry shall be in accordance with

TxDOT Tex-600-J, except using a lime slurry cup.

3. Sample mixtures of hydrated lime or quicklime in slurry form shall be tested to establish compliance with the specifications.
4. Moisture-density relationship shall be established on material sampled from roadway, after stabilization with lime and final mixing, in accordance with ASTM D698, Moist preparation Method.

C. In-place depth shall be evaluated for each one thousand foot (1000 Ft) roadway section and determined in accordance with TxDOT Tex-140-E in hand excavated holes. For each one thousand foot (1000 Ft) section, three (3) phenolphthalein tests shall be performed. Average stabilization depth for one thousand foot (1000 Ft) section shall be based on average depth for three (3) tests.

D. Perform compaction testing in accordance with ASTM D2922. Three (3) tests shall be performed for each one thousand foot (1000 Ft) roadway section.

E. Pulverization analysis shall be performed as required by Paragraph 3.5.C on material sampled during mixing of each production area. Three (3) tests shall be performed per six hundred foot (600 Ft) roadway section or a minimum one (1) for each day of production.

3.10 REWORK OF FAILED SECTIONS

A. Rework sections that do not meet specified thickness.

B. Perform the following steps when more than seventy-two hours (72 Hrs) have lapsed since completion of compaction:

1. Moist cure for a minimum of three days (3 D) after compaction to required density.
2. Add lime at rate of twenty-five percent (25%) of specified rate at no additional cost to the City.
3. Moisture density test of reworked material must be completed by laboratory before field compaction testing can be completed.

3.11 PROTECTION

A. Maintain stabilized subgrade to lines and grades and in good condition until placement of base or surface course. Protect asphalt membrane from being picked up by traffic.

B. Repair defects immediately by replacing material to full depth.

PART IV: TABLES

4.1 QUICKLIME PROPERTY SPECIFICATIONS

CHEMICAL COMPOSITION	**TYPE**		
	A	**B**	**C**
Active lime content, % by weight Ca(OH)+CaO	90.0 min.[1]	87.0 min.[2]	- -
Unhydrated lime content, % by weight CaO	5.0 max.	- -	87.0 min.
Free water content, % by weight H_2O	5.0 max.	- -	- -
SIZING			
Wet Sieve, as % by weight residue retained:			
No. 6	0.2 max.	0.2 max.[2]	8.0 max.[3]
No. 30	4.0 max.	4.0 max.[2]	- -
Dry Sieve, as % by weight residue retained:			
1-inch	- -	- -	0.0
1/2-inch	- -	- -	10.0 max.

NOTES:
1. Maximum five percent (5%) by weight CaO shall be allowed in determining total active lime content.
2. Maximum solids content of slurry.
3. Total active lime content, as CaO, in material retained on No. 6 sieve shall not exceed two percent (2%) by weight of original Type C Lime.

4.2 – LIME-STABILIZED SUBRADE SIEVE ANALYSIS

SIEVE SIZE	**PERCENT PASSING**
1 3/4” Sieve	100%
3/4" Sieve	85%
Number 4 Sieve	60%

END OF SECTION

SECTION 02730
PRIME COAT

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Prime coat for asphalt concrete paving

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for prime coat under this Section. Include payment in unit price for material being primed.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit product data for proposed prime coat.
- C. Submit report of recent calibration of distributor.

1.4 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

1.5 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that material was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 CUTBACK ASPHALT
- A. Provide moisture-free homogeneous material which shall not foam when heated to three hundred forty seven degrees Fahrenheit (347° F) and which meets the following requirements:
- B. Asphalt material for prime coat shall be MC-30 or MC-70 and shall meet requirements as specified in TABLE 4.1 – ASPHALT MATERIAL FOR PRIME COAT in this Section:
  1. Distillate shall be as specified in TABLE 4.2 – DISTILLATE in this Section, expressed as percent by volume of total distillate to six hundred eighty degrees Fahrenheit (680° F).
  2. Tests on Distillation Residue shall be as specified in TABLE 4.3 – DISTILLATE TEST in this Section.

2.2 EMULSIFIED PETROLEUM RESIN

A. EPR-1 Prime: Slow curing emulsion of petroleum resin and asphalt cement conforming to requirements as specified in TABLE 4.4 – EMULSIFIED PERTROLEUM RESIN PROPERTIES in this Section.
B. For use, EPR-1 may be diluted with water up to a maximum three (3) parts water to one (1) part EPR- 1 in order to achieve desired concentration of residual resin/asphalt to facilitate application.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify base is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Thoroughly clean base course surface of loose material by hand brooming or mechanical sweeping prior to application of tack coat.
B. Prepare sufficient base in advance of paving for efficient operations.

3.3 APPLICATION, BASIC

A. Apply prime coat with approved type of self-propelled pressure distributor. Distribute prime coat evenly and smoothly under pressure necessary for proper distribution.
B. Keep storage tanks, piping, retorts, booster tanks and distributors used in handling asphalt materials clean and in good operating condition. Conduct operations so asphalt material does not become contaminated.
C. If yield of asphaltic material appears to be in error, recalibrate distributor prior to continuing the Work.
D. Maintain surface until the Work is accepted by the City.

3.4 APPLICATION, CUTBACK ASPHALT

A. Do not use cutback asphalt during period of April 16th through September 15th.
B. Do not place prime coat when air temperature is below sixty degrees Fahrenheit (60° F) and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above fifty degrees Fahrenheit (50° F) and rising.
C. Distribute at rate of twenty-five hundredths gallons per square yard (0.25 Gal/Sy) to thirty five hundredths gallons per square yard (0.35 Gal/Sy).
D. Equipment shall accurately determine temperature of asphaltic material in heating equipment and in distributor, for determining rate of application and for obtaining uniformity at junction of two (2) distributor loads. Maintain in accurate working order, including recording thermometer at storage heating unit.
E. Base temperature of application on temperature-viscosity relationship that shall permit application of asphalt with viscosity of one hundred centistokes (100 cSt) to one hundred twenty-five centistokes (125 cSt). Maintain asphalt within fifteen degrees Fahrenheit (15° F) of temperature

required to meet viscosity. Selected temperature shall be within range specified in TABLE 4.5 – TEMPERATURES FOR VISCOSITY in this Section.

F. Do not allow temperature of MC-30 to exceed one hundred seventy-five degrees Fahrenheit (175° F).

G. Do not allow temperature of MC-70 to exceed two hundred degrees Fahrenheit (200° F).

3.5 APPLICATION, EMULSIFIED PETROLEUM RESIN

A. Do not place prime coat when air temperature is below thirty-six degrees Fahrenheit (36° F) and falling.

B. Distribute at rate of fifteen hundredths gallons per square yard (0.15 Gal/Sy) to twenty-five hundredths gallons per square yard (0.25 Gal/Sy).

3.6 PROTECTION

A. Do not allow traffic on or placement of subsequent base or surface courses over freshly applied prime coat until authorized by the Project Manager.

PART IV: TABLES

4.1 ASPHALT MATERIAL FOR PRIME COAT

PROPERTIES	**TYPE – GRADE**			
	MC – 30		**MC – 70**	
	MIN.	**MAX.**	**MIN.**	**MAX.**
Water, Percent	-	0.2	-	0.2
Flash Point, T.O.C., °F	100	-	100	-
Kinematic Viscosity at 140° F, cst	30	60	70	140

4.2 DISTILLATE

TEMPERATURE	**TYPE – GRADE**			
	MC – 30		**MC – 70**	
	MIN.	**MAX.**	**MIN.**	**MAX.**
to 437° F	-	25	-	20
to 500° F	40	70	20	60
to 600° F	75	93	65	90
Residue from 680° F Distillation, Volume, Percent	50	-	55	-

4.3 DISTILLATE TEST

TEST	TYPE – GRADE			
	MC – 30		MC – 70	
	MIN.	MAX.	MIN.	MAX.
Penetration at 77° F, 100g, 5 sec.	120	250	120	250
Ductility at 77° F, 5 cm/min. cms	100*	-	100*	-
Solubility in Trichloroethylene, %	99	-	99	-
Spot Test	All Negative			

* If penetration of residue is more than two hundred (200) and ductility at seventy-seven degrees Fahrenheit (77° F) is less than one hundred centimeters (100 Cm), material shall be acceptable when its ductility is sixty degrees Fahrenheit (60° F) is more than one hundred centimeters (100 Cm).

4.4 EMULSIFIED PERTROLEUM RESIN PROPERTIES

PROPERTIES	MIN.	MAX.
Fural Viscosity at 77° F, Sec	14	40
Residue by Evaporation, % by Weight	60	-
Sieve Test, %	-	0.1
Particle Charge Test	Positive	
Tests on Distillation Residue:		
Flash Point, COC (F)	400	-
Kinematic Viscosity @ 140° F (cst)	190	350

4.5 TEMPERATURES FOR VISCOSITY

PRIME COAT TYPE	MINIMUM °F	MAXIMUM °F
MC – 30	70	150
MC – 70	125	175

END OF SECTION

SECTION 02735
TACK COAT

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Tack coat for asphalt concrete paving.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for tack coat under this Section. Include payment in unit price for asphaltic pavements.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D244 – Standard Test Methods for Emulsified Asphalts.
- B. CFTS – City of Friendswood Technical Specifications

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit product data for proposed tack coat.
- C. Submit report of recent calibration of distributor.

1.5 QUALITY ASSURANCE
- A. Provide manufacturer's affidavits that material was manufactured in compliance with standards referenced in this Section.

PART II: PRODUCTS

2.1 EMULSION
- A. Provide homogeneous material which shows no separation of asphalt after mixing and meets viscosity requirements within thirty days (30 D) after delivery.
- B. Emulsion material for tack coat.
  1. Emulsified asphalt: SS-1 or SS-1H meeting criteria listed in Table 4.1 – PROPERTIES OF EMULSIFIED ASPHALT SS-1 OR SS-1H in this Section.
  2. Polymer Modified Emulsion, SS-1P, for use where thin overlays [less than or equal two inches (2 In)] are placed on collector or arterial streets and for speed humps, especially over existing

Portland cement concrete pavement, meeting criteria listed in Table 4.2 – PROPERTIES OF POLYMER MODIFIED EMULSION SS – 1P in this Section.

3. For emulsions used for tack coats during period of April 16th through September 15th, volatile organic compound solvents (VOC) shall not exceed twelve percent (12%) by weight when tested in accordance with ASTM D244.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify compacted base is ready to support imposed loads.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Thoroughly clean base course or concrete surface of loose material by hand brooming or mechanical sweeping prior to tack coat application.

3.3 APPLICATION

A. Apply tack coat uniformly by use of approved distributor at rate not to exceed five hundredths gallons per square yard (0.05 Gal/Sy) of surface depending on texture of underlying surface. Select an application rate that shall provide appropriate asphalt residual.
B. Paint contact surfaces of curbs, structures and joints with thin uniform coat of tack coat.

3.4 PROTECTION

A. Prevent traffic or placement of subsequent courses over freshly applied tack coat until authorized by the Project Manager.

PART IV: TABLES

4.1 PROPERTIES OF EMULSIFIED ASPHALT SS-1 OR SS-1H

PROPERTIES	SS – 1		SS – 1H	
	MIN.	MAX.	MIN.	MAX.
Furol Viscosity at 77° F, sec.	20	100	20	100
Residue by Distillation, %	60	---	60	---
Oil Portion of Distillate, %	---	1/2	---	1/2
Sieve Test, %	---	0.10	---	0.10
Miscibility (Standard Test)	Passing			
Cement Mixing, %	---	2.0	---	2.0
Storage Stability, 1 Day, %	---	1	---	1
Test on Residue:				
Penetration at 77° F, 100g, 5 sec.	120	160	70	100
Solubility in Trichloroethylene, %	97.5	---	97.5	---
Ductibility at 77° F, 5 cm/min., cms	100	---	100	---

4.2 PROPERTIES OF POLYMER MODIFIED EMULSION SS – 1P

PROPERTIES	SS – 1P	
	MIN.	MAX.
Furol Viscosity at 77° F, sec.	30	100
Residue by Distillation, %	60	---
Oil Portion of Distillate, %	---	1/2
Sieve Test, %	---	0.10
Miscibility (Standard Test)	Passing	
Cement Mixing, %	---	2.0
Storage Stability, 1 Day, %	---	1
Test on Residue:		
Penetration at 77° F, 100g, 5 sec.	100	140
Solubility in Trichloroethylene, %	97.0	---
Ductibility at 77° F, 5 cm/min., cms	50	---
Viscosity at 140° F, poises	1300	---

END OF SECTION

SECTION 02800
ASPHALT PAVING

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Surface course of compacted mixture of coarse and fine aggregates and asphaltic binder.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for hot-mix asphalt concrete pavement is on a per ton basis. Separate pay items are used for each different required thickness of pavement.
  2. Payment for hot-mix asphalt concrete pavement includes payment for associated work performed in accordance with Section 02735 – Tack Coat.
  3. Measurement for utility projects: Match actual pavement replaced but no greater than a maximum pavement replacement limits shown on the Drawings.
  4. Measurement for utility projects:
     a. Actual pavement replaced but not beyond the maximum pavement replacement limits shown on the Drawings.
     b. Include installed hot-mix asphaltic base course material that extends one foot (1 Ft) beyond outside edge of pavement to be replaced, except where proposed pavement section shares common edge with existing pavement section.
  5. Payment for speed humps is on linear foot basis and includes milling of existing pavement, tack coat and placement and compaction of asphalt. Measurement of speed hump is along length of twelve foot (12 Ft) wide speed hump, measured transverse to centerline of road. Separate payment is made for thermoplastic markings applied to speed hump.
  6. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Standards for Testing and Materials.
  1. ASTM C33 – Standard Specification for Concrete Aggregates.
  2. ASTM C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

B. CFTS – City of Friendswood Technical Specifications.
C. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-106-E – Calculating the Plasticity Index of Soils
   2. TxDOT Tex-126-E – Molding, Testing and Evaluating Bituminous Black Base Material.
   3. TxDOT Tex-200-F – Sieve Analysis of Fine and Course Aggregates.
   4. TxDOT Tex-203-F – Sand Equivalent Test.
   5. TxDOT Tex-204-F – Design of Bituminous Mixtures.
   6. TxDOT Tex-206-F – Compacting Test Specimens of Bituminous Mixtures.
   7. TxDOT Tex-207-F – Determining Density of Compacted Bituminous Mixtures.
   8. TxDOT Tex-208-F – Test for Stabilometer Value of Bituminous Mixtures.
   9. TxDOT Tex-217-F – Determining Deleterious Material and Decantation Test for Coarse Aggregates.
   10. TxDOT Tex-227-F – Theoretical Maximum Specific Gravity of Bituminous Mixtures.
   11. TxDOT Tex-530-C – Effect of Water on Bituminous Paving Mixtures.
   12. TxDOT Tex-531-C – Prediction of Moisture Induced Damage to Bituminous Paving Materials Using Molded Specimens.

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit certificates that asphalt materials and aggregates meet requirements of Paragraph 2.1 Materials.
C. Submit proposed design mix and test data for surface course.
D. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

PART II: PRODUCTS

2.1 MATERIALS
A. Coarse Aggregate:

   1. Use gravel, crushed stone or combination thereof that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Use aggregate conforming to ASTM C33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed forty percent (40%) by weight when tested in accordance with ASTM C131.
   2. Aggregate by weight shall not contain more than one and one half percent (1.5%) by weight of fine dust, claylike particles or silt when tested in accordance with Tex-217-F, Part II.

B. Fine Aggregate: Sand, stone screenings or combination of both passing No. 10 sieve. Use aggregate conforming to ASTM C33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than ten (10) when tested by TxDOT Tex-106-E. Sand equivalent shall have a minimum value of forty (40) x when tested by TxDOT Tex-203-F.

C. Composite Aggregate: Conform to limits when graded in accordance with TxDOT Tex-200-F as specified in TABLE 4.1 – GRADATION OF COMPOSITE AGGREGATE in this Section. Use type specified on the Drawings.

D. Asphalt Binder: Moisture-free homogeneous material which shall not foam when heated to three hundred forty-seven degrees Fahrenheit (347° F), meeting the requirements specified in TABLE 4.2 – PERFORMANCE GRADED BINDERS in this Section.

E. Anti-stripping Agent:
   1. Evaluate mixture of aggregate, asphalt and additives proposed for use for moisture susceptibility and requirement for anti-stripping agents. To substantiate mix design, produce and test trial mixtures using proposed project materials and equipment prior to placement. Test for susceptibility to moisture and trial mixture may be waived by the Project Manager when similar designs using same material have previously proven satisfactory.
   2. Liquid Anti-stripping Agent: Use anti-stripping agent with uniform liquid with no evidence of crystallization, settling or separation of components. Submit sample of antistripping agent proposed for use and manufacturer's product data, including recommended dosage range, handling and storage and application instructions.

F. Pavement markings for speed humps: Conform to requirements of Section 02860 – Thermoplastic Pavement Markings.

2.2 EQUIPMENT

A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing continuous mixtures meeting specifications. With exception of a drum mix plant, plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins and dust collectors.

B. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:
   1. Cold aggregate bins and proportioning device.
   2. Dryer.
   3. Screens.
   4. Aggregate weight box and batching scales.
   5. Mixer.

6. Asphalt storage and heating devices.
7. Asphalt measuring devices.
8. Truck scales.

B. Bins: Separate aggregate into a minimum of four (4) bins to produce consistently uniform grading and asphalt content in completed mix. Provide one (1) cold feed bin per stockpile.

2.3 MIXES

A. Employ certified testing laboratory to prepare design mixes. Test in accordance with TxDOT Tex-126-E or Tex-204-F, Tex-206-F, Tex-208-F, Tex-530-C and Tex-531-C.

B. Density, Stability and Air Void Requirements as stated in TABLE 4.3 – DENSITY, STABILITY AND AIR VOID REQUIREMENTS in this Section.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify compacted base course is ready to support imposed loads.

B. Verify lines and grades are correct.

3.2 PREPARATION

A. Prepare subgrade in accordance with requirements of Section 02700 – Cement-Stabilized Base Course, Section 02705 – Crushed Concrete Base Course or Section 02715 – Hot-Mix Asphaltic Base Course.

B. Tack Coat: Conform to requirements of Section 02735 – Tack Coat. Where mixture shall adhere to surface on which it is to be placed without use of tack coat, tack coat may be eliminated when approved by the Project Manager.

C. Thoroughly clean base course surface of loose material by hand brooming or mechanical sweeping prior to application of tack coat or surface course. Prepare subgrade in advance of asphaltic concrete paving operation.

D. Perform pavement repair and resurfacing as indicated in Section 02845 – Pavement Repair and Resurfacing.

E. Do not use cutback asphalt.

G. Milling of pavement for speed humps: Mill pavement (concrete or asphalt) to depth of one inch (1 In) and width between eighteen inches (18 In) and twenty-four inches (24 In) around entire perimeter of proposed hump, as shown in detail for speed hump design.

3.3 PLACEMENT

A. Do not place asphaltic pavement less than two inches (2 In) thick when surface temperature taken in shade and away from artificial heat is below fifty degrees Fahrenheit (50° F) and falling. Asphalt may be placed when temperature as measured above is above forty degrees Fahrenheit (40° F) and rising.

B. Haul prepared and heated asphaltic concrete mixture to project in tight

vehicles previously cleaned of foreign material. Mixture temperature shall be between two hundred fifty degrees Fahrenheit (250° F) and three hundred twenty-five degrees Fahrenheit (325° F) when laid.

C. Spread material into place with approved mechanical spreading and finishing machine of screening or tamping type.

D. Surface Course Material: Surface course two inches (2 In) or less in thickness may be spread in one (1) lift. Spread lifts in such a manner that, when compacted, finished course shall be smooth, of uniform density and shall be to section, line and grade as shown. Place construction joints on surface courses to coincide with lane lines or as directed by the Project Manager.

E. Joints: Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.

F. When new asphalt is laid against existing or old asphalt, saw cut existing or old asphalt to full depth to provide straight smooth joint.

G. In smaller restricted areas where use of paver is impractical spread material by hand. Compact asphalt by mechanical means. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove lumps that do not break down readily.

3.4 COMPACTION

A. Construct test strip to identify correct type, number and sequence of rollers necessary to obtain specified in-place density or air-voids when directed by the Project Manager. Prepare test strip at least one thousand feet (1000 Ft) in length, comparable to placement and compaction conditions for Project.

B. Begin rolling while pavement is still hot and as soon as it shall bear roller without shoving, displacement or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water or petroleum by-products.

C. Compact surface thoroughly and uniformly, first with power-driven, three (3) wheel or tandem rollers weighing a minimum of eight tons (8 Tn). Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half (1/2) width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mat temperature drops below one hundred eighty-five degrees Fahrenheit (185° F).

D. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.

E. Along walls, curbs, headers and similar structures and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.

F. Compact binder course and surface course to a minimum density of

ninety-one percent (91%) of maximum possible density of voidless mixture composed of same materials in like proportions.

3.5 TOLERANCES

A. Furnish templates for checking surface in finished sections. A maximum deflection of templates, when supported at center, shall not exceed one-eighth inch (1/8 In).

B. Completed surface, when tested with ten foot (10 Ft) straightedge laid parallel to center line of pavement, shall show no deviation in excess of one-eighth inch (1/8 In) in ten feet (10 Ft). Correct surface not meeting this requirement.

C. Dimensions of speed humps shall conform to details for speed hump design and speed hump height tolerances.

3.6 QUALITY CONTROL

A. Testing shall be performed under provisions of Section 02845 – Pavement Repair and Resurfacing.

B. For in-place depth and density, take a minimum of one (1) core at random locations for each one thousand feet (1000 Ft) of single lane pavement. On a two (2) lane pavement, take samples at random every five hundred feet (500 Ft) from alternating lanes. Take cores for parking lots every five hundred square yards (500 Sy) of base to determine in-place depth and density. If cul-de sac or streets are less than five hundred feet (500 Ft), a minimum of two (2) cores [one (1) per lane] shall be procured. On small projects, take a minimum of two (2) cores for each day's placement. For first days placement and prior to coring, a minimum of five (5) nuclear gauge readings shall be performed at each core location to establish correlation between nuclear gauge (wet density reading) and core (bulk density). This process shall continue for each day's placement until the Project Manager determines that a good basis has been established for the nuclear gauge.

C. Determine in-place density in accordance with TxDOT Tex-207-F and Tex-227-F from cores or sections. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by the Project Manager. Average densities for each street placed in a single day to determine compliance.

D. The Contractor may request three (3) additional cores in vicinity of cores indicating nonconforming in-place depths or density at no additional cost to the City. In-place depth and density at these locations shall be average of four (4) cores.

E. Fill cores and density test sections with new compacted asphaltic concrete.

3.7 NONCONFORMING PAVEMENT

A. Recompact and retest nonconforming street sections not meeting surface test requirements or having unacceptable surface texture. Patch asphalt pavement sections in accordance with procedures established by Asphalt Institute. Retesting shall be at no additional cost to the City.

B. Remove and replace areas of asphalt surface found deficient in thickness by more than ten percent (10%). Use new asphaltic surface of thickness shown on the Drawings. Remove and replace areas of asphalt surface found deficient in average density.

C. Replace speed humps which do not conform to requirements of details or which are rejected by the Project Manager.

3.8 PROTECTION

A. Do not open pavement to traffic until completion of rolling and temperature has cooled to set asphaltic concrete surface or as shown on the Drawings.

B. Maintain asphalt pavement in good condition until completion of the Work.

C. Repair defects immediately by replacing asphalt pavement to full depth.

3.9 PAVEMENT MARKINGS FOR SPEED HUMPS

A. Apply pavement markings to speed humps in conformance with dimensions shown on detail for speed hump design.

PART IV: TABLES

4.1 GRADATION OF COMPOSITE AGGREGATE

GRADATION OF COMPOSITE AGGREGATE		
	PERCENT PASSING	
SIEVE SIZE	Course Surface (TxDOT Type C)	Fine Surface (TxDOT Type D)
7/8”	100	-
5/8”	95 to 100	-
1/2"	-	100
3/8”	70 to 85	85 to 100
#4	43 to 63	50 to 70
#10	30 to 40	32 to 42
#40	10 to 25	11 to 26
#80	3 to 13	4 to 14
#200	1 to 6*	1 to 6*
VMA % Minimum	13	14

* 2 to 8 when Test Method Tes-200-F, Part II (Washed Sieve Analysis) is used.

4.2 PERFORMANCE GRADED BINDERS

PERFORMACE GRADED BINDER	
CRITERIA/TEST	PERFORMANCE GRADE (PG64-22)
Average 7-day Maximum Pavement Design Temperature, C	< 64
Minimum Pavement Design Temperature, C	> -22
ORIGINAL BINDER	
Flash Point Temperature, T48; Minimum C	230
Viscosity, ASTM D 4402; Maximum, 3Pa*s(3000 cp) Test Temperature, C	135
Dynamic Shear, TP5; G*/sin[ ], Minimum, 1.00 kPa Test Temperature @ 10 rad/sec., C	64
ROLLING THIN FILM OVEN (T240) OR THIN FILM OVEN (T179) RESIDUE	
Mass Loss, Maximum, %	1.00
Dynamic Shear, TP5; G*/sin[ ], Minimum, 2.20 kPa Test Temperature @ 10 rad/sec., C	64
PRESSURE AGING VESSEL RESIDUE (PP1)	
PAV Aging Temperature, C	100
Dynamic Shear, TP5; G*/sin[ ], Minimum, 5000 kPa Test Temperature @ 10/rad/sec., C	25
Physical Hardening	Report
Creep Stiffness, TP1; S. Maximum, 300 Mpa –value, Minimum, 0.300 Test Temperature @ 60 sec., C	-12
Direct Tension, TP3; Failure Strain, Minimum, 1.0% Test Temperature @ 1.0 mm/min., C	-12

4.3 DENSITY, STABILITY AND AIR VOID REQUIREMENTS

PERCENT DENSITY		PERCENT OPTIMUM	HVEEM Stability Percent Not Less Than
Min	Max		
94	97	96	35

END OF SECTION

SECTION 02805
CONCRETE PAVING

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Portland cement concrete paving.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for concrete paving is on a square yard basis. Separate pay items are used for each different required thickness of pavement.
  2. Payment for concrete paving, high early strength, is on a square yard basis.
  3. Measurement for utility projects: Match actual pavement replaced but no greater than a maximum pavement replacement limits shown on the Drawings.
  4. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Standards for Testing and Materials.
  1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  2. ASTM A185 – Standard Specifications for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  3. ASTM A615 – Standard Specification for Deformed and Plain Billet – Steel Bars for Concrete Reinforcement.
  4. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  5. ASTM C33 – Standard Specifications for Concrete Aggregates.
  6. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  7. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
  8. ASTM C42 – Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  9. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
  10. ASTM C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

11. ASTM C136 – Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
12. ASTM C138 – Standard Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
13. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
14. ASTM C150 – Standard Specification for Portland Cement.
15. ASTM C174 – Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores.
16. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
17. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
18. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
19. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.

B. CFTS – City of Friendswood Technical Specifications.

C. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-203-F – Sand Equivalent Test.
   2. TxDOT Tex-406-A – Material Finer than 75 Fm (No. 200) Sieve In Mineral Aggregates (Decantation Test for Cement Aggregates).

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit proposed mix design and test data for each type and strength of concrete in the Work. Include proportions and actual flexural strength obtained from design mixes at required test ages.
C. Submit for approval manufacturer's description and characteristics for mixing equipment, and for traveling form paver when proposed for use.
D. Submit manufacturer's certificates giving properties of reinforcing steel. Include certificate of compliance with ASTM A82. Provide specimens for testing when required by the Project Manager.

1.5 HANDLING AND STORAGE
A. Do not mix different classes of aggregate without written permission of the Project Manager.
B. Class of aggregate being used may be changed before or during the Work with written permission of The Project Manager. When new class of aggregate is being used, it shall comply with this Technical Specification and shall be verified by the Project Manager.
C. Reject segregated aggregate. Before using aggregate whose particles

are separated by size, mix them uniformly to grading requirements.

D. Reject aggregates mixed with dirt, weeds or foreign matter.

E. Do not dump or store aggregate in roadbed.

1.6 DEFINITIONS

A. Batch – materials proportioned for concrete according to the APPROVED mix design and adjusted for moisture in aggregates. Batch targets shall be based on mixed design parameters, adjusted for moisture and stay within tolerance the Specifications for proportioning in accordance with ASTM C685.

B. Cracks – any split, rip or tear that penetrates the surface of the finished concrete. Crazing or "spider cracks" shall not be considered under this Section. The following are types of cracking with clear definitions and remedies which shall be followed:

1. Longitudinal Crack – cracks that mostly follow the centerline of the roadway. In a case where the line runs diagonal to the centerline, it shall be determined by using the rise/run method whether or not the crack is parallel to the centerline of the road way. Any crack that has a run greater than the rise (perpendicular to the centerline) shall be considered a longitudinal crack. If said crack proceeds beyond a construction or expansion joint, this shall be considered the same crack. All concrete that has longitudinal cracks shall be replaced with no exceptions, and new maintenance bond given to cover one year (1 Yr) from date of replacement of concrete.
2. Shrinkage Crack – cracks that are less than six hundredths inch (0.06 In) in width and no more than one-half inch (1/2 In) in depth shall be considered shrinkage cracks. No corrective action shall be required, but the length, width (at widest point) and depth (at widest point) shall be documented. At the one year (1 Yr) maintenance walkthrough, if any of these three (3) measurements have increased by ten percent (10%) or new shrinkage cracks have appeared in the same paving panel, corrective action shall be taken as approved by the Director of Engineering. An extended maintenance bond may be required.
3. Stress Crack – cracks that are more than six hundredths inch (0.06 In) but less than one-tenth inch (0.1 In) in width and of varying depths shall be considered stress cracks. These types of cracks are caused by tensile stress on concrete. Length, width and depth stress cracks shall be documented as described in 1.7.B.2 in this Section. Corrective action shall be taken as approved by the Director of Engineering. An extended maintenance bond may be required.
4. Structural Crack – cracks greater than one-tenth inch (0.1 In) in width, no matter what depth shall be considered structural cracks. These types of cracks are caused by severe tensile

stress on concrete and concrete failure. All concrete with structural cracks shall be replaced with no exceptions, and new maintenance bond given to cover one (1 Yr) year from date of replacement of concrete.

C. Joints:
   1. Control joint – shall either be a tooled or saw cut joint that shall control cracking of concrete paving. Control joints shall be spaced not greater than fifteen foot (15 Ft) intervals between expansion joints unless approved by the Project Manager.
   2. Construction joint – shall end a placement of concrete at the end of or at the centerline of a paving section. All construction joints shall use keyways to facilitate tie in to adjacent concrete placement.
   3. Expansion joint – shall end a paving panel or connect to existing pavement. Expansion joint shall use cedar wood material with a one inch (1 In) zip strip to allow for installation of sealant material. Dowels shall be imbedded as specified in the City of Friendswood Standard Detail Sheets. Expansion joints shall be placed not more than sixty feet (60 Ft) apart unless otherwise approved by the Project Manager.

D. Paving Panel – defined as concrete paving from one (1) expansion/construction joint to the next expansion/construction joint in length and edge of paving/construction joint to the next edge of paving/construction joint. There shall be no full width monolithic paving or paving from edge of pavement to edge of pavement, if the placement width exceeds fifteen feet (15 Ft), allowed at anytime.

PART II: PRODUCTS

2.1 MATERIALS

A. Portland Cement:
   1. Sample and test cement to verify compliance with Standards of ASTM C150, Type I or Type III.
   2. Bulk cement which meets referenced standards may be used when method of handling is approved by the Project Manager. When using bulk cement, provide satisfactory weighing devices.
   3. Fly ash which meets standards of ASTM C618 may be used as mineral fill when method of handling is approved by the Project Manager.

B. Water: Conform to requirements for water in ASTM C94.

C. Coarse Aggregate: Crushed stone, gravel or combination thereof, which is clean, hard and durable, conforms to requirements of ASTM C33 and has abrasion loss not more than forty-five percent (45%) by weight when subjected to Los Angeles Abrasion Test (ASTM C131).
   1. Maximum percentage by weight of deleterious substances shall not exceed values specified in TABLE 4.1 – DELETERIOUS

SUBSTANCES in this Section.

2. Conform coarse aggregate (size 1-1/2 inch to No. 4 sieve) to requirements of ASTM C33. Use gradation within limits specified in TABLE 4.2 – COARSE AGGREGATE SIEVE ANLAYSIS REQUIREMENTS when graded in accordance with ASTM C136.

D. Fine Aggregate: Sand, manufactured sand or combination thereof, composed of clean, hard, durable, uncoated grains, free from loams or other injurious foreign matter. Conform fine aggregate for concrete to requirements of ASTM C33. Use gradation within TABLE 4.3 – FINE AGGREGATE SIEVE ANALYSIS REQUIREMENTS in this Section, limits when graded in accordance with ASTM C136.

1. When subjected to color test for organic impurities (ASTM C40), fine aggregate shall not show color darker than standard color. Fine aggregate shall be subjected to Sand Equivalent Test (Tex-203-F). Sand equivalent value shall not be less than eighty (80), unless higher value is shown on the Drawings.

E. Mineral Filler: **FLY ASH CAN ONLY BE USED WHEN DESIGN MIX HAS BEEN SUBMITTED AND APPROVED BY THE DIRECTOR OF ENGINEERING.** Type “C” or Type “F” fly ash of acceptable quality and meeting requirements of ASTM C618 may be used as mineral admixture in concrete mixture. When fly ash mineral filler is used, store and inspect in accordance with ASTM C618. Do not use fly ash in amounts ion excess of twenty-five percent (25%) by weight of cementatious material in mix design. Cement content may be reduced when strength requirements can be met. Note: When fly ash is used, the term "cement" is defined as cement plus fly ash.

F. Air Entraining Agent: Furnish air entraining agent conforming to requirements of ASTM C260.

G. Water Reducer: Water reducing admixture conforming to requirements of ASTM C494 may be used when required to improve workability of concrete. Amount and type of admixture is subject to approval by the Project Manager.

H. Reinforcing Steel:

1. Provide new billet steel manufactured by open hearth process and conforming to ASTM A615, Grade 60. Store reinforcing steel to protect it from mechanical injury and rust. At time of placement, steel shall be free from dirt, scale, rust, paint, oil or other injurious materials.
2. Cold bend reinforcing steel to shapes shown. Once steel has been bent, it may not be rebent.
3. Provide wire fabric conforming to ASTM A82. Use fabric in which longitudinal and transverse wires have been electrically welded at points of intersection. Welds shall have sufficient strength to not be broken during handling or placing. Conform welding and fabrication of fabric sheets to ASTM A185.

4. Reinforcing Steel shall conform with Section 03200 – Reinforcing Steel.

2.2 EQUIPMENT

A. Conform Equipment to requirements of ASTM C94.

2.3 MIXING

A. Compressive strength shall be as specified using test specimens prepared in accordance with ASTM C31 and tested in accordance with ASTM C39. Determine and measure batch quantity of each ingredient, including water for batch designs and all concrete produced for the Work. Mix shall conform to these Technical Specifications and other requirements indicated on the Drawings.

B. Mix design to produce concrete which shall have compressive strength of two thousand seven hundred pounds per square inch (2700 psi) at seven days (7 D) and three thousand pounds per square inch (3000 psi) at twenty-eight days (28 D). Slump of concrete shall be at least three inches (3 In) but no more than five inches (5 In), when tested in accordance with ASTM C143.

1. Concrete pavement, including curb, curb and gutter and saw-tooth curb, shall contain at least five (5) sacks [ninety-four pounds (94 Lbs) per sack] of cement per cubic yard, with not more than six and one-half gallons (6-1/2 Gals) of water, net, per sack of cement (water-cement ratio maximum 0.57). Determine cement content in accordance with ASTM C138. Addition of mineral filler may be used to improve workability or plasticity of concrete to limits specified.
2. Coarse dry aggregate shall not exceed eighty-five percent (85%) of loose volume of concrete.
3. Add air-entraining admixture to ensure uniform distribution of agent throughout batch. Base air content of freshly mixed air-entrained concrete upon trial mixes with materials to be used in the Work, adjusted to produce concrete of required plasticity and workability. Percentage of air entrainment in mix shall be four percent (4%) plus or minus one and one-half percent (± 1-1/2%). Determine air content by testing in accordance with ASTM C231.
4. Use retardant when temperature exceeds ninety degrees Fahrenheit (90° F). Proportion as recommended by manufacturer. Use same brand as used for air-entraining agent. Add and batch material using same methods as used for air-entraining agent.

C. Use high early strength concrete pavement to limits shown on the Drawings. Design to meet following:

1. Concrete Mix: Compressive strength greater than or equal to three thousand pounds per square inch (3000 psi) at seventy-two hours (72 Hrs).

2. Cement: Minimum of seven (7) sacks of cement per cubic yard of concrete.
3. Water-Cement Ratio maximum of 0.45. Slump of concrete shall a maximum of five inches (5 In), when tested in accordance with ASTM C143.
4. Other requirements for proportioning, mixing, execution, testing, etc., shall be in accordance with this Section.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify compacted base is ready to support imposed loads and meets compaction requirements.
B. Verify lines and grades are correct.

3.2 PREPARATION

A. Properly prepare, shape and compact each section of subgrade before placing forms, reinforcing steel or concrete. After forms have been set to proper grade and alignment, use subgrade planer to shape subgrade to its final cross section. Check contour of subgrade with template.
B. Remove subgrade that shall not support loaded form. Replace and compact subgrade to required density.
C. After one inch (1 In) or more of consecutive rain, retest subgrade for compaction and moisture. Replace or, scarify and compact, to achieve required density.

3.3 EQUIPMENT

A. Alternate equipment and methods, other than those required by this Section, may be used provided equal or better results shall be obtained. Maintain equipment for preparing subgrade and for finishing and compacting concrete in good working order.
B. Subgrade Planer and Template:
   1. Use subgrade planer with adjustable cutting blades to trim subgrade to exact section shown on the Drawings. Select planer mounted on visible rollers which ride on forms. Planer frame must have sufficient weight so that it shall remain on form and have strength and rigidity that, under tests made by changing support from wheels to center, planer shall not develop deflection of more than one-eighth inch (1/8 In). Tractors used to pull planer shall not produce ruts or indentations in subgrade. When slip form method of paving is used, operate subgrade planer on prepared track grade or have it controlled by electronic sensor system operated from string line to establish horizontal alignment and elevation of subbase.
   2. Provide template for checking contour of subgrade. Template shall be long enough to rest upon side forms and have strength

and rigidity that, when supported at center, maximum deflection shall not exceed one-eighth inch (1/8 In). Fit template with accurately adjustable rods projecting downward at one foot (1 Ft) intervals. Adjust these rods to gauge cross sections of slab bottom when template is resting on side forms.

C. Machine Finisher: Provide power-driven, transverse finishing machine designed and operated to strike off and consolidate concrete. Machine shall have two (2) screeds accurately adjusted to crown of pavement and with frame equipped to ride on forms. Use finishing machine with rubber tires when it operates on concrete pavement.

D. Hand Finishing:
   1. Provide mechanical strike and tamping template two feet (2 Ft) longer than width of pavement to be finished. Shape template to pavement section.
   2. Provide two (2) bridges to ride on forms and span pavement for finishing expansion and control joints. Provide floats and necessary edging and finishing tools.

E. Burlap Drag or transverse broom for Finishing Slab: Furnish four (4) plies of ten ounce (10 Oz) burlap material fastened to bridge to form continuous strip of burlap full width of pavement. Maintain contact of three foot (3 Ft) width of burlap material with pavement surface. Keep burlap drags clean and free of encrusted mortar.

F. Vibrators: Furnish mechanically-operated, synchronized vibrators mounted on tamping bar which rides on forms and hand-manipulated mechanical vibrators. Furnish vibrators with frequency of vibration to provide maximum consolidation of concrete without segregation.

G. Traveling Form Paver: Approved traveling form paver may be used in lieu of construction methods employing forms, consolidating, finishing and floating equipment. Meet requirements of this specification for subgrade, pavement tolerances, pavement depth, alignments, consolidation, finishing and workmanship. When traveling form paver does not provide concrete paving that meets compaction, finish and tolerance requirements of this Technical Specification, immediately discontinue its use and use conventional methods.
   1. Equip traveling paver with longitudinal transangular finishing float adjustable to crown and grade. Use float long enough to extend across pavement to side forms or edge of slab.

   2. Ensure that continuous deposit of concrete can be made at paver to minimize starting and stopping. Use conventional means of paving locations inaccessible to traveling paver or having horizontal or vertical curvature that traveling paver cannot negotiate.
   3. Where the Drawings require tie bars for adjacent paving, securely tie and support bars to prevent displacement. Tie bars may be installed with approved mechanical bar inserter mounted

on traveling-form paver. Replace pavement in which tie bars assume final position other than that shown on the Drawings.

3.4 FORMS

A. Side Forms: Use metal forms of approved shape and section. Preferred depth of form is equal to required edge thickness of pavement. Forms with depths greater or less than required edge thickness of pavement shall be permitted, provided difference between form depth and edge thickness is not greater than one inch (1 In), and further provided that forms of depth less than pavement edge are brought to required edge thickness by securely attaching wood or metal strips to bottom of form or by grouting under form. Bottom flange of form shall be same size as thickness of pavement. Aluminum forms are not allowed. Forms shall be approved by the Project Manager. Length of form sections shall be not less than ten feet (10 Ft) and each section shall provide for staking in position with not less than three (3) pins. Flexible or curved forms of wood or metal of proper radius shall be used for curves of two hundred foot (200 Ft) radius or less. Forms shall have ample strength and shall be provided with adequate devices for secure setting so that when in-place they shall withstand, without visible springing or settlement, impact and vibration of finishing machine. In no case shall base width be less than eight inches (8 In) for form eight inches (8 In) or more in height. Forms shall be free from warp, bends or kinks and shall be sufficiently true to provide straight edge on concrete. Top of each form section, when tested with straight edge, shall conform to requirements specified for surface of completed pavement. Provide sufficient forms for satisfactory placement of concrete. For short radius curves, forms less than ten feet (10 Ft) in length or curved forms may be used. For curb returns at street intersections and driveways, wood forms of good grade and quality may be used.

B. Form Setting:

1. Rest forms directly on subgrade. Do not shim with pebbles or dirt. Accurately set forms to required grade and alignment and, during entire operation of placing, compacting and finishing of concrete, do not deviate from this grade and alignment more than one-eighth inch (1/8 In) in ten feet (10 Ft) of length. Do not remove forms for at least eight hours (8 Hrs) after completion of finishing operations. Provide supply of forms that shall be adequate for orderly and continuous placing of concrete. Set forms and check grade for at least 300 feet ahead of mixer or as approved by the Project Manager.
2. Adjacent slabs may be used instead of forms, provided that concrete is well protected from possible damage by finishing equipment. Do not use adjacent slabs for forms until concrete has aged at least seven days (7 D).

3.5 REINFORCING STEEL AND JOINT ASSEMBLIES

A. Place reinforcing steel and joint assemblies and position securely as indicated on the Drawings. Wire reinforcing bars securely together at ends and splices, remaining mat shall be fifty percent (50%) tied at intersections. Bars and coatings shall be free of rust, dirt or other foreign matter when concrete is placed. Secure reinforcing steel to chairs.

B. Position pavement joint assemblies at required locations and elevations and rigidly secure in position. Install dowel bars in joint assemblies, each parallel to pavement surface and to center line of pavement, as shown.

C. Cut header boards, joint filler, and other material used for forming joints to receive each dowel bar.

D. Secure in required position to prevent displacement during placing and finishing of concrete.

E. Drill dowels into existing pavement, secure with approved epoxy, and provide paving headers as required to provide rigid pavement sections.

F. Use sufficient number of chairs for steel reinforcement bars to maintain position of bars within allowable tolerances. Place reinforcement as shown on the Drawings. In plane of steel parallel to nearest surface of concrete, bars shall not vary from plan placement by more than one-twelfth (1/12) of spacing between bars. In plane of steel perpendicular to nearest surface of concrete, bars shall not vary from plan placement by more than one-quarter inch (1/4 In).

3.6 FIBROUS REINFORCING

A. Do not use fibrous reinforcing to replace structural, load-bearing or moment-reinforcing steel.

3.7 PLACEMENT

A. Place concrete when air temperature taken in shade and away from artificial heat is above thirty-five degrees Fahrenheit (35° F) and rising. Do not place concrete when air temperature is below forty degrees Fahrenheit (40° F) and falling.

B. Place concrete within ninety minutes (90 Min) after initial water had been added. Remove and dispose of concrete not placed within this period.

C. Concrete slump during placement shall be three inches (3 In) to five inches (5 In), except when using traveling-form paver which require slump shall be a maximum of three inches (3 In).

D. Deposit concrete continuously in successive batches. Distribute concrete in manner that shall require as little rehandling as possible. Where hand spreading is necessary, distribute concrete with shovels or by other approved methods. Use only concrete rakes in handling concrete. At placement interruption of more than thirty minutes (30 Min), place transverse construction joint at stopping point. Remove and replace sections less than ten feet (10 Ft) long.

E. Take special care in placing and spading concrete against forms and at

longitudinal and transverse joints to prevent honeycombing. Voids in edge of finished pavement shall be cause for rejection of pavement sections.

3.8 COMPACTION

A. Consolidate concrete using mechanical vibrators as specified herein. Extend vibratory unit across pavement, not quite touching side forms. Space individual vibrators at close enough intervals to vibrate and consolidate entire width of pavement uniformly. Mount mechanical vibrators to avoid contact with forms, reinforcement, transverse or longitudinal joints.

B. Furnish enough hand-manipulated mechanical vibrators for proper consolidation of concrete along forms, at joints and in areas not covered by mechanically controlled vibrators.

3.9 FINISHING

A. Finish concrete pavement with power-driven transverse finishing machines or by hand finishing methods.

1. Hand finish with mechanical strike and tamping template in same width as pavement to be finished. Shape template to pavement section shown on the Drawings. Move strike template forward in direction of placement, maintaining slight excess of material in front of cutting edge. Make a minimum of two (2) trips over each area. Screed pavement surface to required section. Work screed with combined transverse and longitudinal motion in direction work is progressing. Maintain screed in contact with forms. Use longitudinal float to level surface.

B. On narrow strips and transitions, finish concrete pavement by hand. Thoroughly work concrete around reinforcement and embedded fixtures. Strike off concrete with strike-off screed. Move strike-off screed forward with combined transverse and longitudinal motion in direction work is progressing, maintaining screed in contact with forms, and maintaining slight excess of materials in front of cutting edge. Tamp concrete with tamping template. Use longitudinal float to level surface.

C. After completion of straightedge operation, make first (1st) pass of burlap drag or transverse broom as soon as construction operations permit and before water sheen has disappeared from surface. Follow with as many passes as required to produce desired texture depth. Permit no unnecessary delays between passes. Keep drag wet, clean and free from encrusted mortar during use.

3.10 JOINTS AND JOINT SEALING

A. Conform to requirements of Section 02840 – Concrete Pavement Joints.

3.11 CONCRETE CURING

A. Conform to requirements of Section 02835 – Concrete Pavement Curing.

3.12 TOLERANCES

A. Test entire surface before initial set and correct irregularities or undulations. Bring surface within requirements of following test and then finish. Place ten foot (10 Ft) straightedge parallel to center of roadway to bridge depressions and touch high spots. Do not permit deviation measured from face of straight edge to surface of pavement to exceed one-sixteenth inch (1/16 In) per one foot (1 Ft) from nearest point of contact. Maximum deviation with ten foot (10 Ft) straightedge shall not exceed one-eighth inch (1/8 In). Grind spots in excess of required tolerances to meet surface test requirements. Restore texture by grooving concrete to meet surface finishing specifications.

3.13 FIELD QUALITY CONTROL

A. Perform testing under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures

B. Compressive Strength Test Specimens: Make four (4) test specimens for compressive strength test in accordance with ASTM C31 for each one hundred cubic yards (100 Cy)or less of pavement that is placed in one (1) day. Test two (2) specimens at seven days (7 D), or at number of hours as directed by the Project Manager for high early strength concrete. Test remaining two (2) specimens at twenty-eight days (28 D). Test specimens in accordance with ASTM C39. Minimum compressive strength shall be at least two thousand seven hundred pounds per square inch (2700 psi) for first two (2) specimens tested at seven days (7 D) and three thousand pounds per square inch (3000 psi) for the second two (2) specimens tested at twenty-eight days (28 D).

C. When compressive test indicates failure, make yield test in accordance with ASTM C138 for cement content per cubic yard of concrete. When cement content is found to be less than that specified per cubic yard, increase batch weights until amount of cement per cubic yard of concrete conforms to requirements.

D. Minimum of one (1) – four inch (4 In) core shall be taken at random locations per one thousand square yards (1000 Sy) of pavement to measure in-place depth. Measure depth in accordance with ASTM C174. Each core may be tested for twenty-eight day (28 D)compressive strength according to methods of ASTM C42. Twenty-eight (28) day compressive strength of each core tested shall be a minimum of three thousand pounds per square inch (3000 psi).

E. Request, at option of the Project Manager, three (3) additional cores in vicinity of cores indicating the nonconforming in-place depths at no cost to the City. In-place depth at these locations shall be average depth of four (4) cores.

F. Fill cores and density test sections with new concrete paving or non shrink grout.

G. Alternative testing for depth may be performed using string line and

random testing of locations for depth before concrete is placed.

3.14 NONCONFORMING PAVEMENT

A. Remove and replace areas of pavement found deficient in thickness by more than ten percent (10%) or that fail compressive strength tests, with concrete of thickness and strength shown on the Drawings.

B. When measurement of any core is less than specified thickness by more than ten percent (10%), actual thickness of pavement in this area shall be determined by taking additional cores at ten foot (10 Ft) intervals parallel to centerline in each direction from deficient core until, in each direction, core is taken which is not deficient by more than ten percent (10%). Exploratory cores for deficient thickness shall not be used in averages for adjusted unit price. Exploratory cores are to be used only to determine length of pavement in unit that is to be removed and replaced. Replace nonconforming pavement sections at no additional cost to the City.

3.15 PAVEMENT MARKINGS

A. Restore pavement markings to match those existing in accordance with the City of Friendswood Technical Specifications and Standard Details and the Project Manager's requirements.

3.16 PROTECTION

A. Barricade pavement section to prevent use until concrete has attained a minimum design strength. Cure barricade pavement section for a minimum of seventy-two hours (72 Hrs) before use. Do not open pavement to light construction traffic until concrete is at least ten days (10 D) old. No heavy loads shall be placed on concrete before twenty-eight day (28 D) breaks have passed. Pavement may be open to traffic earlier provided the Contractor pays for testing and additional specimens once the seven day (7 D) specified strength is obtained. Pavement may be opened when high early strength concrete is used and meets the specified seventy-two hour (72 Hr) strength.

B. High early strength concrete may be used to provide access at driveways, street intersections, esplanades and other locations approved by the Project Manager.

C. On those sections of pavement to be opened to traffic, seal joints, clean pavement, and place earth against pavement edges before permitting use by traffic. Opening of pavement to traffic shall not relieve responsibility for the Work.

D. Maintain concrete paving in good condition until completion of the Work.

E. Repair defects by replacing concrete to full depth.

PART IV: TABLES

4.1 DELETERIOUS SUBSTANCES

ITEM	PERCENT BY WEIGHT OF TOTAL SAMPLE MAXIMUM
Clay lumps and friable particles	3.0
Material finer than No. 200 sieve:	
Concrete subject to abrasion	3.0*
All other concrete	5.0*
Coal and lignite:	
Where surface appearance of concrete is of Importance	0.5
All other concrete	1.0

* In case of manufactured sand, when material finer than No. 200 sieve consists of dust of fracture, essentially free of clay or shale, then these limits may be increased to five percent (5%) and seven percent (7%) respectively.

4.2 COARSE AGGREGATE SIEVE ANLAYSIS REQUIREMENTS

SIEVE DESIGNATION (SQUARE OPENINGS)	PERCENTAGE BY WEIGHT
Retained on 1 ¾" sieve	0%
Retained on 1 ½" sieve	0% to 5%
Retained on 3/4" sieve	30% to 65%
Retained on 3/8” sieve	70% to 90%
Retained on No. 4 sieve	95% to 100%
Loss by Decantation Test:	
*Method Tex-406-A	1.0 maximum

* In case of aggregates made primarily from crushing of stone, when material finer than No. 200 sieve is dust fracture essentially free from clay or shale as established by Part III of TxDOT Tex-406-A, percent may be increased to one and one-half percent (1.5%).

4.3 FINE AGGREGATE SIEVE ANLAYSIS REQUIREMENTS

SIEVE DESIGNATION (SQUARE OPENINGS)	**PERCENTAGE BY WEIGHT**
Retained on 3/8" sieve	0%
Retained on No. 4 sieve	0% to 5%
Retained on No. 8 sieve	0% to 20%
Retained on No. 16 sieve	15% to 50%
Retained on No. 30 sieve	35% to 75%
Retained on No. 50 sieve	65% to 90%
Retained on No. 100 sieve	90% to 100%
Retained on No. 200 sieve	97% to 100%

END OF SECTION

SECTION 02805SP

CONCRETE PAVING

The following provisions modify Section 02805 – Concrete Paving Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.4.B and replace with the following:

   "Submit proposed mix design and test data for each type and strength of concrete in the Work. Include proportions and actual compressive strength obtained from design mixes at required test ages."

2. Delete paragraph 1.6.B.3 and replace with the following:

   "Stress Crack – cracks that are more than six hundredths inch (0.06 In) but less than one-tenth inch (0.1 In) in width and of varying depths shall be considered stress cracks. These types of cracks are caused by tensile stress on concrete. Length, width and depth stress cracks shall be documented as described in 1.6.B.2 in this Section. Corrective action shall be taken as approved by the Director of Engineering. An extended maintenance bond may be required."

3. Delete paragraph 2.1.A.3.

4. Delete paragraph 2.1.E.

5. Delete paragraph 2.3.B and replace with the following:

   "Mix design to produce concrete which shall have compressive strength of three thousand pounds per square inch (3000 psi) at seven days (7 D) and three thousand five hundred pounds per square inch (3500 psi) at twenty-eight days (28 D). Slump of concrete shall be at least one inch (1 In) but no more than five inches (5 In), when tested in accordance with ASTM C143."

6. Delete paragraph 2.3.B.1 and replace with the following:

   "Concrete pavement, including curb, curb and gutter and saw-tooth curb, shall contain at least five and one-half (5-1/2) sacks [ninety-four pounds (94 Lbs) per

sack] of cement per cubic yard, with not more than six and one-half gallons (6-1/2 Gals) of water, net, per sack of cement (water-cement ratio maximum of 0.57). Determine cement content in accordance with ASTM C138."

7. Delete paragraph 2.3.C.1 and replace with the following:

"Concrete Mix: Compressive strength greater than or equal to three thousand two hundred fifty pounds per square inch (3250 psi) at seventy-two hours (72 Hrs)."

8. Delete paragraph 3.7.B and replace with the following:

"Concrete shall be placed per the requirements set forth in *Table 4.5 - Temperature Requirements for Placement* and *Table 4.6 - Transporting Time Requirements for Placement* of Section 01080 – Quality Control Testing Procedures."

9. Delete paragraph 3.7.C and replace with the following:

"Concrete slump during placement shall be one inch (1 In) to five inches (5 In), except when using traveling-form paver which require slump shall be a maximum of two inches (2 In)."

10. Delete paragraph 3.13.B and replace with the following:

"Compressive Strength Test Specimens: Make four (4) test specimens for compressive strength test in accordance with ASTM C31 for each one hundred cubic yards (100 Cy) or less of pavement that is placed in one (1) day. Test two (2) specimens at seven days (7 D), or at number of hours as directed by the Project Manager for high early strength concrete. Test remaining two (2) specimens at twenty-eight days (28 D). Test specimens in accordance with ASTM C39. Minimum compressive strength shall be at least three thousand pounds per square inch (3000 psi) for first two (2) specimens tested at seven days (7) and three thousand five hundred pounds per square inch (3500 psi) for the second two (2) specimens tested at twenty-eight days (28 D)."

11. Insert paragraph 3.14.C with the following:

"Remove and replace pavement with unsatisfactory finish as determined by the Owner and Engineer. An unsatisfactory finish can be exposed aggregate surface and includes, but is not limited to, rain event that occurs during or after a concrete pour resulting in a poor finish, poor tooling, finishing or workmanship."

END OF SPECIAL PROVISION

SECTION 02810
CONCRETE MEDIANS AND DIRECTIONAL ISLANDS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Portland cement concrete medians and directional islands.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for concrete medians and directional islands is on a square yard basis measured along length and from back of curbs for width.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 MATERIALS
- A. Concrete: Conform to material and proportion requirements for concrete of Section 02805 – Concrete Paving.
- B. Reinforcing Steel: Conform to material requirements for welded wire fabric of Section 02805 – Concrete Paving.
- C. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02840 – Concrete Pavement Joints.
- D. Expansion Joint Filler: Conform to material requirements for expansion joint filler of Section 02840 – Concrete Pavement Joints.
- E. Subgrade Materials: Conform to subgrade material requirements of Section 02720 – Lime-Stabilized Base Subgrade and Section 02725 – Portland Cement-Stabilized Base Subgrade.

PART III: EXECUTION

3.1 SUBGRADE
- A. Prepare subgrade in accordance with applicable portions of sections on excavation and fill and embankment. Section 02720 – Lime-Stabilized Base Subgrade and Section 02725 – Portland Cement-Stabilized Base Subgrade.

3.2 PLACEMENT OF CONCRETE

A. Place and finish concrete in accordance with applicable portions of Section 02805 – Concrete Paving.

3.3 JOINTS

A. Install joints in accordance with Section 02840 – Concrete Pavement Joints.

3.4 CONCRETE CURING

A. Cure concrete in accordance with Section 02835 – Concrete Pavement Curing.

3.5 PROTECTION

A. Maintain new placed concrete medians and directional islands in good condition until completion of the Work.

B. Replace damaged concrete medians and directional islands to comply with this Section.

END OF SECTION

SECTION 02815
HEADERS, CURB, CURB AND GUTTER

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Reinforced concrete curb, reinforced monolithic concrete curb and gutter, and mountable curb.
- B. Paving headers and railroad headers poured monolithically with concrete base or pavement.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for curbs, curbs and gutter and esplanade curbs is on a linear foot basis measured along face of curb.
  2. Payment for three foot (3 Ft) concrete valley gutter is on a linear foot basis.
  3. Payment for mountable concrete curbs is on a square foot basis.
  4. Payment for concrete paving headers and concrete railroad headers is on a linear foot basis.
  5. Payment for headers is on linear foot basis measured between lips of gutters adjacent to concrete base or measured between backs of curbs adjacent to concrete pavement.
  6. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit details of proposed form work for approval.

1.4 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 MATERIALS
- A. Concrete: Conform to material and proportion requirements for concrete of Section 02805 – Concrete Paving.
- B. Reinforcing Steel: Conform to material requirements for welded wire fabric of Section 02805 – Concrete Paving.
- C. Grout: Nonmetallic, nonshrink grout containing no chloride producing

agents conforming to requirements specified in TABLE 4.1 – NONSHRINK GROUT REQUIREMENTS, in PART IV of this Section.

D. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02840 – Concrete Pavement Joints.

E. Expansion Joint Filler: Conform to material requirements for expansion joint filler of Section 02840 – Concrete Pavement Joints.

F. Mortar: Mortar finish composed of one (1) part Portland cement and one and one-half (1-1/2) parts of fine aggregate. Use only when approved by the Project Manager.

PART III: EXECUTION

3.1 PREPARATION

A. Prepare subgrade in accordance with applicable portions of sections on excavation and fill, embankment and subgrade and roadbed.

3.2 PLACEMENT

A. Guideline: Set to follow top line of curb. Attach indicator to provide constant comparison between top of curb and guideline. Ensure flow lines of gutters on monolithic curb and gutters conform to slopes indicated on the Drawings.

B. Forms: Brace to maintain position during pour. Use metal templates cut to section shown on the Drawings.

C. Reinforcement: Secure in position so that steel shall remain in place throughout placement. Reinforcing steel shall remain at approximate center of base or pavement as indicated on the Drawings.

D. Joints: Place in accordance with Section 02840 – Concrete Pavement Joints. Place dummy groove joints at driveways to match concrete pavement joints at right angles to curb lines. Cut dummy grooves one-quarter inch (1/4 In) deep using approved edging tool.

E. Place concrete in forms to required depth. Consolidate thoroughly. Do not permit rock pockets in form. Entirely cover top surfaces with mortar.

F. Verify headers are to the depth and the rebar is in place according to the City of Friendswood Standard Details.

3.3 MANUAL FINISHING

A. For monolithic curb and gutters, remove front curb forms, after concrete is in place. Form exposed portions of curb and of curb and gutter, using mule which conforms to curb shape, as shown on the Drawings.

B. Thin coat of mortar may be worked into exposed face of curb or curb and gutter using mule and two (2) handled wooden “darby” at least three feet (3 Ft) long.

C. Before applying final finish move ten foot (10 Ft) straightedge across curb or across gutter and up curb to back form of curb. Repeat until curb and gutter are true to grade and section. Lap straightedge over previous

finish operation by five feet (5 Ft).

D. Steel trowel finish surfaces to smooth, even finish. Make face of finished curb true and straight.

E. Edge outer edge of gutter with one-quarter inch (1/4 In) edger. Finish edges with tool having one-quarter inch (1/4 In) radius.

F. Finish visible surfaces and edges of finished curb or curb and gutter free from blemishes, form marks and tool marks. Finished curb or curb and gutter shall have uniform color, shape and appearance.

3.4 MECHANICAL FINISHING

A. Mechanical curb or curb and gutter forming and finishing machines may be used instead of, or in conjunction with, previously described methods, when approved by the Project Manager. Use of mechanical methods shall provide specified curb or curb gutter design and finish.

3.5 CURING

A. Immediately after finishing operations, cure exposed surfaces of curb or curb and gutter in accordance with Section 02835 – Concrete Pavement Curing.

3.6 TOLERANCES

A. Top surfaces of curb or curb and gutter shall have uniform width and shall be free from humps, sags or other irregularities. Surfaces of curb top, curb face and gutter shall not vary more than one-eighth inch (1/8 In) from edge of straightedge laid along them, except at grade changes.

3.7 PROTECTION

A. Maintain newly placed headers, curbs and curbs and gutters in good condition until completion of the Work.

B. Replace damaged headers, curbs and curbs and gutters to comply with this Section.

PART IV: TABLES

4.1 NONSHRINK GROUT REQUIREMENTS

Compressive Strength:	
At 7 days	3500 psi
At 28 days	8000 psi
Initial Set Time	45 minutes
Final Set Time	1.5 hours

END OF SECTION

SECTION 02820
CONCRETE SIDEWALKS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Reinforced concrete sidewalks.
- B. Wheelchair ramps.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for concrete sidewalks is on a square foot basis.
  2. No separate payment shall be made for work outside these limits or in areas where sidewalks or wheelchair ramps have been removed or replaced for the Contractor's convenience.
  3. Payment for wheelchair ramps of each type specified is on a per ramp basis.
  4. Removal and replacement of existing sidewalks, curb or curb and gutter and saw-cutting is paid on a unit cost basis for each item.
  5. Sodding shall be paid one foot (1 Ft) on each side of sidewalk unless otherwise noted.
  6. Coloring of wheelchair ramps is included in cost of ramp.
  7. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in Field.
  2. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  3. ASTM C42 – Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  4. ASTM C138 – Standard Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
  5. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
  6. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
  7. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

(12,400 ft-lbf/ft^3 (600 kN-m/m^3).

B. CFTS – City of Friendswood Technical Specifications.
C. TASABA – Texas Accessibility Standards of Architectural Barriers Act, of the Texas Civil Statues.

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit certified testing results and certificates of compliance.

PART II: PRODUCTS

2.1 MATERIALS
A. Concrete: Conform to material and proportion requirements for concrete of Section 02805 – Concrete Paving.
B. Reinforcing Steel: Conform to material requirements of Section 02805 – Concrete Paving for reinforcing steel. Use No. 3 (3/8 In) reinforcing bars.
C. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02840 – Concrete Pavement Joints.
D. Expansion Joint Filler: Conform to material requirements for expansion joint material of Section 02840 – Concrete Pavement Joints.
E. Forms: Use straight, unwarped wood or metal forms with nominal depth equal to or greater than proposed sidewalk or wheelchair ramp thickness. The use of two inch by four inch (2 In x 4 In) lumber as forms shall not be allowed.
F. Sand Bed: Conform to material requirements for bank run sand of Section 02140 – Utility Backfill Materials.
G. Sodding: Conform to material requirements for sodding of Section 02915 – Sodding.
H. Coloring for wheelchair ramps: Conform to material requirements for colored concrete of Section 02825 – Colored Concrete for Wheelchair Ramps.

PART III: EXECUTION

3.1 REPLACEMENT
A. Replace sidewalks which are removed or damaged during construction with thickness and width equivalent to one (1) removed or damaged, unless otherwise shown on the Drawings. Finish surface (exposed aggregate, stamped concrete, etc.) to match existing sidewalk.
B. Provide wheelchair ramps or existing, replaced or new sidewalks when sidewalk intersects curb at street or driveway.

3.2 PREPARATION
A. Identify and protect utilities which are to remain.

B. Protect living trees, other plant growth and features designated to remain.
C. Conduct clearing and grubbing operations in accordance with Section 02100 – Clearing and Grubbing.
D. Excavate subgrade six inches (6 In) beyond outside lines of sidewalk or wheelchair ramp. Shape to line, grade and cross section. For soils with plasticity index above forty percent (40%), stabilize soil with lime in accordance with Section 02720 – Lime-Stabilized Base Subgrade. Compact subgrade to minimum of ninety percent (90%) maximum dry density at optimum moisture content plus or minus three percent (±3%), as determined by ASTM D698.
E. Immediately after subgrade is prepared, cover with compacted sand bed to depth as shown on the Drawings. Lay concrete when sand is moist but not saturated.

3.3 PLACEMENT
A. Setting Forms: Straight, unwarped wood or metal forms with nominal depth equal to or greater than proposed sidewalk thickness. Use of two inch by four inch (2 In x 4 In) wood studs as forms shall not be allowed. Securely stake forms to line and grade. Maintain position during concrete placement.
B. Reinforcement:
    1. Install reinforcing bars in conformance of Section 03200 – Reinforcing Steel.
    2. Install reinforcing steel as shown on the drawings. Lay longitudinal bars in sidewalks or wheelchair continuously, except through expansion joints.
    3. Use sufficient number of chairs to support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.
    4. Drill dowels into existing paving, sidewalk and driveways, secure with epoxy and provide headers as required.
    5. Use sufficient number of chairs for steel reinforcement bars to maintain position of bars within allowable tolerances. Place reinforcement as shown on the Drawings. In plane of steel parallel to nearest surface of concrete, bars shall not vary from plan placement by more than one and one-half (1-1/2) of spacing between bars. In plane of steel perpendicular to nearest surface of concrete, bars shall not vary from plan placement by more than one-quarter inch (1/4 In).
C. Expansion Joints: Install expansion joints with load transfer units in accordance with Section 02840 – Concrete Pavement Joints.
D. Place concrete in forms to specified depth and tamp thoroughly with "jitterbug" tamp or other acceptable method. Bring mortar to surface.
E. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush,

and impress or hand-groove required pattern into wheelchair ramp.

F. Apply coating to wheelchair ramp with contrasting color in accordance with Section 02825 – Colored Concrete for Wheelchair Ramps.

G. Unless otherwise indicated on the Drawings, install construction sidewalk joints one-eighth inch (1/8 In) deep, at intervals not exceeding five feet (5 Ft). Use joint tool equal in width to edging tool.

H. Finish edges with tool having one-quarter inch (1/4 In) radius.

I. After concrete has set sufficiently, refill space along sides of sidewalk to one inch (1 In) from top of walk with suitable fill material. Tamp until firm and solid, place sod as applicable. Dispose of excess material in accordance with Section 01580 – Waste Material Disposal. Repair driveways and parking lots damaged by sidewalk excavation in accordance with Section 02845 – Pavement Repair and Resurfacing.

3.4 CURING

A. Conform to requirements of Section 02835 – Concrete Pavement Curing.

3.5 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. Compressive Strength Test Specimens: Four (4) test specimens for compressive strength test shall be made in accordance with ASTM C31 for each thirty cubic yards (30 Cy) or less of sidewalk that is placed in one day (1 D). Two (2) specimens shall be tested at seven days (7 D). Remaining two (2) specimens shall be tested at twenty-eight days (28 D). Specimens shall be tested in accordance with ASTM C39. Minimum compressive strength: two thousand seven hundred pounds per square inch (2700 psi) at seven days (7 D) for first two (2) specimens and three thousand pounds per square inch (3000 psi) at twenty-eight days (28 D) for the second two (2) specimens.

C. Yield test for cement content per cubic yard of concrete shall be made in accordance with ASTM C138. When cement content is found to be less than that specified per cubic yard, reduce batch weights until amount of cement per cubic yard of concrete conforms to requirements.

D. If the Contractor places concrete without notifying the laboratory, the City shall have the concrete tested by means of core test as specified in ASTM C42. When concrete does not meet this specification, cost of test, shall be deducted from the Contractor's payment.

E. Sampling of fresh concrete shall be in accordance with ASTM C172.

F. Take slump tests when cylinders are made and when concrete slump appears excessive.

G. Concrete shall be acceptable when average of two (2) twenty-eight (28) day compression tests is equal to or greater than minimum twenty-eight day (28 D) strength specified.

H. If either of two (2) tests on field samples is less than average of two (2) tests by more than ten percent (10%), that entire test shall be considered

suspect and not indicative of concrete strength. Core samples shall be required from in-place concrete in question.

I. If twenty-eight day (28 D) laboratory test indicates that concrete of low strength has been placed, test concrete in question by taking cores as directed and approved by the Project Manager. Take and test at least three (3) representative cores as specified in ASTM C42 and deduct cost from payment due.

3.6 NONCONFORMING CONCRETE

A. Remove and replace areas that fail compressive strength tests, or thickness of concrete shown on the Drawings.

B. Replace non-conforming sections at no additional cost to the City.

3.7 PROTECTION

A. Maintain newly-placed concrete in good condition until completion of the Work.

B. Replace damaged areas.

END OF SECTION

SECTION 02820SP

CONCRETE SIDEWALKS

The following provisions modify Section 02820 – Concrete Sidewalks Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.3 and replace with the following:

   "Payment for wheelchair ramps, including truncated domes, is on a square foot basis."

2. Delete paragraphs 1.2.A.4 thru 1.2.A5.

3. Delete paragraph 3.2.D and replace with the following:

   "Excavate subgrade six inches (6 In) beyond outside lines of sidewalk or wheelchair ramp. Shape to line, grade and cross section. For soils with plasticity index above forty percent (40%), stabilize soil with lime in accordance with Section 02720 - Lime-Stabilized Base Subgrade. Compact subgrade to minimum of ninety-five percent (95%) maximum dry density at optimum moisture content plus or minus three percent (±3%), as determined by ASTM D698."

4. Delete paragraph 3.3.E and replace with the following:

   "Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush."

6. Delete paragraph 3.5.B and replace with the following:

   "Compressive Strength Test Specimens: Four (4) test specimens for compressive strength test shall be made in accordance with ASTM C31 for each thirty cubic yards (30 Cy) or less of sidewalk that is placed in one day (1 D). Two (2) specimens shall be tested at seven days (7 D). Remaining two (2) specimens shall be tested at twenty-eight days (28 D). Specimens shall be tested in accordance with ASTM C39. Minimum compressive strength: three thousand pounds per square inch (3000 psi) at seven days (7 D) for first two (2) specimens and three thousand five hundred pounds per square inch (3500 psi) at twenty-eight days (28 D) for the second two (2) specimens."

END OF SPECIAL PROVISION

SECTION 02825
COLORED CONCRETE FOR WHEELCHAIR RAMPS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Colored concrete for Wheelchair ramps.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for coloring agent under this Section. Include payment in unit price bid for wheelchair ramps.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit product data for proposed coloring agent.

1.4 REFERENCES
- A. ADA – Americans with Disabilities Act.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TABA – Texas Architectural Barriers Act.

PART II: PRODUCTS

2.1 MATERIALS
- A. Coloring Agent: Provide dry-shake color hardener consisting of quartz-silica mixture of finely-graded, non-metallic aggregates, plasticizer and cement binder for producing color as shown on the Drawings.
- B. Color shall be Black.
- C. Concrete: Conform to material and proportion requirements of Section 02805 – Concrete Paving.

PART III: EXECUTION

3.1 WHEELCHAIR RAMPS
- A. Install wheelchair ramps in accordance with requirements of Part III of Section 02820 – Concrete Sidewalks with addition of procedure for application of coloring agent as required by Paragraph 3.2, Coloring Agent.

3.2 COLORING AGENT

A. Apply coloring agent on newly finished concrete surface as soon as job conditions permit, but in no event later than two hours (2 Hrs) after concrete is placed, at rate recommended by manufacturer or as approved by the Project Manager.

B. Apply color hardener uniformly to surface by dry-shake method when no excess moisture shows at surface of concrete, but while concrete is still plastic throughout. Do not sprinkle or otherwise add water to surface during application or finishing. Necessary moisture for color hardener shall come from the concrete as that color hardener develops the proper bond and produces adequate density for color-hardened surface.

C. First (1st) shake shall consume two-thirds (2/3) of material. Withhold one-third (1/3) for second (2nd) shake and final touch-up. After first (1st) shake, float surface thoroughly by mechanical or hand methods. Do not trowel surface between first (1st) and second (2nd) shakes.

D. Apply second (2nd) shake evenly, then float and trowel surface. Retain small quantity of material from second (2nd) shake for touching up non-uniform or weak-toned areas. Minimize hard troweling and use consistent finishing practices to ensure uniformity or color.

END OF SECTION

SECTION 02830
CONCRETE DRIVEWAYS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Portland cement concrete driveways.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for concrete driveways is on square foot basis, including excavation and stabilize subgrade.
  2. No separate payment shall be made for work in areas where driveway has been removed or replaced for the Contractor's convenience.
  3. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

1.3 REFERENECES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 MATERIALS
- A. Concrete: Conform to material and proportion requirements for concrete of Section 02805 – Concrete Paving.
- B. Reinforcing Steel: Conform to material requirements for reinforcing steel of Sections 02805 – Concrete Paving and 03200 – Reinforcing Steel.
- C. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02840 – Concrete Pavement Joints.
- D. Expansion Joint Filler: Conform to material requirements for expansion joint material of Section 02840 – Concrete Pavement Joints.
- E. Subgrade Materials: Conform to subgrade material requirements of Section 02720 – Lime-Stabilized base Subgrade or Section 02725 – Portland Cement-Stabilized Base Subgrade.

PART III: EXECUTION

3.1 PREPARATION

A. Prepare subgrade in accordance with applicable portions of Section 02720 – Lime-Stabilized Base Subgrade and Section 02725 – Portland Cement-Stabilized Base Subgrade.

3.2 REINFORCING STEEL

A. Reinforcing steel shall comply with Section 03200 – Reinforcing Steel. Steel shall be raised off the ground using chairs. Minimum size of reinforcing bars shall be #3 (3/8 In) reinforcing bars at sixteen inch (16 In) centers with a minimum of eighteen inches (18 In) overlap.

B. No concrete shall be placed until after reinforcing bars and forms have been inspected and approved by the Project Manager.

3.2 PLACEMENT

A. Place and finish concrete in accordance with applicable portions of Section 02805 – Concrete Paving.

3.3 JOINTS

A. Install joints in concrete driveway in accordance with Section 02840 – Concrete Pavement Joints.

3.4 CONCRETE CURING

A. Cure concrete driveway in accordance with Section 02835 – Concrete Pavement Curing.

3.5 PROTECTION

A. Conform to applicable requirements of Section 02835 – Concrete Pavement Curing.

END OF SECTION

SECTION 02830SP

CONCRETE DRIVEWAYS

The following provisions modify Section 02830 – Concrete Driveways Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and replace with the following:

   "Payment for concrete driveways is on a square yard basis, including excavation and stabilized subgrade."

3. Delete paragraph 3.2.A and replace with the following:

   "Reinforcing steel shall comply with Section 03200 - Reinforcing Steel. Steel shall be raised off the ground using chairs. Minimum size of reinforcing bars shall be #4 (1/2 In) reinforcing bars at sixteen inch (16 In) centers with a minimum of eighteen inches (18 In) overlap."

END OF SPECIAL PROVISION

SECTION 02835
CONCRETE PAVEMENT CURING

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Curing of Portland cement concrete paving.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for concrete curing under this Section. Include payment in unit price for Concrete Paving, Concrete Sidewalks, Concrete Driveways, Mountable Curbs, Curbs and Curb and Gutters.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C156 – Standard Test Method for Water Retention by Concrete Curing Materials.
  2. ASTM C171 – Standard Specifications for Sheet Materials for Curing Concrete.
  3. ASTM C309 – Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit manufacturer's product data for cover materials and liquid membrane-forming compounds.

PART II: PRODUCTS

2.1 COVER MATERIALS FOR CURING
- A. Conform curing materials to one of the following:
  1. Polyethylene Film: Opaque pigmented white film conforming to requirements of ASTM C171.
  2. Waterproofed Paper: Paper conforming to requirements of ASTM C171.
  3. Cotton Mats: Single layer of cotton filler completely enclosed in cover of cotton cloth. Mats shall contain not less than three-

quarters pound (3/4 Lb) of uniformly distributed cotton filler per square yard of mat. Cotton cloth used for covering materials shall weigh not less than six ounces per square yard (6 Oz/Sy). Stitch mats so that mat shall contact surface of pavement at all points when saturated with water.

2.2 LIQUID MEMBRANE-FORMING COMPOUNDS

A. Conform liquid membrane-forming compounds to ASTM C309. Membrane shall restrict loss of water to not more than 0.55 kg/m2 in seventy-two hours (72 Hrs) using test method ASTM C156.

PART III: EXECUTION

3.1 CURING REQUIREMENT

A. Cure concrete pavement by protecting against loss of moisture for period of at least seventy-two hours (72 Hrs) immediately upon completion of finishing operations. Do not use membrane curing for concrete pavement to be overlaid by asphalt concrete.

B. Failure to provide sufficient cover material shall be cause for immediate suspension of concreting operations.

3.2 POLYETHYLENE FILM CURING

A. Immediately after finishing surface and after concrete has taken its initial set, apply water in form of fine spray. Cover entire surface and all edges of pavement slab with polyethylene film so film shall remain in direct contact with surface and edges during specified curing period.

B. Cover entire surface and both edges of pavement slab. Overlap joints in film sheets a minimum of twelve inches (12 In). Immediately repair tears or holes occurring during curing period by placing acceptable moisture-proof patches or replacing film sheets.

3.3 WATERPROOFED PAPER CURING

A. Immediately after finishing surface and after concrete has taken its initial set, apply water in form of fine spray. Cover entire surface and all edges of pavement slab with waterproofed paper so paper shall remain in direct contact with surface and edges during specified curing period.

B. Prepare waterproofed paper to form blankets of sufficient width to cover entire surface and all edges of pavement slab. Blankets shall not be more than sixty feet (60 Ft) in length. Overlap joints in blankets caused by joining paper sheets by at least five inches (5 In) and securely seal with asphalt cement having melting point of approximately one hundred eighty degrees Fahrenheit (180° F). Place blankets with overlaps of at least twelve inches (12 In). Immediately repair tears or holes appearing in paper during curing period by cementing patches over defects or replacing blankets.

3.4 COTTON MAT CURING

A. Immediately after finishing surface and after concrete has taken its initial set, completely cover entire surface and edges of pavement slab with cotton mats, thoroughly saturated before application, maintaining contact with surface and edges of pavement equally at all points.

B. Keep mats on pavement for specified curing period. Keep mats saturated so that, when lightly compressed, water shall drip freely from them.

3.5 LIQUID MEMBRANE-FORMING COMPOUNDS

A. Immediately after free surface moisture and after concrete has dispersed, apply liquid membrane-forming compound in accordance with manufacturer's instructions.

B. Moisten concrete by water fogging prior to application of film, paper or mat when surface has become dry.

C. Seal concrete surface with single coat at rate of coverage recommended by manufacturer or as directed by the Project Manager, but not less than one gallon (1 Gal) per two hundred square feet (200 Sf) of surface area.

D. Concrete surface shall be completely and evenly covered. Any portion that has streaking, splattering or spurting shall be redone at no additional cost to the City.

3.6 TESTING MEMBRANE

A. Treated areas shall be visually inspected for areas of lighter color of dry concrete as compared to dump concrete. Test suspected areas by placing few drops of water a on surface. Membrane passes test when water stands in rounded beads or small pools which can be blown along surface of concrete without wetting surface.

B. Reapply membrane compound immediately at no cost to the City when membrane fails test noted above.

END OF SECTION

SECTION 02840
CONCRETE PAVEMENT JOINTS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Joints for concrete paving, concrete sidewalks, concrete driveways, mountable curbs, curbs and curb and gutters.
- B. Saw-cutting existing concrete or asphalt pavements for new joints.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for street pavement expansion joints, with or without load transfer, is on a linear foot basis.
  2. No separate payment shall be made for horizontal dowels. Include payment in the unit price for Concrete Paving, Concrete Driveways, Concrete Sidewalks or Curb and Gutter.
  3. No separate payment shall be made for formed or sawed street pavement contraction joints and longitudinal weakened plane joints. Include payment in the unit price for Concrete Paving.
  4. No separate payment shall be made for joints for Mountable Curbs, Curb, Curb and Gutter, Saw-tooth Curb, Concrete Sidewalks and Concrete Driveways. Include payment in the unit price for Mountable Curbs, Curbs, Curb and Gutter, Saw-tooth Curb, Concrete Sidewalks and Concrete Driveways.
  5. Payment shall be made for Preformed Expansion Joints on a linear foot basis only when field conditions require that sidewalk be moved adjacent to existing concrete structure (i.e., street, back of curb, etc.).
  6. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  2. ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
  3. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  4. ASTM D3405 – Standard Specification for Joint Sealants, Hot-

Applied, for Concrete and Asphalt Pavements.

B. CFTS – City of Friendswood Technical Specifications.
C. TxDOT – Texas Department of Transportation.
   1. TxDOT Tex-525-C – Tests for Asphalt and Concrete Joint Sealers.

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit product data for joint sealing compound and proposed sealing equipment for approval.
C. Submit samples of dowel caps, metal supports and deformed metal strip for approval. Submit manufacturer's recommendation for placing sealant(s).

PART II: PRODUCTS

2.1 BOARD EXPANSION JOINT MATERIAL
A. Filler board of selected stock: Use wood of density and type as follows:
   1. Clear, all-heart cypress weighing no more than forty pounds per cubic foot (40 Lbs/Cf), after being oven dried to constant weight.
   2. Clear, all-heart redwood weighing no more than thirty pounds per cubic foot (30 Lbs/Cf), after being oven dried to constant weight.

2.2 PREFORMED EXPANSION JOINT MATERIAL
A. Bituminous fiber and bituminous mastic composition material conforming to ASTM D994 and ASTM D1751.

2.3 JOINT SEALING COMPOUND
A. Joint sealants shall conform to one (1) of the sealant classes described in this Section.
B. Hot-poured rubber-asphalt compound to conform to ASTM D3405.
C. Two (2) component Synthetic Polymer.
   1. Curing is to be by polymerization and not by evaporation of solvent or fluxing of harder particles.
   2. Cure sufficiently at average temperature of seventy-seven degrees Fahrenheit (77° F) plus or minus two degrees Fahrenheit (± 2° F) so as not to pick up under wheels of traffic in a maximum of three hours (3 Hrs).
   3. Performance requirements, when tested in accordance with TxDOT Tex-525-C, shall meet above curing times and requirements as specified in TABLE 4.1 – COLD EXTRUDED AND COLD POURABLE (SELF LEVELING) SPECIFICATIONS in this Section.
   4. Provide cold-extruded type for vertical or sloping joints.
   5. Provide self-leveling type for horizontal joints.

D. Self-Leveling, Low Modulus Silicone or Polyurethane Sealant for Asphaltic Concrete and Portland Cement Concrete Joints. This shall be a single component self-leveling silicone or polyurethane material that is compatible with both asphalt and concrete pavements. The sealer shall not require a primer for bond; a backer rod shall be required shall be compatible with the sealant; no reaction shall occur between rod and sealant. When tested in accordance with TxDOT Tex-525-C, self-leveling sealant shall meet requirements as specified in TABLE 4.2 – SELF-LEVELING, LOW MODULUS OR POLYURETHANE SEALEANT SPECIFICATIONS in this Section.

2.4 LOAD TRANSMISSION DEVICES

A. Smooth, steel dowel bars conforming to ASTM A615, Grade 60. When indicated on the Drawings, encase one (1) end of dowel bar in approved cap having inside diameter one-sixteenth inch (1/16 In) greater than diameter of dowel bar.
B. Deformed steel tie bars conforming to ASTM A615, Grade 60.

2.5 SUPPORTS FOR REINFORCING STEEL AND JOINT ASSEMBLY

A. Employ supports of approved shape and size that shall secure reinforcing steel and joint assembly in correct position during placing and finishing of concrete. Space supports as directed by the Project Manager.

PART III: EXECUTION

3.1 PLACEMENT

A. When new Work is adjacent to existing concrete, place joints at same location as existing joints in adjacent pavement.
B. If limit of removal of existing concrete or asphalt pavement does not fall on existing joint, saw cut existing pavement a minimum of two inches (2 In) deep to provide straight, smooth joint surface without chipping, spalling or cracks.
C. All new concrete joints shall be placed as shown in the City of Friendswood Standard Details.

3.2 CONSTRUCTION JOINTS

A. Place transverse construction joint wherever concrete placement must be stopped for more than thirty minutes (30 Min). Place longitudinal construction joints at interior edges of pavement lanes using #6 (3/4 In) deformed tie bars, thirty inches (30 In) long and spaced sixteen inches (16 In) on centers and use keyways.

3.3 EXPANSION JOINTS

A. Place three-quarters inch (3/4 In) wide expansion joints at radius points of curb returns for cross street intersections or as located in adjacent pavement but no further than sixty feet (60 Ft) apart. Use no boards shorter than six feet (6 Ft). When pavement is twenty-four feet (24 Ft) or narrower, use not more than two (2) lengths of board. Secure pieces to form straight joint. Shape board filler accurately to cross-section of concrete slab. Use load transmission devices of type and size shown on the Drawings unless otherwise specified or shown as "No Load Transfer Device." Seal with joint sealing compound.

3.4 CONTRACTION JOINTS

A. Place contraction joints at same locations as in adjacent pavement or at spaces indicated on the Drawings.

B. Use sawed joints as alternate to contraction and weakened plane joints. Use circular cutter capable of cutting straight line groove a minimum of one-quarter inch (1/4 In) wide. Maintain depth of one-quarter (1/4) of pavement thickness. Commence sawing as soon as concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing and prior to initiation of cracks. Once sawing has commenced, continue until completed. Make saw cut with one (1) pass. Complete sawing within twenty-four hours (24 Hrs) of concrete placement. Saw joints at required spacing consecutively in sequence of concrete placement.

C. Concrete Saw: Provide sawing equipment adequate in power to complete sawing to required dimensions and within required time. Maintain ample supply of saw blades at work site during sawing operations. Maintain sawing equipment on job during concrete placement.

3.5 LONGITUDINAL WEAKENED PLANE JOINTS

A. Place longitudinal weakened plane joints at spaces indicated on the Drawings. If more than fifteen feet (15 Ft) in width is poured, longitudinal joint must be saw cut. Seal sawed or tooled groove with joint sealing compound.

3.6 EXPANSION AND CONTRACTION JOINTS FOR MOUNTABLE CURB, CURB, CURB AND GUTTER

A. Place three-quarters inch (3/4 In) wide preformed expansion joints through mountable curb, curb, curb and gutters at locations of expansion and contraction joints in adjacent pavement, at end of radius returns, at street intersections, at driveways, at curb inlets and any other location directed by the Project Manager. Maximum spacing between joints shall be fifteen feet (15 Ft) for contraction joints and sixty feet (60 Ft) for expansion joints.

3.7 EXPANSION AND CONTRACTION JOINTS FOR CONCRETE SIDEWALKS

A. Provide three-quarters inch (3/4 In) wide expansion joints conforming to ASTM A1751 across sidewalk at intervals no greater than sixty feet (60 Ft) and along sidewalks at back of curbs, at intersections with driveways, steps and walls. Provide expansion joint material conforming to ASTM D994 for small radius curves and around fire hydrants and utility poles. Extend expansion joint material full depth of slab. Saw-cut or tool contraction joints into sidewalk at intervals not exceeding five feet (5 Ft).

3.8 EXPANSION JOINTS FOR CONCRETE DRIVEWAYS

A. Provide three-quarters inch (3/4 In) wide expansion joints conforming to ASTM D1751 across driveway at street pavement, at right-of-way line, at existing concrete driveways and intersections with sidewalks and other structures or as shown on the Drawings. Extend expansion joint material full depth of slab. Contraction joints are not normally required, unless shown on the Drawings or as directed by the Project Manager.

3.9 JOINT SEALING

A. Seal joints only when surface and joints are dry, ambient temperature is above fifty degrees Fahrenheit (50° F) and less than eighty-five degrees Fahrenheit (85° F) and weather is not foggy or rainy.

B. Use joint-sealing equipment in like new working condition throughout joint sealing operation and be approved by the Project Manager. Use concrete grooving machine or power-operated wire brush and other equipment such as plow, brooms, brushes, blowers or hydro or abrasive cleaning as required to produce satisfactory joints.

C. Clean joints of loose scale, dirt, dust and curing compound. The term joint includes wide joint spaces, expansion joints, contraction joints and cracks, either preformed or natural. Remove loose material from concrete surfaces adjacent to joints.

D. Fill joints neatly with joint sealer to depth shown. Pour sufficient joint sealer into joints so that upon completion, surface of sealer within joint shall be one-quarter inch (1/4 In) above level of adjacent surface or at elevation as directed by the Project Manager.

3.10 PROTECTION

A. Maintain newly-placed joints in good condition until completion of the Work.

B. Replace damaged joints material with new material as required by this Section.

PART IV: TABLES

4.1 COLD EXTRUDED AND COLD POURABLE (SELF LEVELING) SPECIFICATIONS.

COLD EXTRUDED AND COLD POURABLE (SELF-LEVELING) SPECIFICATIONS	
PROPERTY	**REQUIREMENT**
Penetration, 25° C (77° F), 150g Cone, 5 s, 0.1 mm (in.), maximum	130
Bond and Extension 50%, -29° C (-20° F), 3 cycles:	
Dry Concrete Block	Pass
Steel blocks (Primed, if recommended by manufacturer)*	Pass
Flow at 70° C (158° F)	None
Water content % by mass, maximum	5.0
Resilience:	
Original sample, % minimum (cured)	50
Oven-aged at 70° C (158° F), % minimum	50
Cold Extruded material only – Cold Flow (10 minutes)	None

After bond extension test, there shall be no evidence of cracking, separation
or other opening that is over one-eighth inch (1/8 in.) deep in sealer or between sealer and test blocks.

* Steel blocks shall be used when armor joints are specified.

4.2 SELF-LEVELING, LOW MODULUS OR POLYURETHANE SEALEANT SPECIFICATIONS

SELF-LEVELING, LOW MODULUS SILICONE OR POLYURETHANE SPECIFICATIONS	
PROPERTY	**REQUIREMENT**
Tack Free Time, 25° ± 1° C (77° ± 2° F), minutes	120 maximum
Nonvolatile content, % by mass	93 minimum
Tensile Strength and 24 Hour Extension Test:	
Initial, 10-day cure 25° ± 1° C (77° ± 2° F), kPa (psi)	21 to 69 (3 to 10)
After Water Immersion, kPa (psi)	21 to 69 (3 to 10)
After Heat Aging, kPa (psi)	21 to 69 (3 to 10)
After Cycling -29° C (-20° F), 50%, 3 cycles, kPa (psi)	21 to 69 (3 to 10)
24 Hour Extension	Pass (All Specimens)

After twenty-four hours (24 Hrs), there shall be no evidence of cracking, separation or other opening that is over one eighth inch(1/8 in.) deep at any point in the sealer or between the sealer and test blocks.

END OF SECTION

SECTION 02840SP

CONCRETE PAVEMENT JOINTS

The following provisions modify Section 02840 – Concrete Pavement Joints Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and replace with the following:

   "No separate payment shall be made for expansion joints under this Section. Include payment in unit price for Concrete Paving."

2. Delete paragraph 1.2.A.5.

4. Delete paragraph 3.4.B and replace with the following:

   "Use sawed joints as alternate to contraction and weakened plane joints. Use circular cutter capable of cutting straight line groove a minimum of one-quarter inch (1/4 In) wide. Maintain depth of one-quarter (1/4) of pavement thickness plus one-half inch (1/2 In). Commence sawing as soon as concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and prior to initiation of cracks. Once sawing has commenced, continue until completed. Make saw cut with one (1) pass. Complete sawing within twenty-four hours (24 Hrs) of concrete placement. Saw joints at required spacing consecutively in sequence of concrete placement."

END OF SPECIAL PROVISION

SECTION 02850
BLAST CLEANING OF PAVEMENT

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Removal of existing pavement markings.
- B. Preparation of pavement surfaces for new pavement markings.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for blast cleaning of roadway lanes is on a linear foot basis for each width, measured in place.
  2. Payment for blast cleaning of symbols and legends is on a per legend or symbol basis, for each type of group of symbols or legends.
  3. Payment for removal of raised pavement markings, all types, is on a lump sum basis.
  4. Refer to Section 01270 - Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS
- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit description and characteristics of proposed blasting medium and equipment for approval.

1.4 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 MATERIALS
- A. Blasting Media: Quality commercial product capable of producing specified surface cleanliness without deposition of deleterious materials on cleaned pavement surface. Do not use high silica content sand particles as blasting agent that may result in high levels of free crystalline silica dust.

2.2 EQUIPMENT

A. Equipment shall be power-driven and of sufficient capacity to remove pavement markings. Equipment shall utilize moisture and oil traps of sufficient capacity to remove contaminants from air and prevent deposition of moisture, oil or other contaminants on pavement surface.

PART III: EXECUTION

3.1 REMOVAL OF EXISTING MARKINGS

A. Remove pavement markings in a sequence that shall prevent driver confusion or where indicated on the Drawings. Included are areas where it shall be necessary for drivers to cross existing markings which they would not normally cross. Completely remove or obliterate markings. Do not damage pavement surface.

3.2 CLEANING FOR PLACEMENT OF MARKERS

A. Remove old pavement markings, loose material and other contaminants deleterious to adhesion of new pavement markings to be placed. On Portland cement concrete pavement, minimize over-blasting to prevent damage to pavement surface. Small particles of tightly adhering existing pavement markings may remain, as approved by the Project Manager, if complete removal shall result in pavement surface damage.

B. Follow manufacturer's written instructions for proper cleaning of pavement surfaces to receive pavement marking.

END OF SECTION

SECTION 02850SP

BLAST CLEANING OF PAVEMENT

The following provisions modify Section 02850 – Blast Cleaning of Pavement Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and replace with the following:

   "No separate payment shall be made for work performed under this Section. Include payment in unit price for related work."

2. Delete paragraphs 1.2.A.2 and 1.2.A.3.

END OF SPECIAL PROVISION

SECTION 02855
RAISED PAVEMENT MARKERS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Raised reflective pavement markers and jiggle bars.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for Type I raised reflective pavement markers with one (1) reflective face is per each marker installed.
  2. Payment for Type I raised reflective pavement markers with two (2) reflective faces is per each marker installed.
  3. Payment for Type I raised pavement markers with no reflective face is per each marker installed.
  4. Payment for Type II raised reflective pavement markers with one (1) reflective face is per each marker installed.
  5. Payment for Type II raised reflective pavement markers with two (2) reflective faces is per each marker installed.
  6. Payment for Type "W" jiggle bars is on a unit price basis per each jiggle bar.
  7. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D2444 – Standard Test Method for Determination of Impact Resistance of Thermoplastic Pipe and Fittings by means of a Tup (Falling Weight).
  2. ASTM E808 – Standard Practice for Describing Retroreflection.
  3. ASTM E809 – Standard Practice for Measuring Photometric Characteristics of Retroreflectors.
- B. CFTS – City of Friendswood Technical Specifications.
- C. Federal Specification L-P-380C – Plastic Molding Material Methacrylate.
- D. TxDOT – Texas Department of Transportation.
  1. TxDOT Material Specification DMS-4100 – Jiggle BarTile.
  2. TxDOT Material Specification DMS-6130 – Bituminous Adhesive for Pavement Markers.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Submit manufacturer's product data concerning following materials for approval:
   1. Types I, II and III, W and Y markers.
   2. Primers, solvents and adhesives.
   3. Installation instructions.
C. Submit certificate by manufacturer that each marker and adhesive conforms to requirements in this Section.
D. Submit details of manufacturer's replacement policy for each type and class of marker.

1.5 DELIVERY AND STORAGE

A. Deliver markers in cartons of one hundred (100) units and epoxy adhesive in one gallon (1 Gal) pails. Ship like materials in like-sized containers to facilitate storage.
B. Store material in cool, dry conditions until application.

PART II: PRODUCTS

2.1 MARKERS

A. Raised Reflective Pavement Markers: Shallow frustum of pyramid shaped markers with tempered glass prismatic reflective elements. Bodies shall be plastic shells with resin/sand fillings or single-piece injection-molded bodies of impact resistant polymers. Plastic shells shall be Methyl Methacrylate conforming to Federal Specification L-P-380C, Type I, Class 3 and shall have a minimum wall thickness of sixty-five hundredths of an inch (0.65 In).
B. Marker configuration shall be as specified in Table 4.1 – RAISED PAVEMENT MARKER CONFIGURATIONE FOR TYPES I, II AND III.
C. Optical performance for Type I or II Raised Pavement Markers shall be as specified in Table 4.2 – RAISED PAVEMENT MARKER OPTICAL PERFORMANCE FOR TYPES I AND II.
D. Optical performance for Type III Raised Pavement Markers shall be as specified in Table 4.3 – RAISED PAVEMENT MARKER OPTICAL PERFORMANCE FOR TYPES III.
E. Testing Procedure: Locate randomly selected test marker with center of reflecting face five feet (5 Ft) from uniformly bright light source with effective diameter of two-tenths of an inch (0.2 In). Use photocell width of five hundredths of an inch (0.05 In) for Type I markers and photocell with annular ring of thirty-seven hundredths of an inch by forty-six hundredths of an inch (0.37 In x 0.46 In) for Type II markers; shield to eliminate stray light. Distance from light source to photocell center of twenty-one hundredths of an inch (0.21 In). Modify source receiver dimensions and distance between source and receiver proportionally to test distance change for test distances other than five feet (5 Ft). Lots containing more than four percent (4%) reflecting face failures shall be rejected according to ASTM E808 and ASTM E809.

F. Physical requirements shall be in accordance with following test procedures:
   1. Type I and Type III Markers: Select three (3) random markers per lot. Center marker over open end of vertically positioned one inch (1 In) long hollow metal cylinder with three inch (3 In) inside diameter and twenty-five hundredths of an inch (0.25 In) wall thickness. Apply load slowly to top of marker through one inch (1 In) diameter by one inch (1 In) high metal plug centered on marker. Breakage or appreciable deformation of test sample at a load less than two thousand pounds (2000 Lbs) shall be cause for lot rejection.
   2. Type II Markers: Select twenty (20) random markers per lot. Condition markers in convection oven at one hundred thirty degrees Fahrenheit (130° F) for one hour (1 Hr). At elevated temperature, impact reflective face by dropping ninety gram (90 g) dart, fitted with twenty-five hundredth of an inch (0.25 In) radius spherical head, six inches (6 In) perpendicularly onto center of reflective surface. Cracks in impact surface area shall be generally concentric in appearance. Small radial cracks less than twenty-five hundredth of an inch (0.25 In) in length shall be allowed. Lot shall be acceptable when eighteen (18) test samples meet testing requirements. The failure of four (4) test samples shall cause lot rejection. Retest additional twenty (20) markers when three (3) samples from the first (1st) group fail. The failure of one (1) lens of re-sample group shall cause lot rejection.

G. Impact Resistance: Test in accordance with ASTM D2444 Tup A.

H. Jiggle Bar Tile, Class A, shall conform to TxDOT Material Specifications D-9-4100 and includes Types I-A, I-C, II-A-A, W and Y.
   1. Type I-A shall contain approach face that reflects amber light. Body, other than reflective face, shall be yellow.
   2. Type I-C shall contain approach face that reflects white light. Body, other than reflective face, shall be white, silver-white or light gray.
   3. Type II-A-A shall contain two (2) reflective faces (approach and trailing) each of which shall reflect amber light. Body, other than reflective faces, shall be yellow.
   4. Type W shall have white body and no reflective faces.
   5. Type Y shall have yellow body and no reflective faces.
   6. Adhesive:
      a. Bituminous adhesive conforming to TxDOT material Specification D-9-6130 shall be used for Class A type markers on bituminous pavements.
      b. Epoxy adhesive for Class A type markers on Portland cement concrete pavements.

c. Adhesives for installation of jiggle bar shall be as recommended by manufacturer.

2.2 ADHESIVE

A. Obtain two (2) component epoxy adhesive from reflective pavement marker manufacturer which conforms to manufacturer's requirements for installation for Class A, B, C and D markers on Portland cement concrete pavements.

B. Provide bituminous adhesive per TxDOT Material Specification D-9-6130 and which conforms to manufacturer's requirements for installation for Class A, B, C and D markers on bituminous pavements.

PART III: EXECUTION

3.1 PREPARATION

A. Accurately locate and install approved markers to conform to classes and colors indicated on the Drawings.

B. Clean and repair surfaces to receive markings. Remove loose material, dust and contaminants such as oil, curing membrane or polished aggregates.

C. Blast clean surfaces indicated on the Drawings or where directed by the Project Manager in accordance with requirements of Section 02850 – Blast Cleaning of Pavement. Do not clean Portland cement concrete pavements by grinding. Mechanical wire brushing may be used to remove curing membranes.

3.2 INSTALLATION

A. Prepare pavement surfaces and install markers in accordance with marker and adhesive manufacturer's recommendations.

B. Test pavement surface for moisture content prior to application of markings. Place approximate two square foot (2 Sf) sheet of clear plastic or tar paper on road surface and hold in place for twenty minutes (20 Min). Immediately inspect sheet for build up of condensed moisture. When sufficient moisture has condensed to cause water to drip from sheet, do not apply markings. Repeat test as necessary until sufficient moisture has evaporated from pavement to allow placement.

C. Observe manufacturer's recommended pavement and ambient air temperature requirements for application. When manufacturer has no temperature recommendations, do not install markings when pavement surface temperature is below sixty degrees Fahrenheit (60° F) or above one hundred twenty degrees Fahrenheit (120° F).

D. Position reflective face of markers so that direction of reflection of one (1) face is directly opposite to direction of reflection of other face and parallel to centerlines of street.

E. Prepare surfaces to which markers are to be attached by adhesive by a method to ensure that surface is free of dirt, curing compound, grease,

oil, moisture, loose or unsound pavement markings and other materials which would adversely affect adhesive bond.

F. Establish guides to mark lateral location of pavement markings as shown on drawings. Guides placed on roadway for alignment purposes shall not establish permanent marking on roadway.

G. Place pavement markings in alignment with guides. Deviation rate in alignment shall not exceed one inch (1 In) per two hundred feet (200 Ft) of roadway. A maximum deviation shall not exceed two inches (2 In) nor shall deviation be abrupt. Remove and replace markings that are out of alignment or proper sequence.

H. Apply adhesive in sufficient quantity to ensure adhesion and as recommended by manufacturer for installation.

I. Markers shall be free of rust, scale, dirt, oil, grease, moisture or contaminants which might adversely affect adhesive bond.

J. Adhesive or other materials that impair functional reflectivity shall not be acceptable.

K. Place markers immediately after adhesive is applied and set into adhesive. Pavement markers shall not be in contact with pavement surface but shall be seated on continuous layer of adhesive. One hundred percent (100%) of bonding area of marker shall be in contact with adhesive.

L. For Bituminous adhesive use, pavement and pavement marker temperature shall be at least forty degrees Fahrenheit (40° F). Do not heat Bituminous adhesive to temperature greater than four hundred degrees Fahrenheit (400° F). Agitate Bituminous adhesive immediately to ensure even heat distribution.

M. Prime pavement surface and apply markings as recommended by manufacturer.

3.3 CLEANING

A. Keep project site free of unnecessary traffic hazards at all times.

B. Clean area upon completion of the Work and remove rubbish from the work site.

3.4 WARRANTY

A. Warrant material and labor for period of twelve months (12 Mos) from date of installation of markings.

PART IV: TABLES

4.1 RAISED PAVEMENT MARKER CONFIGURATIONE FOR TYPES I, II AND III.

RAISED PAVEMENT MARKER CONFIGURATION			
MARKER	**NOMINAL DIMENSIONS**	**REFLECTING FACE SLOPE**	**REFLECTING FACE SURFACE AREA**
Type I	4” x 4” x 0.75 high	30°	3.25 sq. in.
	3” x 5” x 0.70 high	30°	4.00 sq. in.
Type II	2” x 4” x 0.40 high	30°	1.87 sq. in.
Type III	3” x 5” x 0.70 high	30°	4.00 sq. in.

4.2 RAISED PAVEMENT MARKER OPTICAL PERFORMANCE FOR TYPES I AND II.

TYPE I AND II RAISED PAVEMENT OPTICAL PERFORMANCE			
SPECIFIC INTENSITY, SI, MIN.	**WHITE**	**YELLOW**	**RED**
Entrance Angle = 0°	15.0	9.0	3.5
Entrance Angle = 20°	6.0	3.6	1.2

4.3 RAISED PAVEMENT MARKER OPTICAL PERFORMANCE FOR TYPES III.

TYPE III RAISED PAVEMENT OPTICAL PERFORMANCE			
SPECIFIC INTENSITY, SI, MIN.	**WHITE**	**YELLOW**	**RED**
Entrance Angle = 0°	15.0	9.0	3.5
Entrance Angle = 20°	6.0	3.6	1.2

END OF SECTION

SECTION 02860
THERMOPLASTIC PAVEMENT MARKINGS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. This item includes white or yellow thermoplastic pavement markings for crosswalks, stop lines, lane lines, edge lines and other types of traffic controls.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for thermoplastic pavement markings is on a linear foot basis for the width of markings.
  2. Payment for words and symbols is per each word or symbol.
  3. Unit price bid for each shall be item full compensation for furnishing and placing all materials and for all manipulations, including blast cleaning, surface sealing and priming, labor, tools, equipment and incidentals necessary to complete the Work in accordance with drawings and Technical Specifications.
  5. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. When Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Standards for Testing and Materials.
  1. ASTM E28 – Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus.
  2. ASTM G152 – Standard Practice for Operating Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
  3. ASTM G153 – Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TxDOT – Texas Department of Transportation.
  1. TxDOT Tex-822-B – Determining Refraction Index of Glass Beads.
  2. TxDOT Tex-826-B – Water Absorption Test of Beads.
  3. TxDOT Tex-839-B – Determining Color in Reflective Material.
  4. TxDOT Tex-851-B – Evaluating the Abrasion Resistance of Pavement Marking Material.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.

B. Product Data: Submit Manufacturer's literature indicating product specifications and instructions for handling, installation and curing. Include performance test data sheets for each product.
C. Submit material supplier's certification of compliance with the Technical Specifications.
D. Submit proposed methods, equipment and sequence of operation for layout, surface preparation and installation.
E. Chemical Analysis: Submit infrared analysis of Type B resins for each manufacturer used.

PART II: PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. General Requirements: Especially compound Type B thermoplastic pavement marking material for use on either asphaltic or Portland cement concrete surfaces. Clearly mark each container to indicate color, weight, type of material and lot or batch number (consider lot or batch as each individual mix or blend that produces finished product ready for use). Package material in either suitable corrugated containers or thermal degradable plastic bags to avoid sticking during shipment or storage.
B. Thermoplastic markings shall not be slippery when wet, and shall not exhibit tacky, exposed surface. Cold ductility of material shall permit normal road surface expansion and contraction without chipping or cracking. Markings shall retain their original color, dimensions and placement under normal traffic conditions at road surface temperatures of one hundred fifty-eight degrees Fahrenheit (158° F) and below.
C. Prime and filler pigments shall pass U.S. Standard sieve No. 230 (0.0024 inch opening) when washed free of resins by solvent washing and meet following specific requirements for each pigment.
    1. Prime Pigments: White pigment shall be Rutile Titanium Dioxide. Yellow pigment shall be a heat-resistant, double-encapsulated medium chrome yellow or other approved heat-resistant pigment.
    2. Filler Pigment: Filler pigment shall be calcium carbonate, with a purity of ninety-five percent (95%).
D. Binder
    1. Type B – Alkyd: Use binder consisting of mixture of resins, at least one (1) of which is solid at room temperature and high boiling point plasticizers. At least one-third (1/3) of binder compositions shall be a maleic-modified glyceryl ester 012 Rosin and shall be no less than eight percent (8%) by weight of entire material formulation.
E. Glass Traffic Beads: The total silica used in formulation shall be in the form of glass traffic beads meeting the following requirements:
    1. Manufacture: Use glass traffic beads having the following

characteristics:

a. Manufactured from glass;
b. Spherical in shape;
c. Free of sharp angular particles;
d. Free of particles showing milkiness, surface scoring or surface scratching;
e. Water white in color.

2. Contaminants: Use glass traffic beads having the following characteristics:
   a. Containing less than one-quarter of one percent (0.25%) moisture by weight;
   b. Free of trash, dirt, etc;
   c. Showing no evidence of objectionable static electricity when flowing through traffic-bead dispenser.
3. Gradation:
   a. Sieve Analysis: Glass traffic beads shall meet gradation requirements specified in TABLE 4.1 – GLASS TRAFFIC BEADS SIEVE ANALYSIS, in this Section.
   b. Irregular Particles: Glass traffic beads, retained on screen used to determine gradation requirements, shall contain not more than thirty percent (30%) (by weight) of irregular particles.
4. Index of Refraction: Glass traffic beads, when tested by TxDOT Tex-822-B, using liquid immersion method at seventy-seven degrees Fahrenheit (77° F) shall show index of refraction within range of 1.50 to 1.53.
5. Wetting: Use glass traffic beads capable of being readily wet with water when tested in accordance with TxDOT Tex-826-B.
6. Stability: Use glass traffic beads showing no tendency toward decomposition, surface etching, change in retro-reflective characteristics or change in color after:
   a. One hour (1 Hr) exposure to concentrated hydrochloric acid at seventy-seven degrees Fahrenheit (77° F);
   b. Twenty-four hour (24 Hr) exposure to weak alkali;
   c. One hundred hours (100 Hrs) of Weather-O-Meter exposure, in accordance with ASTM G152 and ASTM G153.

2.2 FINISHED PRODUCT REQUIREMENTS

A. Physical Characteristics: Finished thermoplastic pavement markings material shall be free-flowing granular material, unless otherwise shown on the Drawings. Material shall remain in free flowing state in storage at temperatures of one hundred degrees Fahrenheit (100° F) or less. Materials shall be readily sprayed through nozzles commonly used on thermoplastic spray equipment at temperatures between four hundred one degree Fahrenheit (401° F) to four hundred twenty-five degrees

Fahrenheit (425° F).

B. Toxicity: At temperatures up to and including four hundred forty-six degrees Fahrenheit (446° F), materials shall not give off fumes which are toxic and otherwise injurious to persons, animals or property.

C. Material shall not break down or deteriorate when held at four hundred one degrees Fahrenheit (401° F) for four hours (4 Hrs).

D. Temperature versus viscosity characteristics of material in plastic state shall remain constant throughout up to four reheatings at four hundred one degrees Fahrenheit (401° F) and from batch to batch.

E. Material shall not be adversely altered by contact with sodium chloride, calcium chloride or other similar chemicals on or used on, roadway surface; by contact with oil content of pavement materials or by contact from oil dropping from traffic.

F. Softening Point: After heating thermoplastic materials for two hours (2 Hrs) at four hundred degrees Fahrenheit (400° F) Type B Alkyd material shall have softening point greater than 194 degrees Fahrenheit when tested in accordance with ASTM E28-58T – Ball and Ring Method.

G. Color: CIE chromaticity coordinates of materials, when determined in accordance with TxDOT Tex-839-B, shall fall within area having following corner points and shall meet luminosity requirements specified in TABLE 4.2 – CIE CHROMATICITY COORDINATE CORNER POINTS LUMINISITY REQUIREMENTS, in this Section. Material shall meet above specified color requirements, before and after seventy hours (70 Hrs) of exposure in Weather-O-Meter (Atlas, Sunshine Type) fitted with [eighteen minutes (18 Min) sunshine and rain to one hundred two minutes (102 Min) of sunshine] cyclic gear. Prepare panels for testing with material as supplied.

H. Abrasion: Thermoplastic pavement marking materials shall have loss between four grams (4 g) and twelve grams (12 g) when tested for abrasion in accordance with TxDOT Tex-851-B. Test according to steps one (1) through eight (8) of procedure utilizing test parameters specified in TABLE 4.3 – ABRASION TEST FOR THERMOPLASTIC PAVEMENT MARKING MATERIALS, in this Section.

I. Uniformity: Manufacture material so that, when sampled in accordance with TxDOT Manual of Testing Procedures, a one hundred gram (100 g) sample shall be representative of the batch or lot of material.

J. When applied one-eighth inch (1/8 In) thick, setting time shall not exceed characteristic straight-line curve lower limit which is four minutes (4 Min) at fifty-nine degrees Fahrenheit (59° F) road surface temperatures and upper limit of which is ten (10) minutes at ninety degrees Fahrenheit (90° F) road surface temperature. Both temperatures are to be measured at a maximum relative humidity of ninety percent (90%).

2.3 FORMULAE

A. Type B – Alkyd Thermoplastic Marking shall be as specified in TABLE 4.4 – TYPE B ALKYD THERMOPLASTIC MARKING FORMULA, in this Section.

PART III: EXECUTION

3.1 GENERAL

A. Spray apply pavement marking or extrude hot material to pavement surface unless application method is specified on the Drawings.

B. Provide continuous mixing and agitation of material. Provide clean, square, marking ends. Do not use pans, aprons or similar appliances which die overruns.

C. Provide thermometer capable of measuring temperature of pavement marking material.

D. Use automatic bead dispenser attached to pavement marking equipment in manner that beads are dispensed uniformly and almost instantly upon marking as marking is being applied to road surface. Rate of application shall be sufficient to achieve retro-reflective characteristics specified. Provide automatic cut-off control for bead dispenser, synchronized with cut-off of pavement marking application process.

E. Place markings in accordance with approved traffic control plan so that minimal interruption to traffic flow is achieved, or so that driver confusion is minimized. Protect newly-installed pavement markings from damage by traffic.

F. Apply pavement markings onto clean, dry pavement having road surface temperature above sixty degrees Fahrenheit (60° F). When pavement marking application is by spray and operations cease for five minutes (5 Min) or more, flush spray head by spraying pavement marking material into pan or similar container until material is proper temperature for application.

G. Use markings that are completely reflectorized internally and externally.

H. Use crew experienced in the Work of installing pavement markings and supply all equipment and materials necessary for placement of pavement markings.

I. Apply material within temperature limits recommended by manufacturer.

J. Prior to placement of thermoplastic material, properly prepare pavement with primer.

3.2 LAYOUT

A. Place pavement markings in proper alignment with guidelines established on roadway. Do not deviate from alignment established greater than two inches (2 In). Do not deviate in alignment of marking being placed greater than one inch (1 In) per two hundred feet (200 Ft) of marking and do not deviate abruptly.

B. Place additional markings required to achieve alignment specified

throughout both straight and horizontally curved sections of roadway. Additional markings placed on roadway for alignment purposes shall be temporary in nature and shall not be established as permanent marking on roadway. Materials used for alignment markings and equipment used to place markings shall be approved by the Project Manager.

3.3 SURFACE PREPARATION

A. Clean pavement by sandblasting and prepare in accordance with recommendations of thermoplastic material manufacturer and to satisfaction of the Project Manager prior to placement of markings. Surface scarification can be used with prior approval of the Project Manager.

B. Use cleaning methods approved by the Project Manager that completely remove contaminants, loose materials and conditions deleterious to proper adhesion. Do not clean Portland cement concrete surfaces by grinding.

C. Further prepare Portland cement concrete surfaces after cleaning by completely sealing with epoxy or methyl methacrylate sealer as recommended by thermoplastic material manufacturer. Place sealer sufficiently in advance of thermoplastic to allow release of all solvents.

D. Prime asphaltic surfaces with sealer as recommended by thermoplastic material manufacturer and based on surface conditions. Include adhesive or adhesion promoter when asphaltic surfaces exhibit polished aggregate.

3.4 INSTALLATION

A. Install in widths of four inches (4 In), six inches (6 In), eight inches (8 In) or twelve inches (12 In) or shape as otherwise shown on the Drawings. Tolerances in width shall not exceed one-eighth inch (1/8 In). Tolerance shall not exceed one-quarter inch (1/4 In) in case of undulation in pavement.

B. Material shall not prohibit adhesion of other thermoplastic markings if, at some future time, new markings are placed over or across existing materials.

C. Maintain uniform thickness of each pavement marking. The minimum thickness of markings, as measured above plane formed by pavement surface, shall not be less than one-eighth inch (1/8 In), one hundred twenty-five mils (125 mils), unless shown otherwise on the Drawings. The maximum thickness shall be three-sixteenths inch (3/16 In). Supply device approved by the Project Manager to measure thickness of applied extruded markings.

3.5 TESTING

A. Maintain uniform cross section, density, quality and thickness for markings. Markings shall be uniform throughout their thickness. Use applied markings that are ninety-five percent (95%) free of holes and voids and free of blisters for a minimum of sixty days (60 D) after application.

PART IV: TABLES

4.1 GLASS TRAFFIC BEADS SIEVE ANALYSIS

OPENINGS U.S. STANDARD SIEVES	**PERCENT PASSING**
No. 20	95 – 100
No.30	80 – 95
No. 50	15 – 35
No. 100	0 – 4

4.2 CIE CHROMATICITY COORDINATE CORNER POINTS LUMINISITY REQUIREMENTS

	POINT 1	**POINT 2**	**POINT 3**	**POINT 4**	
Color	X Y	X Y	X Y	X Y	Luminosity
White {tc \ 12" White}	0.290 – 0.315	0.310 – 0.295	0.350 – 0.340	0.330 – 0.360	Minimum 65

4.3 ABRASION TEST FOR THERMOPLASTIC PAVEMENT MARKING MATERIALS

THERMOPLASTIC MARKINGS TEST PARAMETERS	
TEST PARAMETERS	**VALUE**
Test Distance	5 Inches
Blast Pressure	40 psi
Sample Angle	10° and 122 gram blast media
Blast Media	1200 grams

4.4 TYPE B – ALKYD THERMOPLASTIC MARKING FORMULA

MATERIAL	**POUNDS**
Binder	18 – 23
Titanium Dioxide	12 – 15
Calcium Carbonate	20 – 42
Glass Traffic Beads	30 – 45
TOTAL	100

END OF SECTION

SECTION 02865
TRAFFIC SIGNS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Requirements for furnishing and installing signs for traffic control.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for traffic signage is on a per each basis per sign type.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  2. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  3. ASTM B209 – Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
  4. ASTM B449 – Standard Specification for Chromates on Aluminum.
  5. ASTM B695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
  6. ASTM D4956 – Standard Specification for Retroreflective Sheeting for Traffic Control.
- B. CFTS – City of Friendswood Technical Specifications.
- C. TxDOT – Texas Department of Transportation.
  1. Department of Materials Specification DMS-7110 Aluminum Sign Blanks.
  2. Department of Materials Specification DMS-8300 Sigh Face Materials.
  3. Standard Specifications for Construction of Highways, Streets and Bridges Item 636 – Aluminum Signs (Type A).
  4. Texas Manual on Uniform Traffic Control Devices (TMUTCD), Latest Edition.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit manufacturer's product data concerning following materials for approval:

1. Sign Blanks.
2. Facing materials.
3. Mounting hardware and poles.

C. Submit manufacturer's certification that all signage meets requirements in this Technical Specification.

PART II: PRODUCTS

2.1 ALUMINUM SIGN BLANKS

A. Aluminum sheet or coil sign blanks shall meet all requirements of TxDOT Standards Specification Item 636, TxDOT DMS-7110 Aluminum Sign Blanks and ASTM B209, Alloys 6061-T-6 or 5052-H38.

B. Sign blanks made from sheet or coil shall be free of buckles, warps, dents, cockles, burrs and other defects and must be a plane surface. Sign blank thickness shall be eight-hundredths inch (0.08 In) in thickness.

C. Treat all sign blanks fabricated from sheet and coil with a chromate chemical process resulting in a coating meeting the requirements of ASTM B449, Class 2. The coating shall be light colored, tight and free from powdery residues.

D. Manufacturer shall furnish mill test reports for aluminum sheet or coil which reflect the chemical and physical properties of the aluminum.

2.2 SIGN MOUNTING HARDWARE AND ADHESIVES

A. All material for sign posts and mounting hardware shall be galvanized Steel and be in compliance with ASTM A307, ASTM A153 and ASTM B695.

B. Sign posts shall be two and three-eighths inches (2-3/8 In) in outside diameter galvanized steel.

C. Sign Post mounting shall be “Pos-Lok” or equal system consisting of sixteen inch (16 In) sleeve and removable wedge.

D. Pipe and post clamp castings and miscellaneous fasteners shall be verified by manufacturer’s certifications stating that the material meets all applicable requirements.

2.3 FACE MATERIALS

A. All materials are to be certified by lot or shipment that material supplied meets requirements listed in these Specifications. Material shall also comply with ASTM D4956 and TxDOT DMS 8300.

B. Sign face materials shall be processed, applied and stored according to the manufacturer’s recommendations. Sign face materials shall perform for a minimum of ten years (10 Yrs).

C. The Project Manager shall reject any sign and or face material for the following reasons:

1. Cracks discernible with the unaided eye from the drivers position

while in an outside lane at a distance of fifty feet (50 Ft) or greater from the sign.

2. Peeling in excess of one-quarter inch (1/4 In).
3. Shrinkage in excess of one-eighth inch (1/8 In) total per forty-eight inches (48 In) of sheeting width.
4. Fading or loss of color to the extent that color fails to meet the requirements of ASTM D4956 or TxDOT DMS 8300.
5. In non-construction zone – loss of reflectivity to a level eighty percent (80%) of the minimum values as specified in ASTM D4956.
6. In construction zone – loss of reflectivity to a level sixty percent (60%) of the minimum values as specified in ASTM D4956.
7. Face consists of pressure-activated material of either diamond or prismatic vinyl.

2.4 STREET NAME SIGNS

A. Street name signs shall conform to the applicable City of Friendswood Standard Details, and to TxDOT Specifications where applicable.

PART III: EXECUTION

3.1 INSTLLATION

A. All signs and their installation shall be accordance with the latest edition of the TMUTCD Texas Manual on Construction Traffic Control Devices (TMUTCD).
B. All signs shall be installed at the locations shown on the Drawings or as directed by the Project Manager.
C. Sign Posts shall be set a minimum of three feet (3 Ft) in depth in a twelve inch (12 In) diameter hole filled with concrete as specified in Section 03300 – Structural Concrete.
D. All installation and materials shall conform to all applicable requirements specified in Section 01430 – Project Signage.

END OF SECTION

SECTION 02905
TOPSOIL

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Furnishing and placing topsoil for finish grading and for seeding, sodding and planting.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for topsoil under this Section. Include payment in Section 02910 – Hydromulch Seeding or Section 02915 – Sodding.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENECES
- A. CFTS – City of Friendswood Technical Specifications.

PART II: PRODUCTS

2.1 TOPSOIL
- A. Topsoil shall be fertile, friable, natural sandy loam surface soil obtained from excavation or borrow operations having characteristics specified in TABLE 4.1 – TOPSOIL CHARACTERISTICS in this Section.
- B. Topsoil shall be reasonably free of subsoil, clay lumps, weeds, non-soil materials and other litter or contamination. Topsoil shall not contain roots, stumps and stones larger than two inches (2 In).
- C. Obtain topsoil from naturally well-drained areas where topsoil occurs at a minimum depth of four inches (4 In) and has similar characteristics to that found at placement site. Do not obtain topsoil from areas infected with growth of or reproductive parts of nut grass or other noxious weeds.

PART III: EXECUTION

3.1 EXAMINATION
- A. Excavate topsoil for esplanades and areas to receive grass or landscaping from areas to be further excavated. Stockpile in area approved by the Project Manager.
- B. Stockpile topsoil to depth not exceeding eight feet (8 Ft). Cover to protect

from erosion.

3.2 TOPSOIL EXCAVATION

A. Conform to excavation and stockpiling requirements of Section 02135 – Excavation for Roadway.

3.3 PLACEMENT

A. Place no topsoil until subgrade has been approved. For areas to be seeded or sodded, scarify or plow existing material to a minimum depth of four inches (4 In) or as indicated on the Drawings. Remove vegetation and foreign inorganic material. Place four inches (4 In) of topsoil on loosened material and roll lightly with appropriate lawn roller to consolidate topsoil.

B. Increase depth of topsoil to six inches (6 In) when placed over sand bedding and backfill materials specified in Section 02140 – Utility Backfill Materials.

C. For areas to receive shrubs or trees, excavate existing material and place topsoil to depth and dimensions shown on the Drawings.

D. Remove spilled topsoil from curbs, gutters and, paved areas and dispose of excess topsoil in accordance with requirements of Section 01580 – Waste Material Disposal.

E. Place topsoil to promote good drainage and compact with light roller. Water topsoil after placement until saturated for a minimum depth six inches (6 In), fill in and recompact areas of settlement.

3.4 PROTECTION

A. Protect topsoil from wind and water erosion until planting is completed.

PART IV: TABLES

4.1 TOPSOIL CHARACTERISTICS

TOPSOIL CHARSCTERISTICS	
CHARSCTERISTIC	**VALUE**
pH Value	Between 5.5 and 6.5
Liquid Limit	50 or Less
Plasticity Index	20 or Less
Gradation	Maximum of 10% passing No. 200 Sieve

END OF SECTION

SECTION 02915
SODDING

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Restoration of existing lawn areas disturbed by construction shall be by installation of new sod.
- B. Planting of sod within areas designated on the Drawings for purpose of surface stabilization, channel stabilization or vegetation buffer strips.
- C. Sod is defined as blocks, squares, strips of turfgrass and adhering soil used for vegetative planting. To be placed edge to edge for complete coverage.
- D. Lawn is defined as ground covered with fine textured grass kept neatly mowed.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for sodding is on a square yard basis.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.

1.4 REFERENCES
- A. CFTS – City of Friendswood Technical Specifications.
- B. Structural Pest Control Board of the State of Texas.

1.5 QUALITY ASSURANCE
- A. Sod only when weather and soil conditions are deemed by the Project Manager to be suitable for proper placement.
- B. Water and fertilize new sod.
- C. Guarantee sod to be growing thirty days (30 D) after substantial completion.
- D. Maintenance Period:
  1. Begin maintenance immediately after each section of grass sod is installed and continue for thirty day (30 D) period from date of substantial completion.
  2. Re-sod unacceptable areas.
  3. Water, fertilize, control disease and insect pests, mow, edge,

replace unacceptable materials and perform other procedures consistent with good horticultural practice to ensure normal, vigorous and healthy growth. Install disease control within guidelines set forth by Structural Pest Control Board of the State of Texas.

E. Notify the Project Manager ten days (10 D) before end of maintenance period for inspection.

PART II: PRODUCTS

2.1 SOD

A. Species: Bermuda (Cynodon Dactylon), Buffalo (Buchloe Dactyloides) or St. Augustine (Stenotaphrum Secundatum) Gulf Coast variety to match existing sod.

B. Contents: ninety-five percent (95%) permanent grass suitable to climate in which it is to be placed; not more than five percent (5%) weeds and undesirable grasses; good texture, free from obnoxious grasses, roots, stones and foreign materials.

C. Size: twelve inch (12 In) wide strips, uniformly two inches (2 In) thick with clean-cut edges.

D. Sod is to be supplied and maintained in healthy condition as evidenced by grass being normal green color.

2.2 FERTILIZER

A. Available nutrient percentage by weight: twelve percent (12%) nitrogen, four percent (4%) phosphoric acid and eight percent (8%) potash; or fifteen percent (15%) nitrogen, five percent (5%) phosphoric acid and ten percent (10%) potash.

2.3 WEED AND INSECT TREATMENT

A. Provide acceptable treatment to protect sod from weed and insect infestation. Submit treatment method to the Project Manager for approval. Install insect and disease control within guidelines set forth by Structural Pest Control Board of the State of Texas.

2.4 WATER

A. Potable, available on-site through the Contractor's water trucks. The Contractor may use the City of Friendswood hydrants when water use is measured and verified. Do not use private resident's water.

2.5 BANK SAND

A. Free of clay lumps, roots, grass, salt or other foreign material.

PART III: EXECUTION

3.1 PREPARATION

A. Verify that soil placement and compaction have been satisfactorily completed. Verify that soil is within allowable range of moisture content.
B. Top soil shall be free of weeds and foreign material immediately before sodding.
C. Do not start the Work until conditions are satisfactory. Do not start the Work during inclement or impending inclement weather.
D. Rake areas to be sodded smooth, free from unsightly variations, bumps, ridges or depressions.
E. Two inches (2 In) of top soil shall be placed for sodding preparation in conformance of Section 02905 – Topsoil over areas to be sodded prior to planting of sod.
F. Apply fertilizer at rate of twenty-five pounds (25 Lbs) per 1000 square feet. Apply after raking soil surface and not more than forty-eight hours (48 Hrs) prior to laying sod. Mix thoroughly into upper two inches (2 In) of soil. Lightly water to aid in dissipation of fertilizer.

3.2 APPLICATION

A. Full Sodding: Lay sod with closely fitted joints leaving no voids and with ends of sod strips staggered. Lay sod within twenty-four hours (24 Hrs) of harvesting.
B. On slopes two to one (2:1) and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at a maximum of two feet (2 Ft) on center. Drive pegs flush with soil portion of sod.
C. Prior to placing sod, on slopes three to one (3:1) or where indicated, place Hold/Gro or Roll Lite or equal over topsoil. Securely anchor in place with posts sunk firmly into ground at a maximum of sixteen feet (16 Ft) on center along pitch of slope and equal to width of wire mesh horizontally across slopes.
D. After sod is laid, irrigate thoroughly to secure six inch (6 In) minimum penetration into soil below sod.
E. Tamp and roll sod with approved equipment to eliminate minor irregularities and to form close contact with soil bed immediately after planting and watering. Submit type of tamping and rolling equipment to be used to the Project Manager for approval, prior to construction.

3.3 MAINTENANCE

A. Watering:
    1. Water lawn areas once a day with a minimum of one-half inch (1/2 In) of water for first three weeks (3 Wk) after area is sodded.
    2. After three week (3 Wk) period, water twice a week with three-quarters inch (3/4 In) of water each time unless comparable amount has been provided by rain.
    3. Make weekly inspections to determine moisture content of soil

unless soil is in frozen condition.

4. Water in afternoon or at night to enable soil to absorb a maximum amount of water with a minimum evaporation.

B. Mowing:
   1. Mow sod at intervals which shall keep grass height from exceeding three and one-half inches (3-1/2 In).
   2. Set mower blades at two and one-half inches (2-1/2 In).
   3. Do not remove more than one-half (1/2) of grass leaf surface.
   4. Mow sodded areas requiring mowing within one month (1 Mo) after installation with light-weight rotary type mower. Mow sod only when dry and not in saturated or soft condition.
   5. Remove grass clippings during or immediately after mowing.

C. Fertilizer and Pest Control:
   1. Evenly spread fertilizer composite at rate of forty pounds (40 Lbs) per five thousand square feet (5000 Sf) or as recommended by manufacturer. Do not place fertilizer until two weeks (2 Wks) after placement of sod.
   2. Restore bare or thin areas by topdressing with mix of fifty percent (50%) sharp sand and fifty percent (50%) sphagnum peat moss.
   3. Apply mixture one-quarter inch (1/4 In) to one-half inch (1/2 In) thick.
   4. Treat areas of heavy weed and insect infestation as recommended by treatment manufacturer.

D. Restrict all traffic from sodded areas until sod is established or for a minimum of ten days (10 D) during growing season. Use wood lath and plastic tape to cordon sodded areas. Maintain tape and lath throughout for a minimum of thirty days (30 D) during growing season.

3.4 CLEANUP

A. During course of planting, remove excess and waste materials; keep lawn areas clean and take precautions to avoid damage to existing structures, plants, grass and streets.

B. Remove barriers, signs and other the Contractor material and equipment from project site at termination of establishment period.

C. Dispose of unused materials and rubbish in accordance with Section 01580 – Waste Material Disposal.

END OF SECTION

SECTION 02915SP

SODDING

The following provisions modify Section 02915 – Sodding Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and replace with the following:

   "No separate payment shall be made for work performed under this Section. Include payment in unit cost for related work."

END OF SPECIAL PROVISION

SECTION 02925
LANDSCAPE IRRIGATION

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Pipe and fittings, valves, sprinkler heads and accessories.
- B. Control system.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. Payment for landscape irrigation shall be made under this Section on lump sum basis.
  2. Payment for capped irrigation sleeve, for connection to future system expansion, is on linear foot basis.
  3. Refer to Section 01270 – Measurement and Payment.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Materials.
  1. ASTM D2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  2. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure – Rated Pipe (SDR Series).
- B. CFTS – City of Friendswood Technical Specifications.

1.4 SYSTEM DESCRIPTION
- A. Electric solenoid controlled underground irrigation system.
- B. Source Power: one hundred volt (120 V).

1.5 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.

1.6 QUALIFICATIONS
- A. Manufacturer: Company specializing in performing work of this Section with a minimum three years (3 Yr) documented experience.

1.7 REGULATORY REQUIREMENTS
- A. Conform to applicable code for piping and component requirements.

1.8 PRE-INSTALLATION CONFERENCE
- A. Convene one week (1 Wk) prior to commencing work of this Section.

1.9 COORDINATION
- A. Coordinate work with site landscape grading and delivery of plant life.

1.10 EXTRA MATERIALS
- A. Furnish extra components under provisions of Section 00300 – Unit Price Form.
  1. Two (2) sprinkler heads of each type and size.
  2. Two (2) valve box keys.
  3. Two (2) wrenches for each type head core and for removing and installing each type head.

PART II: PRODUCTS

2.1 PIPE MATERIALS
- A. Pipe shall be continuously and permanently imprinted with manufacturer's name, size, schedules, type and working pressure.
- B. PVC Pipe ASTM D2241; Two hundred pound per square inch (200 psi) pressure rated upstream from controls, one hundred sixty pounds per square inch (160 psi) downstream; solvent welded sockets rubber gasket joints.
- C. Fittings: Type and style of connection to match pipe.
- D. Solvent Cement: ANSI/ASTM D2564 for PVC pipe and fittings.
- E. Sleeve material: Four inch (4 In) schedule 40 PVC.

2.2 OUTLETS
- A. Manufacturer's or approved equal:
  1. Rainbird Model 1804.
  2. Rainbird Model 1812.
  3. Hunter Model PGP.
- B. Rotary type sprinkler head: Pop-up type with screens; fully adjustable for flow and pressure; size as indicated; with letter or symbol designating degree of arc and arrow indicating center of spray pattern.
- C. Spray Type Sprinkler Head: Pop-up head with full circle, half circle, third circle, quarter circle and square pattern.

2.3 VALVES
- A. Manufacturer's or approved equal:
  1. Rainbird Model PEB Series.
- B. Gate Valves: Bronze construction, non-rising stem and sized to line.
- C. Backflow Preventers: FEBCO 765 Bronze body construction, reduced pressure zone or pressure vacuum breaker type.
- D. Valve Box and Cover: rectangular ten inches by four inches (10 In x 4 In) or nine inches (9 In) round.

2.4 CONTROLLER
- A. Manufacturer's or approved equal:
  1. Rainbird Model RC1260C.

B. Valves: Electric solenoid wiring including required fittings and accessories.
C. Wire conductors: Color coded.

PART III: EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of Section 01315 – Coordination and Meetings.
B. Verify location of existing utilities.
C. Verify that required utilities are available, in proper location and ready for use.

3.2 PREPARATION

A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover and structures.
B. Layout and stake locations of system components.
C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.3 TRENCHING

A. Trench and filling as required.
B. Trench size:
    1. Minimum cover over installed supply piping: Eighteen inches (18 In).
    2. Minimum cover over installed branch piping: Twelve inches (12 In).
    3. Minimum cover over installed outlet piping: Twelve inches (12 In).
C. Trench to accommodate grade changes.
D. Maintain trenches free of debris, material or obstructions that may damage pipe.
E. Do not leave trenches open overnight.

3.4 INSTALLATION

A. Install pipe, valves, controls and outlets in accordance with manufacturer's instructions.
B. Connect to utilities.
C. Set outlets and box covers at finish grade elevations.
D. Install control wiring as required. Provide ten inch (10 in) expansion coil at each valve to which controls are connected and at one hundred foot (100 Ft) intervals. Bury wire beside pipe. Mark valves with neoprene valve markers containing locking device. Set valve markers in one hundred pounds per square inch (160 psi) PVC pipe risers exiting from top of valve to finish grade.
E. After piping is installed, but before outlets are installed and filling commences, open valves and flush system with full head of water.

F. Coordinate pipe installation with conduit installation.

3.5 FIELD QUALITY CONTROL
A. Field inspection and testing shall be performed.
B. Prior to filling, test system for leakage for whole system to maintain one hundred pounds per square inch (100 psi) pressure for one hour (1 Hr).

3.6 FILLING
A. Cover with three inches (3 In) of sand over piping; fill trench and compact to subgrade elevation. Protect piping from displacement.

3.7 ADJUSTING
A. Adjust control system to achieve time cycles required.
B. Change and adjust head types for full water coverage as directed.

3.8 DEMONSTRATION
A. Demonstrate system under provisions of Section 01755 – Starting Systems.
B. Instruct City's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance material as basis for demonstration.

END OF SECTION

SECTION 02925SP

LANDSCAPE IRRIGATION

The following provisions modify Section 02925 – Landscape Irrigation Standard Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete paragraph 1.2.A.1 and 1.2.A.2, and replace with the following:

   "Payment shall be per property for each irrigation system removed and replaced due to conflict during construction to obtain an operational system, including replacement of sprinkler heads to match existing head type and manufacturer, valves and plugging and capping existing system to allow for continued use of system during construction."

END OF SPECIAL PROVISION

SECTION 03000
MORTAR

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Mortar and grout for masonry.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for mortar for facilities under this Section. Include payment in Lump Sum for building or structure with price breakdown included in Schedule of Values.
  2. No separate payment shall be made for mortar utilities under this Section. Include payment in unit price for the utility work.
  3. Refer to Section 01270 – Measurement and Payment and Section 01200 – Schedule of Values.
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ASTM – American Society for Testing and Material.
  1. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
  2. ASTM C143 – Standard Testing Method for Slump of Hydraulic Cement Concrete
  3. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.
  4. ASTM C150 – Standard Specification for Portland Cement.
  5. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes.
  6. ASTM C270 – Standard Specification for Mortar for Unit Masonry.
  7. ASTM C404 – Standard Specification for Aggregates for Masonry Grout.
  8. ASTM C476 – Standard Specification for Grout for Masonry.
  9. ASTM C780 – Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- B. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS
- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Include design mix, indicate Property Method used, required environmental conditions, and admixture limitations.
- C. Samples: Submit two (2) ribbons of each mortar color, illustrating color

and color range.

D. Submit test reports under provisions of Section 01450 – Contractor's Quality Control.
E. Submit test reports on mortar indicating conformance to ASTM C270.
F. Submit test reports on grout indicating conformance to ASTM C476.
G. Submit manufacturer's certificate under provisions of Section 01450 – Contractor's Quality Control, that products meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site and store and protect products under provisions of Section 01610 – Approved Products List.
B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperatures to a minimum fifty degrees Fahrenheit (50° F) prior to, during, and forty-eight hours (48 Hrs) after completion of masonry work.

1.7 MIX TESTS

A. Test mortar and grout in accordance with Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.
B. Testing of Mortar Mix: Test in accordance with ASTM C780. Test mortar mix for compressive strength, consistency, mortar aggregate ratio, water content, air content, and splitting tensile strength.
C. Testing of Grout Mix: Test in accordance with ASTM C109. Test grout mix for compressive strength and slump.

PART II: PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, white color.
B. Masonry Cement: Not permitted.
C. Mortar Aggregate: ASTM C144, standard masonry type. Grading and color suitable for type of masonry, one (1) source for entire project. [Not less than five percent (5%) shall pass No. 100 sieve].
D. Hydrated Lime: ASTM C207, Type S.
E. Grout Aggregate: ASTM C404.
F. Water: Clean and potable.

2.2 MORTAR COLOR

A. Mortar Color: Mineral oxide pigment; color; to be selected by the Project Manager from manufacturer's samples.

2.3 ADMIXTURES

A. Antifreeze: Antifreeze admixtures shall not be permitted.

B. Accelerator: Accelerator may be used only with approval of the Project Manager.

2.4 MORTAR

A. Mortar for Load Bearing Walls and Partitions: ASTM C270, Type S utilizing Property Method to achieve one thousand eight hundred pounds per square inch (1800 psi) strength.
B. Mortar for Non-load Bearing Walls and Partitions: ASTM C270, Type S utilizing the Property Method to achieve one thousand eight hundred pounds per square inch (1800 psi) strength.
C. Mortar for Masonry Below Grade or in Contact with Earth: ASTM C270, Type M utilizing the Property Method to achieve two thousand five hundred pounds per square inch (2500 psi) strength.
D. Pointing Mortar: ASTM C270, Type N, using the Property Method to achieve seven hundred fifty pounds per square inch (750 psi) strength.

2.5 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270 to achieve strengths noted in Paragraph 2.4.
B. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
C. Do not use anti-freeze compounds to lower freezing point of mortar.
D. If water is lost by evaporation, retemper only within two hours (2 Hrs) of mixing.
E. Use mortar within two hours (2 Hrs) after mixing at temperatures of eighty degrees Fahrenheit (80° F), or two and one-half hours (2-1/2 Hrs) at temperatures under fifty degrees Fahrenheit (50° F).

2.6 GROUT

A. Bond Beams, Lintels, and Other Areas to be Grouted Solid: Three thousand pounds per square inch (3000 psi) strength at twenty-eight days (28 D); seven inch (7 In) to eight inch (8 In) slump per ASTM C143; mixed in accordance with ASTM C476, Fine Grout.

2.7 GROUT MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476, Fine Grout.
B. Add admixtures in accordance with manufacturer's instructions. Provide uniformity of mix.
C. Do not use anti-freeze compounds to lower freezing point of grout.

PART III: EXECUTION

3.1 EXAMINATION

A. Request inspection of spaces to be grouted.

3.2 PREPARATION

A. Apply bonding agent to existing concrete surfaces.
B. Plug clean out holes with masonry units to prevent leakage of grout materials. Brace masonry for wet grout pressure.

3.3 INSTALLATION

A. Install mortar and grout in accordance with manufacturer's instructions.
B. Work grout into masonry cores and cavities to eliminate voids.
C. Do not displace reinforcement while placing grout.
D. Remove grout spaces of excess mortar.

END OF SECTION

SECTION 03005
GROUT

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Mix design requirements, testing, furnishing and production of grout for:
  1. Pressure grouting of jacked-pipe.
  2. Annular grouting of cased or uncased sewer pipe.
  3. Grouting voids in ground resulting from caving, loss of ground or settlement.
- B. Compaction grouting is not part of this specification.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment shall be made for the Work performed under this Section. Include cost of such the Work in contract unit prices for the Work of which it is component part.
  2. Refer to Section 01270 - Measurement and Payment for Unit Price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for the Work in this Section is included in Total Stipulated Price.

1.3 DEFINITIONS
- A. Pressure Grouting: Filling void behind liner or pipe with grout under pressure sufficient to ensure void is properly filled but without overstressing temporary or permanent ground support or causing ground heave to occur.
- B. Annular Grouting: Filling annular space between carrier pipe and casing or ground, by pumping.
- C. Ground Stabilization Grouting: Filling of voids, fissures or under-slab settlement due to caving or loss of ground by injecting grout under gravity or pressure to fill void.

1.4 REFERENCE STANDARDS
- A. ASTM – American Society for Testing and Materials.
  1. ASTM C138 Standard Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
  2. ASTM C144 Standard Specification for Aggregate for Masonry Mortar.
  3. ASTM C150 Standard Specification for Portland Cement.
  4. ASTM C494 Standard Specification for Chemical Admixture for Concrete.
  5. ASTM C869 Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.

6. ASTM C937 Standard Specification for Grout Fluidifier for Pre-placed Aggregate Concrete.
7. ASTM C942 Standard Test Method for Compressive Strength of Grout for Pre-placed Aggregate Concrete into Laboratory.
8. ASTM C1017 Standard Specification for Chemical Admixture for Use in Producing Flowing Concrete.

B. CFTS – City of Friendswood Technical Specifications.

1.5 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit description of materials, grout mix, equipment and operational procedures to accomplish each grouting operation. Description may include sketches as appropriate, indicating type and location of mixing equipment, pumps, injection points, venting method, flow lines, pressure measurement, volume measurement, grouting sequence, schedule and stage volumes. Tests and certifications shall have been performed within last twelve months (12 Mos) prior to date of submittal.

C. Submit grout mix design report, including:
1. Grout type and designation.
2. Grout mix constituents and proportions, including materials by weight and volume.
3. Grout densities and viscosities, including wet density at point of placement.
4. Initial set time of grout.
5. Bleeding, shrinkage/expansion.
6. Compressive strength.

D. For cellular grout, also submit the following:
1. Foam concentrate supplier's certification of dilution ratio for foam concentrate.
2. A description of proposed cellular grout production procedures.

E. Maintain and submit logs of grouting operations indicating pressure, density and volume for each grout placement.

PART II: PRODUCTS

2.1 MATERIALS

A. Grouting materials: Conform to Section 03300 – Structural Concrete, except as modified in the following paragraphs.

B. Grout Type Applications.
1. Grout for pressure grouting, backfill grouting and annular grouting: Sand-cement mortar mix.
2. Grout for annular grouting of sanitary sewer: Low density (cellular) grout, unless otherwise approved by the Project Manager.
3. Grout for filling space in manholes: Sand-cement mortar mix.
4. Ground stabilization: Sand-cement mortar mix.

C. Do not include toxic or poisonous substances in grout mix or otherwise inject such substances underground.

2.2 GROUT

A. Develop one (1) or more mixes based on following criteria as applicable:
   1. Size of annular void between sewer pipe and casing or size of void between casing and surrounding soil.
   2. Absence or presence of groundwater.
   3. Adequate retardation.
   4. Non-shrink characteristics.
   5. Pumping distances.

B. Prepare mixes that satisfy required application. Provide materials conforming to the following standards:
   1. Cement: ASTM C150.
   2. Water: Potable.
   3. Foam: ASTM C869.
   4. Slurry: ASTM C138.
   5. Cellular Grout: ASTM C138.
   6. Sand for sand-cement mortar mix: ASTM C144.

C. Provide grout meeting the following minimum requirements:
   1. Minimum twenty-eight day (28 D) unconfined compressive strength: one thousand five hundred pounds per square inch (1500 psi) for water lines, one thousand pounds per square inch (1000 psi) for other carrier pipes for mortar grout and three hundred pounds per square inch (300 psi) for cellular grout.
   2. Determine strength by ASTM C942.
   3. Maximum allowable density: Less than one hundred thirty pounds per cubic foot (130 pcf).

D. Fluidifier: Provide fluidifier, meeting ASTM C937 that holds solid constituents of grout in colloidal suspension and is compatible with cement and water used in grouting operations.

E. Admixtures.
   1. Use admixtures meeting ASTM C494 and ASTM C1017 as required, to improve pump ability, control time of set, hold sand in suspension and reduce segregation and bleeding.
   2. For cellular grout, do not use foam or admixtures that promote steel corrosion.
   3. Ensure that admixtures used in mix are compatible. Provide written confirmation from admixture manufacturers of their compatibility.

PART III: EXECUTION

3.1 PREPARATION

A. Notify the Project Manager at least twenty-four hours (24 Hrs) in advance of grouting operations.

B. Select and operate grouting equipment to avoid damage to new or existing underground utilities and structures.
C. In selection of grouting placement consider pipe flotation, length of pipe, length of tunnel, depth from surface and type of sewer pipe, type of pipe blocking and bulkheading, grout volume and length of pipe to be grouted between bulkheads.
D. Operate dewatering systems until grouting operations are complete and grout has reached initial set.

3.2 EQUIPMENT
A. Batch and mix grout in equipment of sufficient size and capacity to provide necessary quality and quantity of grout for each placement stage.
B. Use equipment for grouting of type and size generally used for the Work, capable of mixing grout to homogeneous consistency and providing means of accurately measuring grout component quantities and accurately measuring pumping pressures. Use pressure grout equipment which delivers grout to injection point at steady pressure.

3.3 ANNULAR GROUTING FOR SEWER/WATER LINE IN CASED OR UNCASED AUGERS
A. Fill annular space between sewer pipe and casing or ground, with grout.
B. Placement:
1. Placement Limits: Predetermine limits of each grout placement stage by size and capacity of batching equipment and initial set time of proposed grout. Under no circumstances shall placement continue at grout port longer than that period of time for mix to take initial set. Locate grout hole spacing and locations according to number of stages necessary to grout tunnel liners. Stage or lift cannot be installed on another lift until proper set has been attained and placement procedures approved by admixture or additive manufacturer.
2. Limit pressure on annular space to prevent damage or distortion to pipe. Define limiting and estimated required pressure range. Provide an open ended, high point tap or equivalent vent and monitor it at bulkhead opposite to point of grouting.
3. Pump grout until material discharging is similar in consistency to that at point of injection.
C. Remove temporary bulkheads installed for grouting.
D. Batch and mix cellular grout mechanically to ensure consistency of mix. Wet solids thoroughly before introduction of foaming agent. Operate batching system to maintain slurry weight within three percent (3%) of design density. Introduce foam into slurry in accordance with manufacturer's recommendations.

3.4 PRESSURE GROUTING FOR JACKED PIPE
A. For jacked pipe sixty inches (60 In) in diameter or greater, pressure grout annulus after installation, displacing bentonite lubrication. Jacked pipes

less than sixty inch (60 In) diameter may be left ungrouted unless excavated diameter exceeds external pipe diameter by more than one inch (1 In).

B. Inject grout through grout holes in sewer pipe. Drilling holes from surface or through carrier pipe walls is not allowed. Perform grouting by injecting it at pipe invert with bentonite displacement occurring through high point tap or vent.

C. Control ground water as necessary to permit completion of grouting without separation of grout materials.

D. Limit pressures to prevent damage or distortion to pipe or to keep flexible pipe within acceptable tolerances.

E. Pump grout until material discharging is similar in consistency to that at point of injection.

3.5 GROUND STABILIZATION GROUTING

A. Completely fill voids outside limits of excavation caused by caving or collapse of ground. Fill with gravity or pressure injected sand-cement grout as necessary to fill void.

B. Take care in grouting operations to prevent damage to adjacent utilities or public or private property. Grout at pressure that shall not distort or imperil portion of the Work or existing installations or structures.

C. Verify that void has been filled by volumetric comparisons and visual inspection. In case of settlement under existing slabs, take cores as directed by the Project Manager, at no additional cost to the City, to demonstrate that void has been filled.

3.6 FIELD QUALITY CONTROL

A. Annular Grouting for Sewer Line in Cased or Uncased Augers.

1. Make one (1) set of four (4) compressive test specimens for every two hundred feet (200 Ft) of sewer pipe installed in primary lined tunnel.
2. For cased or uncased augers, make one (1) set of four (4) compressive test specimens for each grouting operation or for each one hundred feet (100 Ft) of pipe installed, whichever is more frequent.
3. For cellular grout, check slurry density both at point of batching and placement at least twice each hour in accordance with ASTM C138. Record density, time and temperature. Density must be within three percent (3%) of design density at point of batching and five percent (5%) of design density at point of placement.

B. Pressure Grouting for Jacked Pipe. Make one (1) set of four (4) compressive test specimens for every four hundred feet (400 Ft) of jacked pipe pressure grouting.

C. Ground Stabilization Grouting. Make one (1) set of four (4) compressive test specimens for every location where ground stabilization grouting is performed.

D. All testing to be done in conformance with Section 01470 – Testing Laboratory Services and Section 01475 – Quality Control Testing Procedures.

END OF SECTION

SECTION 03010
REINFORCING STEEL

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. Furnishing, fabrication and installation of all reinforcing bar, and for placement in concrete.
- B. Requirements for placing, tying and supporting reinforcing steel in concrete.

1.2 MEASUREMENT AND PAYMENT
- A. UNIT PRICES:
  1. No separate payment shall be made for reinforcing steel used as part of a new cast-in-place structure or concrete paving. Include cost for labor, materials and equipment in the cost of the bid item for the structure or paving.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. ACI – American Concrete Institute.
  1. ACI 3 1813 18R – Building Code Requirements for Reinforced Concrete and Commentary.
  2. ACI SP-66 – Detailing Manual.
- B. AWS – American Welding Society.
  1. AWS – D1.4 – Structural Welding Code -Reinforcing Steel.
- C. ASTM – American Society for Testing and Materials.
  1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  2. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement.
  3. ASTM A497 – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete Reinforcement.
  4. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  5. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
  6. ASTM A767 – Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
  7. ASTM A775 – Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

D. CFTS – City of Friendswood Technical Specifications.
E. CRSI – Concrete Reinforcing Steel Institute.
   1. Placing Reinforcing Bars.
   2. Manual of Standard Practice.
F. ICBO – International Conference of Building Officials.
   1. ICBO Research Report.
G. WRI – Wire Reinforcement Institute.
   1. Manual of Standard Practice, Welded Wire Reinforcement.

1.4 SUBMITTALS
A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Action Submittals:
   1. Shop Drawings prepared in accordance with CRSI Manual of Standard Practice and ACI SP-66 Detailing Manual:
      a. Bending lists.
      b. Placing drawings.
C. Informational Submittals:
   1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
   2. Mechanical Threaded Connections:
      a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
      b. Manufacturer's instructions.
      c. Verification that device threads have been tested and meet requirements for thread quality, in accordance with manufacturers published methods.
D. Welding Qualification: Prior to welding, submit welder qualifications and nondestructive testing procedures.
E. Test results of field testing.
F. Shop drawings shall show all bars, sizes, dimensions, spacings, clearances, and placement patterns.

1.5 QUALITY ASSURANCE
A. Provide manufacturer's affidavits that steel was manufactured in compliance with standards referenced in this Section.
B. Provide manufacturer's affidavits that steel is American made and not imported.
C. Welder Qualifications: Certified in accordance with AWS D1.4.
D. Independent Testing Laboratory, contracted by the City, shall inspect all items that are welded and shall report results to the Project Manager.

1.6 DELIVERY, STORAGE, AND HANDLING
A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."

B. Reinforcing steel shall not remain on the ground for any length of time.

PART II: PRODUCTS

2.1 MATERIALS

A. Deformed Billet-Steel Reinforcing Bars:
   1. Includes stirrups, ties, and spirals.
   2. ASTM A615, Grade 60, where welding is not required.
   3. ASTM A706/A706M, Grade 60, for reinforcing to be welded.
   4. ASTM A767/767M, Grade 60, for galvanized bars.

B. Mechanical Splices and Connections:
   1. Metal Sleeve Splice: Furnish with cast filler metal, capable of developing, in tension or compression, one hundred twenty-five percent (125%) of minimum tensile strength of bar. Manufacturer and Product:
      a. Erico Products, Inc., Cleveland, OH, Cadweld T-Series.
   2. Mechanical Threaded Connections: Furnish metal coupling sleeve with internal threads engaging threaded ends of bars developing in tension or compression one hundred twenty-five percent (125%) of yield strength of bar. Manufacturers and Products:
      a. Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
      b. Richmond Screw Anchor Co., Inc., Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.

C. Welded Wire Reinforcement:
   1. ASTM A185 or A497 and ACT 31 8/318R, using ASTM A82 wire of seventy-five kilo-pounds per square inch (75 ksi) minimum tensile strength.
   2. Furnish flat sheets only; rolled sheets shall not be permitted.

2.2 ACCESSORIES

A. Tie Wire:
   1. Black, soft-annealed sixteen (16) gauge wire.
   2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:
   1. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers meeting requirements of CRSI Manual of Standard Practice. Other types of supports or spacers shall not be permitted.
   2. In concrete exposed to view after form removal: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them, or all-plastic bar supports and side form spacers.
   3. Precast concrete supports of same strength as concrete for reinforcing in concrete placed on grade.

4. Plastic Bar Supports: As manufactured by Aztec Concrete Accessories, Bloomington, CA.

2.3 FABRICATION
A. Follow CRSI Manual of Standard Practice.
B. Bend bars cold.

PART III: EXECUTION

3.1 PREPARATION
A. Notify the Project Manager when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
B. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.
C. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

3.2 REINFORCING BAR INSTALLATION
A. Bundle or space bars, instead of field bending, where construction access through reinforcing is necessary.
B. Spacing and Positioning: Conform to ACI 381/318R. There shall be a minimum of one inch (1 In) spacing between end of reinforcing bars and the face of the form.
C. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars".
D. Splicing:
1. Follow ACI 318/1318R.
2. Use lap splices of not less than eighteen inches (18 In), unless otherwise shown on the Drawings or unless other methods are permitted in writing by the Project Manager.
3. Stagger splices in adjacent bars where indicated.
E. Mechanical Splices and Connections:
1. Use only in areas specifically approved in writing by the Project Manager.
2. Install threaded rods as recommended by manufacturer with threads totally engaged into coupling sleeve and in accordance with ICBO Research Report.
3. For metal sleeve splice, follow manufacturer's installation recommendations.
4. Maintain a minimum edge distance and concrete cover.

F. Tying Reinforcing Bars:
1. Tie every other intersection on mats.
2. All edges shall be one hundred percent (100%) tied.
3. No two (2) consecutive reinforcing bars in either direction shall

be untied.

4. Bend ties wire away from concrete surface to provide clearance of one inch (1 In) from surface of concrete to tie wire.

G. Reinforcing Steel Mat Supports.

1. Reinforcing Steel Mat supports shall be either plastic, metal with plastic tips, or concrete brick only.
2. Supports shall be of the size and height needed to maintain position of reinforcing steel in the concrete.
3. Supports shall be installed underneath the crossing bar closest to the subgrade (bottom).
4. Supports shall be placed in a checkerboard fashion similar to that for tying of the reinforcing steel.

G. Reinforcement Around Openings: On each side and above and below pipe or opening, place an equivalent length and area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.

H. Straightening and Re-bending: Field re-bending of reinforcing steel bars is not permitted.

I. Unless permitted by the Project Manager, do not cut reinforcing bars in the field.

3.3 WELDED WIRE REINFORCEMENT INSTALLATION

A. Use only where specifically shown.

B. Extend reinforcement to within two inches (2 In) of edges of slab, and lap splices at least eighteen inches (18 In).

C. Tie laps and splices securely at ends with tie wire, and at least every twenty-four inches (24 In).

D. Place welded wire reinforcement on concrete blocks and rigidly support equal to that provided for reinforcing bars. Do not use broken concrete, brick, or stone.

E. Follow ACI 318/1318R and current Manual of Standard Practice, Welded Wire Reinforcement.

F. Do not use rolled fabric or flat mats that have been rolled. Install flat sheets only.

3.4 TESTS AND INSPECTION

A. An independent testing agency shall be retained by the City to visually inspect and test reinforcing steel welds in accordance with AWS D1.4.

B. An independent testing agency shall be retained by the City to inspect each mechanical splice and verify each component is installed in accordance with manufacturer's instructions and ICBO Research Report.

C. Special inspection shall be provided by the City as indicated on the Drawings.

END OF SECTION

SECTION 03015
STRUCTURAL CONCRETE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements for materials, proportioning, batching, mixing, delivery, and testing of Portland Cement Concrete to be used for concrete paving, concrete structures, and all other types of concrete construction.

B. Requirements for furnishing, erecting and removing form work, constructing expansion, construction, and control joints.

C. Requirements for placing, curing, protecting and finishing of concrete.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. No payment will be made for concrete for utility construction under this Section. Include cost in applicable utility structure.
2. Obtain services of and pay for certified testing laboratory to prepare design mixes.
3. Refer to Section 01270 – Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum):

1. If Contract is Stipulated Price Contract, payment for work in this Section shall be included in Total Stipulated Price.

1.3 REFERENCES

A. ACI – American Concrete Institute.

1. ACI 117 – Standard Tolerances for Concrete Construction and Materials.
2. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
3. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
4. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.
5. ACI 308 – Standard Practice for Curing Concrete.
6. ACI 309R – Guide for Consolidation of Concrete.
7. ACI 311 – Guide for Concrete Plant Inspection and Field Testing of Ready-Mix Concrete.
8. ACI 315 – Details and Detailing of Concrete Reinforcement.
9. ACI 318 – Building Code Requirements for Reinforced Concrete and Commentary.
10. ACI 544 – Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete.

B. ASTM – American Standards and Testing of Materials.

1. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

2. ASTM A185 – Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM A767 – Standard Specifications for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
5. ASTM A775 – Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
6. ASTM A820 – Standard Specification for Steel Fibers for Fiber-Reinforced Concrete.
7. ASTM A884 – Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
8. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
9. ASTM C33 – Standard Specification for Concrete Aggregates.
10. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
11. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
12. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
13. ASTM C138 – Standard Test Method for Unit Weight Yield and Air Content (Gravimetric) of Concrete.
14. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
15. ASTM C150 – Standard Specification for Portland Cement.
16. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
17. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.
18. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
19. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
20. ASTM C309 – Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.
21. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
22. ASTM C595 – Standard Specification for Blended Hydraulic Cements.
23. ASTM C685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
24. ASTM C618 – Standard Specification for Coal Fly Ash or Calcined Natural Pozzolan for Use in Concrete.
25. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
26. ASTM C1077 – Standard Practice for Laboratory Testing of Concrete and Concrete Aggregate for Use in Construction and

Criteria for Laboratory Evaluation.

C. CFTS – City of Friendswood Technical Specifications.
D. CRSI – Concrete Reinforcing Steel Institute.
   1. CRSI MSP-1 – Manual of Standard Practice.
   2. CRSI – Placing Reinforcing Bars.
E. Federal Specifications.
   1. Federal Specification SS-S-210A – Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.
F. NRMCA – National Ready Mix Concrete Association
   1. Concrete Plant Standards.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit proposed mix design and test data prepared by a certified testing laboratory for each type and strength of concrete in Work.
C. Submit laboratory reports prepared by independent testing laboratory stating that all material used in concrete mix design comply with requirements in this Section.
D. Submit manufacturer's mill certificates for reinforcing steel. Provide specimens for testing when required by Project Manager.
E. Submit certification from concrete supplier that all materials and equipment used to produce and deliver concrete comply with this Technical Specification.
F. When required on The Drawings, submit shop drawings showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details, and other pertinent information.

1.5 CONCRETE CLASSIFICATION AND USE

A. Classifications of concrete are for specific use and material only. Compressive Strengths shall vary depending on Designs, Details and Individual Technical Specifications, but at a minimum shall meet the minimum requirements as Specified in TABLE 4.1 – CONCRETE CLASSIFICATION MINIMUM REQUIREMENTS.
B. Class of concrete shall be identified as follows:
   1. Class A Concrete – Paving, drilled shafts, non-structural culverts, inlets, manholes, curb, curb and gutter, sidewalk, driveway, wheelchair ramp, pilot channel and slope paving.
   2. Class B Concrete – Paving, structural culverts, wingwall, headwall and bridge structures.
   3. Class C Concrete – Small signs, anchors, and pipe blocking.
   4. Class D Concrete – Seal slab.
   5. Class E Concrete – Prestressed concrete beams, boxes and traffic barriers.
   6. Class F – “High Early Strength” concrete for traffic surfaces only and only with approval of Director of Engineering.

1.6 HANDLING AND STORAGE

A. Cement: Store cement off of ground in well-ventilated, weatherproof building to prevent deterioration or exposure to moisture. Different brands of cement or same brand from different sources shall not be used on the same project unless approved by the Director of Engineering.

B. Aggregates: All aggregates shall be transported and stockpiled separately according to their sources and gradations. Aggregates shall be handled in accordance with ACI requirements to prevent segregation and loss of fines or contamination with foreign materials.
   1. If aggregates show segregation or the different grades become mixed, aggregates shall be re-screened before placing in the proportioning bins.
   2. Aggregates from different sources or different gradations shall be segregated to prevent intermixing. Mixing of aggregates in stockpiles shall not be permitted.
   3. No aggregate shall be transferred to proportioning bins when the moisture content of the aggregate is such that it will affect the accuracy of proportioning. Such aggregates shall be removed and stockpiled until a dry surface condition is obtained.

PART II: PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland cement concrete shall be composed of Portland cement fine aggregate, coarse aggregate, water and admixtures as approved by the Project Manager and shall be proportioned and mixed as specified in this Section.

B. Cementitious Material:
   1. Portland Cement: ASTM C150, Type I/II, unless use of Type III is authorized by Project Manager; or ASTM C595, Type IP. For concrete in contact with sewage use Type II cement.
   2. When aggregates are potentially reactive with alkalis in cement, use cement not exceeding four pounds per cubic yard (4 Lbs/Cy) alkali content in form of $Na_2O + 0.658K_20$.

C. Water: Clean, free from harmful amounts of oils, acids, alkalis, organic or other deleterious substances, and meeting requirements of ASTM C94. Water from municipal supplies approved by State agencies will not require testing, but water from other sources shall be tested before use in concrete.
   1. Tests shall be made in accordance with AASHTO T26. One gallon (1 Gal) shall be taken to qualified testing laboratory for testing.
   2. Water used in white Portland cement concrete shall be free from iron and other impurities which may cause staining or discoloration.

D. Aggregate:
   1. Coarse Aggregate: ASTM C33. Unless otherwise indicated, use following ASTM standard sizes: No. 357 or No. 467; No. 57 or

No. 67, No. 7. Maximum size: Not larger than one-fifth (1/5) of narrowest dimension between sides of forms, nor larger than three-quarters (3/4) of minimum clear spacing between reinforcing bars. Coarse aggregates shall meet the requirements as specified in TABLE 4.2 – COARSE AGGREGATE GRADATION in this Section.

a. Coarse aggregate material shall be made of either durable crushed or uncrushed gravel, crushed stone having uniform quality throughout. All coarse aggregate material shall have a wear of not more than forty percent (40%).
b. Deleterious substance shall have a maximum permissible percentage by weight as specified in TABLE 4.3 – DELETERIOUS SUBSTANCES in this Section. Aggregate to be free from excess of salt, alkali, vegetable matter or other objectionable material either free or as adherent coating.

2. Fine Aggregate: ASTM C33. Fine aggregates shall meet the requirements as specified in TABLE 4.4 – FINE AGGREGATE GRADATION in this Section. Fine aggregates shall be sand or combination of sand and not more than fifty percent (50%) stone screenings.
   a. Sand shall be clean, hard, durable and uncoated grains.
   b. Stone screenings shall be clean, hard, durable and uncoated fragments resulting from crushing of stone.
3. Determine potential reactivity of fine and coarse aggregate in accordance with Appendix to ASTM C33.
4. Mineral filler – The addition of stone dust and/or sand as filler in Portland Cement Concrete paving may be used when approved by the Project Manager. Stone dust and sand shall be of acceptable quality and cleanliness as a mineral filler to improve workability and plasticity of the concrete mixture, in amounts not to exceed fifteen percent (15%) of the weight of fine aggregate. When tested with standard laboratory sieves, the mineral filler shall meet the requirements as specified in TABLE 4.5 – MINERAL FILLERS in this Section. Fly Ash shall not be used as a filler unless approved by the Director of Engineering. If approval has been granted for use of Fly Ash, then fly ash shall conform to ASTM C618.

E. Air Entraining Admixtures: An air entraining agent shall be required and shall conform to ASTM C260. Air entrainment shall be four percent (4%) plus or minus one percent (±1%) for all concrete classes and verified for conformity in the field by a certified testing laboratory. Concrete with air entrainment quantity of five percent and one-half (5.5%) to seven percent (7.0%) may be accepted on condition of passing twenty-eight day (28 D) compressive strength tests and approval of the Project Manager. Concrete with air entrainment quantity greater than seven percent (7%)

or less than two percent (2%) shall be rejected. Air content shall be determined by ASTM C138 or ASTM C173. No air entrainment shall be required for seal slabs.

F. Chemical Admixtures:
   1. Water Reducers: ASTM C494, Type A.
   2. Water Reducing Retarders: ASTM C494, Type D.
   3. High Range Water Reducers (Superplasticizers): ASTM C494, Types F and G.

G. Prohibited Admixtures: No admixtures containing calcium chloride, thiocyanate, or materials that contribute free chloride ions in excess of one tenth of a percent (0.1%) by weight of cement shall be used in concrete mixes.

H. Fiber:
   1. Fibrillated Polypropylene Fiber:
      a. Addition Rate: One and one-half pounds (1-1/2 Lbs) of fiber per cubic yard of concrete.
      b. Physical Properties:
         (1) Material: Polypropylene.
         (2) Length: One-half inch (1/2 In) or greater.
         (3) Specific Gravity: 0.91.
      c. Acceptable Manufacturer: W. R. Grace Company, Fibermesh, or approved equal.
   2. Steel Fiber: Comply with applicable provisions of ACI 544 and ASTM A820.
      a. Ratio: Fifty pounds (50 Lbs) to two hundred pounds (200 Lbs) of fiber per cubic yard of concrete.
      b. Physical Properties.
         (1) Material: Steel.
         (2) Aspect Ratio [for fiber lengths of one-half inch (1/2 In) to two and one-half inch (2-1/2 In), length divided by diameter or equivalent diameter]: Thirty to One (30:1) – one hundred to one (100:1).
         (3) Specific Gravity: 7.8.
         (4) Tensile Strength: Forty kilo-pounds per square inch (40 ksi) – four hundred kilo-pounds per square inch (400 ksi).
         (5) Young's Modulus: Twenty-nine thousand kilo-pounds per square inch (29,000 ksi).
         (6) Minimum Average Tensile Strength: Fifty thousand kilo-pounds per square inch (50,000 psi).
         (7) Bending Requirements: Withstand bending around one eighth inch (0.125 In) diameter mandrel to angle of ninety degrees Fahrenheit (90° F), at temperatures not less than sixty degrees Fahrenheit (60° F), without breaking.

I. Curing Compounds: Type 2 white-pigmented liquid membrane-forming compounds conforming to ASTM C309.

2.2 PRODUCTION METHODS

A. Use either ready-mixed concrete from a source approved by the Director of Engineering conforming to requirements of ASTM C94, or concrete produced by volumetric batching and continuous mixing in accordance with ASTM C685.

2.3 MEASUREMENT OF MATERIALS

A. Measure dry materials by weight, except volumetric proportioning may be used when concrete is batched and mixed in accordance with ASTM C685.
B. Measure water and liquid admixtures by volume.

2.4 DESIGN MIX

A. Use design mixes prepared by certified testing laboratory in accordance with ASTM C1077 and conforming to requirements of this Section. Design shall be based on the required over-design factor according to ASTM C94 and assuming a coefficient of variation equal to fifteen (15). The average of three (3) consecutive strength tests shall be equal to or greater than the specified strength. Classification shall meet the requirements as specified in TABLE 4.1 – CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS in this Section.
B. Proportion of concrete materials shall be based on ACI 211.1 to comply with durability and strength requirements of ACI 318, Chapters 4 and 5, and this Specification. Submit concrete mix designs to Project Manager for review and approval.
C. Variations in proportions of concrete may be based on field experience or trial mixtures, in accordance with requirements at Section 5.3 of ACI 318, may be made, but only when approved by Project Manager.
D. Proportioning of Portland Cement and water shall meet the requirements as specified in TABLE 4.1 – CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS in this Section.
E. Add steel or polypropylene fibers only when called for on The Drawings or in another Section of these Technical Specifications.
F. Determine air content in accordance with ASTM C138, ASTM C173 or ASTM C231.
G. Once a design mix for any class of concrete has been approved by the Project Manager, the mix shall not be varied as to source, quantity, quality, grading of materials, proportioning of any other way except as allowed for moisture adjustment and tolerances as specified in ASTM C685.

PART III: EXECUTION

3.1 BATCHING AND MIXING

A. Measure, batch, mix, and deliver ready-mixed concrete in accordance with ASTM C94, Sections 8 through 11. Produce ready-mixed concrete using automatic batching system as described in NRMCA Concrete Plant

Standards, Part 2 – Plant Control Systems.

B. Measure, mix and deliver concrete produced by volumetric batching and continuous mixing in accordance with ASTM C685, Sections 6 though 8.

C. Maintain concrete workability without segregation of material and excessive bleeding. Obtain approval of Project Manager before adjustment and change of mix proportions.

D. Ready-mixed concrete delivered to site shall be accompanied by batch tickets providing information required by ASTM C94, Section 16. Concrete produced by continuous mixing shall be accompanied by batch tickets providing information required by ASTM C685, Section 14. Water withheld from the mix shall also be noted on the batch ticket. In addition to the referenced information, each batch ticket shall also include the design mix information so that the batch can be compared on site to the mix design.

E. Clean, maintain and operate equipment so that it thoroughly mixes material as required.

F. Moisture Control:
   1. At the time of batching, all aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing.
   2. In no event shall the free moisture content of the fine aggregate at the time of batching exceed eight percent (8%) of its saturated, surface-dry weight. The batch-to-batch uniformity of all aggregates shall be such that variations in moisture content within one hour (1 Hr) do not exceed twelve pounds (12 Lbs) in the batch quantity for one cubic yard (1 Cy) of concrete, or that a gradual change does not exceed twenty-four pounds (24 Lbs) in a period of four hours (4 Hrs).
   3. The Contractor shall install, and maintain in operating condition, an electrically actuated moisture meter which will indicate on a readily visible scale the percentage of moisture in the fine aggregate as it is batched, within a sensitivity of one-half percent (1/2%) by weight of the fine aggregate.

G. Scales
   1. Scales shall be used for the accurate measurement of each of the materials entering each batch of concrete.
   2. If scales are of the dial type, the dial shall be of such size and so arranged that it may be read easily from the operating platform.
   3. If scales are of the multiple beam type, the scales shall be provided with an indicator operated by the main beam which will give positive visible evidence of over or underweight. The indicator shall be so designed that it will operate during the addition of the last two hundred pounds (200 Lbs) of material of any weighing. The over-travel of the indicator hand shall be at least one-third (1/3) of the loading travel. Indicators shall be

enclosed to protect against moisture and dust.

4. Scales shall be tested by a commercial scale company and certified that the scales meet all requirement for weighing equipment. Certification shall be required whenever a scale is relocated, and at least once every six months (6 Mos). Copies of the certifications shall be provided to the Project Manager when requested.

H. Recorders

1. An accurate recorder shall be provided for producing a digital printout of the batch number and scale readings corresponding to each of the ingredients of each concrete batch, including zero (0) initial readings. The individual ingredients shall be indicated by name or code corresponding to each weight.
2. Each printout shall indicate date and time of batching, identification number identical to that of the concrete delivery ticket and codes for the mix design and of the Work.
3. The printout shall be prepared in duplicate, with one (1) copy delivered together with its corresponding concrete delivery ticket to the Project Manager, as specified herein before.
4. Each recorder mechanism shall be enclosed in a locked, dust tight cabinet and shall be placed in a position convenient for observation.

3.2 DELIVERY AND DELIVERY EQUIPMENT

A. Hand-mixed concrete shall be made in batches not larger than one-third cubic yard (1/3 Cy) and only with approval of the Project Manager. Concrete shall be Sakrete or approved equal, no separate proportioning of materials outside of a batch plant will be allowed. Batching shall be in accordance with manufactures directions and stated measurements.

1. Mixing of concrete shall be in a clean, water tight mixing box.
2. Introduce measured amount of clean water.
3. Mix water and cement a minimum of six (6) turns or until batch maintains uniform color and consistency.
4. At no time shall bags of Sakrete be put in place, sliced open and water added in a ditch or hole.

B. Pumping and pneumatic conveying equipment shall be of a suitable kind with adequate pumping capacity. Equipment shall be cleaned at the end of each operation. Pneumatic placement shall be controlled so that segregation does not occur in the discharged concrete. Concrete shall not be conveyed through any pipe made of aluminum or aluminum alloy.

C. Transit mix trucks shall be in good working order. All trucks shall have the following operational, delivery and placing conditions and equipment:

1. Actuated drum revolution counter shall be in good working order.
   a. Batch shall be mixed at the plant between fifty (50) and seventy (70) revolutions before being transported to site.
   b. At no time shall a batch be placed when mixed less than seventy (70) revolutions or more than 100 revolutions,

except as noted in 3.2.C.1.c.

c. Batch shall be mixed for a minimum of twenty-five (25) revolutions after additional water has been introduced into the mix on site. This procedure shall be repeated for each instance when water is added.

2. Water supply reserve tank shall be supplied on each truck.
   a. Water tank shall be full on arrival at site.
   b. Water tank shall have accurate scale to measure gallons of water to be introduced to truck mixer.
   c. Project Manager shall verify the amount of water used on site for mixing and verify the recording on the trip ticket.
3. Drum mixer shall be watertight and shall be free of hardened concrete and shall have fins that are capable of thoroughly mixing concrete.
4. Any defective equipment that cannot meet the Specifications of 3.2.C shall not be allowed on site until the deficiencies have been corrected.

3.3 PLACING CONCRETE

A. Give sufficient advance notice to the Project Manager [at least forty-eight hours (48 Hrs) prior to commencement of operations] to permit inspection of forms, reinforcing steel, embedded items and other preparations for placing concrete. Place no concrete prior to the Project Manager's approval.

B. Schedule concrete placing to permit completion of finishing operations in daylight hours. However, when necessary to continue after daylight hours, site shall be illuminated completely as required. When rainfall occurs after placing operations are started, provide covering to protect work.

C. Subgrade surface shall be sprinkled sufficiently with water to prevent absorption of water from freshly placed concrete.

D. Forms and rebar shall be cleaned of all foreign materials; subgrade shall be free of all trash and other materials.

E. Batches that do not have computer batch tickets or delivery tickets shall be refused. Once a truck has been refused for any reason it shall leave the site. Attempts to fix deficiencies on site shall not be allowed.

F. Temperature specifications for placement of concrete shall be as follows and as specified in TABLE 4.6 – TEMPERATURE REQUIREMENTS FOR PLACEMENT in this Section:
   1. Ambient (Air) temperature shall be taken in the shade and shielded from direct sunlight and wind.
   2. Minimum ambient temperature for concrete placement shall be thirty-five degrees Fahrenheit (35° F) and rising. At no time shall concrete be placed when ambient temperature is below forty degrees Fahrenheit (40° F) and falling.
   3. Maximum ambient temperature shall be ninety degrees

Fahrenheit (90° F). Addition of ice to concrete mix shall allow ambient temperature maximum to be one hundred degrees Fahrenheit (100° F), upon approval of the Project Manager.

4. Minimum concrete temperature shall be fifty degrees Fahrenheit (50° F).
5. Maximum concrete temperature shall be ninety degrees Fahrenheit (90° F). Addition of ice shall permit the maximum temperature to be ninety-five degrees Fahrenheit (95° F). At no time shall any concrete be placed when concrete temperature exceeds ninety-five degrees Fahrenheit (95° F).

G. When adverse weather conditions affect quality of concrete, postpone concrete placement. Protect placed concrete from temperatures below thirty-two degrees Fahrenheit (32° F) until concrete has cured for minimum of three days (3 D) at seventy degrees Fahrenheit (70° F) or five days (5 D) at fifty degrees Fahrenheit (50° F).

H. Time constraints – Concrete shall be placed so that there is no more than one hour (1 Hr) of time elapsed from last discharge to next discharge. Addition of allowable dosage of water retardation agent shall extend time limit by one-half hour (1/2 Hr). Limit on time from batch to placement shall be as specified in TABLE 4.7 – TRANSPORTING TIME REQUIREMENTS in this Section.

I. If no water has been withheld from the mix at the plant, then addition of water to mix on site shall not exceed two gallons per cubic yard (2 Gal/Cy) of concrete. If water has been withheld, then up to the amount withheld can be added upon approval of the Project Manager. Any additional water above that, but not to exceed two gallons per cubic yard (2 Gal/Cy), shall be added only with the approval of the Project Manager. At no time shall slump exceed mix design nor be more than one and one-half inches (1-1/2 In) less than specified slump. All water that has been added to the truck shall be written on the trip ticket and batch ticket by the Project Manager.

J. Use troughs, pipes and chutes lined with approved metal or synthetic material for placing concrete so that concrete ingredients are not separated. Keep chutes, troughs and pipes clean and free from coatings of hardened concrete. Allow no aluminum or aluminum alloy material to come in contact with concrete.

K. Limit free fall of concrete to four feet (4 Ft). Do not deposit large quantities of concrete at one location so that running or working concrete along forms is required. Do not jar forms after concrete has taken initial set, and do not place strain on projecting reinforcement rods or anchor bolts.

L. Use tremies for placing concrete in walls and similar narrow or restricted locations. Use tremies made in sections, or provide in several lengths, so that outlet may be adjusted to proper height during placing operations.

M. Place concrete in continuous horizontal layers approximately twelve inches (12 In) thick. Place each layer while layer below is still plastic.

N. Compact each layer of concrete with concrete spading implements and

mechanical vibrators of approved type and adequate number for size of placement. When immersion vibrators cannot be used, use form vibrators. Apply vibrators to concrete immediately after depositing. Move vibrator vertically through layer of concrete just placed and several inches into plastic layer below. Do not penetrate or disturb layers previously placed which have partially set. Do not use vibrators to aid lateral flow concrete. Closely supervise consolidation to ensure uniform insertion and duration of immersion.

O. Handling and Placing Concrete: Conform to ACI 302.1R, ACI 304R and ACI 309R.

3.4 FIELD QUALITY CONTROL

A. Testing shall be performed under provisions of Sections 01470 – Testing Laboratory Services and 01475 – Quality Control Testing Procedures.

B. Unless otherwise directed by the Project Manager, the following minimum testing of concrete shall be required. Testing shall be performed by qualified individuals employed by approved independent testing laboratory, and conform to requirements of ASTM C1077.

1. Take concrete samples in accordance with ASTM C172.
2. Make one (1) set of compression test specimens for each mix design at least once per day and for each one hundred cubic yards (100 Cy) or fraction thereof. Make, cure and test specimens in accordance with ASTM C31 and ASTM C39.
    a. Tests are representative random sampling of each one hundred cubic yard (100 Cy) unit placement of concrete. Passing or failure of compressive testing shall represent all one hundred cubic yard (100 Cy) for acceptance or deficiency.
3. When taking compression test specimens, test each sample for slump according to ASTM C143, for temperature according to ASTM C1064, for air content according to ASTM C231, and for unit weight according to ASTM C138.
4. Inspect, sample and test concrete in accordance with ASTM C94, Section 13, 14, and 15, and ACI 311-5R.

C. Test Cores: Conform to ASTM C42.

D. Testing High Early Strength Concrete: When Type III cement is used in concrete, specified seven day (7 D) and twenty-eight day (28 D) compressive strengths shall be applicable at three days (3 D) and seven days (7 D), respectively.

E. Seven day (7 D) compressive strengths shall be seventy (70%) percent of twenty-eight day (28 D) strength requirement.

F. If twenty-eight day (28 D) compressive strengths fail to meet class specified requirements, then those portions of structure represented by test specimens shall be replaced at no additional cost to City.

G. Take one (1) slump test a minimum of every fifty cubic yards (50 Cy) of placement according to ASTM C143. Project Manager shall be authorized to have testing laboratory take slump on any questionable concrete.

3.5 FINISHING

A. Burlap drag or transverse broom for finishing slab.
   1. Burlap Finish – Furnish four (4) plies of ten ounce (10 oz) burlap material fastened to bridge to form continuous strip of burlap full width of pavement. Maintain contact three foot (3 Ft) width of burlap material with pavement surface. Keep burlap drags clean and free of encrusted mortar. Burlap shall be dragged longitudinally (parallel) with the centerline of the roadway. Finish look shall be straight lined. Swoops, diagonals or ridges shall not be allowed.
   2. Broom Finish – Furnish brooms with either horsehair or synthetic fiber bristles. Straw bristles shall not be allowed. Keep bristles clean and free of encrusted mortar. Broom shall be dragged latitudinally (perpendicular) with the centerline of the roadway. Adequate combination of pressure and bristle thickness shall be used to provide medium to heavy texture. Finish look shall be straight lined. Swoops, diagonals or ridges shall not be allowed.
   3. Fire hose finishing shall not be allowed.

B. Finishing for patches and structures shall conform to the following requirements.
   1. Patch honeycomb, minor defects and form tie holes in concrete surfaces with cement mortar mixed one part cement to two parts fine aggregate. Repair defects by cutting out unsatisfactory material and replacing with new concrete, securely keyed and bonded to existing concrete. Finish to make junctures between patches and existing concrete as inconspicuous as possible. Use stiff mixture and thoroughly tamp into place. After each patch has stiffened sufficiently to allow for greatest portion of shrinkage, strike off mortar flush with surface.
   2. Apply rubbed finish to exposed surfaces of formed concrete structures as noted on The Drawings. After pointing has set sufficiently, wet surface with brush and perform first surface rubbing with No. 16 carborundum stone, or approved equal. Rub sufficiently to bring surface to paste, to remove form marks and projections, and to produce smooth, dense surface. Add cement to form surface paste as necessary. Spread or brush material, which has been ground to paste, uniformly over surface and allow to reset. In preparation for final acceptance, clean surfaces and perform final finish rubbing with No. 30 carborundum stone or approved equal. After rubbing, allow paste on surface to reset; then wash surface with clean water. Leave structure with clean, neat and uniform-appearing finish.

C. Finish tolerances shall be as follows:
   1. Top concrete surface of sidewalks shall be true planes within one-quarter inch (1/4 In) in ten feet (10 Ft).
   2. Wheelchair ramps shall be held to tolerances as stated in Sections 02820 – Concrete Sidewalks and 02825 – Colored Concrete for Wheelchair Ramps.
   3. Roadway slabs parallel to the centerline shall be true planes within one-sixteenth inch (1/16 In) in ten feet (10 Ft).
   4 All other surfaces shall be true planes within one-quarter inch (1/4 In) in ten feet (10 Ft).
   5. All tolerances shall be checked with a steel edge that has zero (0) tolerance deviation.

3.6 CURING

A. Comply with ACI 308. Cure by preventing loss of moisture, rapid temperature change and mechanical injury for period of seven (7) curing days when Type II or IP cement has been used and for three (3) curing days when Type III cement has been used. Start curing as soon as free water has disappeared from concrete surface after placing and finishing. A curing day is any calendar day in which temperature is above fifty degrees Fahrenheit (50° F) for at least nineteen hours (19 Hrs). Colder days may be counted when air temperature adjacent to concrete is maintained above fifty degrees Fahrenheit (50° F). In continued cold weather, when artificial heat is not provided, removal of forms and shoring may be permitted at end of calendar days equal to twice required number of curing days. However, leave soffit forms and shores in place until concrete has reached specified twenty-eight day (28 D) strength, unless directed otherwise by the Project Manager.
   1. Moisture Cover Curing Method: The concrete surfaces to be cured shall be covered with specific moisture-retaining cover material placed in the widest practical width with sides and ends lapped at least three inches (3 In) and sealed by waterproofing tape or adhesive. All holes or tears that develop during curing period shall be repaired immediately. Minimum curing time for this method shall be seven days (7 D).
   2. Liquid Membrane Curing: The specified membrane curing compound shall be applied to damp concrete surfaces as soon as possible after the final finishing operations are complete, but in no case later than two hours (2 Hrs) after finishing. Curing compound shall be applied uniformly over the concrete surfaces by means of approved spray equipment in accordance manufacturer's instruction. No deformities (tear drop, pattern, etc.) shall be accepted. Should the cure coat be damaged from any cause during the curing period, damaged portions shall be repaired and recoated immediately with additional compound.

B. Formed surfaces not requiring rubbed-finished surface shall be cured by leaving forms in place for full curing period. Keep wood forms wet during

curing period. Add water as needed for other types of forms. Non-structural concrete forms, upon approval of the Project Manager, may be removed after two days (2 D) and curing compound applied.

C. Rubbed Finish:
   1. For formed surfaces requiring rubbed finish, remove forms as soon as practicable without damaging surface.
   2. After rubbed-finish operations are complete, continue curing formed surfaces by using either approved curing/sealing compounds or moist cotton mats until normal curing period is complete.

D. Unformed Surfaces: Cure by membrane curing compound method.
   1. After concrete has received final finish and surplus water sheen has disappeared, immediately seal surface with uniform coating of approved curing compound, applied at rate of coverage recommended by manufacturer or as directed by the Project Manager. Do not apply less than one gallon (1 Gal) per one hundred eighty square feet (180 Sf) of area. Provide satisfactory means to properly control and check rate of application of compound.
   2. Thoroughly agitate compound during use and apply by means of approved mechanical power pressure sprayers equipped with atomizing nozzles. For application on small miscellaneous items, hand-powered spray equipment may be used. Prevent loss of compound between nozzle and concrete surface during spraying operations.
   3. Do not apply compound to dry surface. When concrete surface has become dry, thoroughly moisten surface immediately prior to application of compound. At locations where coating shows discontinuities, pinholes or other defects, or when rain falls on newly coated surface before film has dried sufficiently to resist damage, additional coat of compound shall be applied at specified rate of coverage.

3.7 PROTECTION

A. Protect concrete against damage until final acceptance by City.

B. Protect fresh concrete from damage due to rain, hail, sleet, or snow. Provide protection while concrete is still plastic, and whenever precipitation is imminent or occurring.

C. Do not backfill around concrete structures or subject them to design loadings until components of structure needed to resist loading are complete and have reached specified twenty-eight day (28 D) compressive strength, except as authorized otherwise by the Project Manager.

D. Concrete pavement shall not be used before the twenty-eight day (28 D) compressive strength unless the seven day (7 D) compressive strength test has reached the twenty-eight day (28 D) strength requirement. Pavement can be used for light vehicles only after the twenty-eight day

(28 D) strength has been met. At no time shall any equipment or vehicles heavier than eight thousand pounds (8000 Lbs) GVW (Gross Vehicle Weight) be allowed on pavement before it passes the twenty-eight day (28 D) compressive strength tests.

3.8 REMOVAL OF FORMS AND SHORING

A. Remove forms from surfaces requiring rubbing only as rapidly as rubbing operation progresses. Remove forms from vertical surfaces not requiring rubbed-finish when concrete has aged for required number of curing days. When curing compound is used, do not remove forms before during first (1st) two (2) full days after concrete placement.

B. Leave soffit forms and shores in place until concrete has reached specified twenty-eight day (28 D) strength, unless directed otherwise by the Project Manager.

3.9 DEFECTIVE WORK

A. Immediately repair defective work discovered after forms have been removed. When concrete surface is bulged, uneven, or shows excess honeycombing or form marks which cannot be repaired satisfactorily through patching, remove and replace entire section.

PART IV:TABLES

4.1 CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS

CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS					
Class of Concrete	Sacks of Cement per Cubic Yard Minimum	Minimum Compressive Strength at 28 Days	Maximum Cement to Water Ratio	Coarse Aggregate Grade Number	Slump
A	5.0	3000**	6.25	2 – 3	3 – 5*
B	6.0	3600**	6.00	1,2,3,4,5	4
C	4.0	2000**	8.00	2,3,4,5,6,7	5
D	6.0	3000**	6.00	2,3,4,5	5
E	6.0	As specified	5.50	3,4,5,6	5
F	8.75	5500**	3.6	6	5

*When ASTM C494, Type F or Type G admixture is used to increase workability, this range may be 6 to 9.

**These are minimum compressive strengths; please note a mix design is required for various applications to ensure specified compressive strengths are met for their intended use.

4.2 COARSE AGGREGATE GRADATION

COARSE AGGREGATE GRADATION CHART										
Aggregate Grade No.	Nominal Size Inches	Percent Retained on Each Sieve								
		2-1/2 In.	2 In.	1-1/2 In.	1 In.	3/4 In.	1/2 In.	3/8 In.	No. 4	No. 8
1	2	0	0-20	15-50		60-80			95-100	
2 (467)*	1-1/2		0	0-5		30-65		70-90	95-100	
3	1-1/2		0	0-5		10-40	40-75		95-100	
4 (57)*	1			0	0-5		40-75		90-100	95-100
5 (67)*	3/4				0	0-10		45-80	90-100	95-100
6 (7)*	1/2					0	0-10	30-60	85-100	95-100
7	3/8						0	5-30	75-100	
8	3/8						0	0-5	35-80	90-100

* Numbers in parenthesis indicate that the gradations conform to Corresponding ASTM gradation in ASTM C33.

4.3 DELETERIOUS SUBSTANCES

MAXIMUM PERMISSIBLE PERCENTAGES	
Deleterious Material	Maximum Percentage
Material removed by decantation, ASTM C117	1.0 %
Shale, slate or similar materials	1.0 %
Clay lumps	0.25 %
Soft fragments	3.0 %
Others, including friable, thin, elongated or laminated pieces	3.0 %

Sum of all deleterious ingredients, exclusive of material removed by decantation shall not exceed 5 % by weight.

4.4 FINE AGGREGATE GRADATION

FINE AGGREGATE GRADATION CHART								
Aggregate Grade No.	Percent Retained on Each Sieve							
	3/8 In.	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
1	0	0-5	0-20	15-50	35-75	65-90	90-100	97-100

4.5 MINERAL FILLERS

MINERAL FILLER GRADATION CHART		
Percent Retained on Each Sieve		
No. 20	No. 30	No. 100
0 %	0 to 5 %	0 to 30 %

4.6 TEMPERATURE REQUIREMENTS FOR PLACEMENT

PLACEMENT TEMPERATURE REQUIREMENTS	
AMBIENT TEMPERATURE[1]	
Minimum temperature to start placing concrete	35° and rising
Minimum temperature to stop placing concrete	40° and falling
Maximum temperature for placing concrete without ice	90°
Maximum temperature for placing concrete with ice	100°
CONCRETE TEMPERATURE	
Minimum concrete temperature	50°
Maximum concrete temperature without ice	90°
Maximum concrete temperature with ice	95°
MINIMUM CURING TIMES WHEN PLACED CONCRETE HAS BEEN EXPOSED TO FREEZING TEMPERATURES	
From 50° to 70°, minimum days	5
70° and above, minimum days	3
[1]Ambient temperature is to be taken as specified in paragraph 3.3.F.1 of this Section.	

4.7 TRANSPORTING TIME REQUIREMENTS

TRANSPORTING TIME REQUIREMENTS FOR PLACEMENT		
Ambient Temperature	Maximum Time (No Retarding Agent) in Minutes	Maximum Time (With Retarding Agent) in Minutes[1]
Non-Agitated Concrete		
Above 80° F	15	30
80° F and Below	30	45
Agitated Concrete		
Above 90° F	45	75
75° F to 90° F	60	90
75° F and Below	90	120
NOTE: Time interval shall be from the addition of cement to the batch to start of placement of concrete in the forms. [1]Normal Dosage of retarder.		

END OF SECTION

SECTION 03015SP

STRUCTURAL CONCRETE

The following provisions modify Section 03015 – Structural Concrete Specification. Where a portion of the Specification is modified or deleted by this Special Provision, the unaltered portions of the Specification shall remain in effect.

1. Delete Table 4.1 and replace with the following:

CONCRETE CLASSIFICATION MINIMUM SPECIFICATIONS					
Class of Concrete	Sacks of Cement per Cubic Yard Minimum	Minimum Compressive Strength at 28 Days	Maximum Cement to Water Ratio	Coarse Aggregate Grade Number	Slump
A	5.5	3500	6.25	2 – 3	1 – 5*
B	6.0	3600	6.00	1,2,3,4,5	4
C	4.0	2000	8.00	2,3,4,5,6,7	5
D	6.0	3000	6.00	2,3,4,5	5
E	6.0	As specified	5.50	3,4,5,6	5
F	8.75	5500	3.6	6	5

*When ASTM C494, Type F or Type G admixture is used to increase workability, this range may be 6 to 9.

END OF SPECIAL PROVISION

APPENDIX A
GEOTECHNICAL REPORT

GEOTECHNICAL REPORT

1. The following report is provided as information to Bidders.

2. In the design and preparation of Contract Documents for this Project, the Owner and the Engineer have relied upon the information in the geotechnical report of investigation and analysis of soils and subsurface conditions of the construction site.

3. The Owner and Engineer shall not be held responsible for the accuracy of completeness of any information or data in the report.

4. Bidder shall have full responsibility for interpretation of the report and use of the information for his bidding and construction purposes.

5. Bidder may perform such additional soils investigation as he deems appropriate.

Geotechnical Engineering Report

Blackhawk Boulevard Reconstruction Phase II

Blackhawk Boulevard

Friendswood, Texas

January 29, 2018

Terracon Project No. 91165096 Revision 2

Prepared for:

HDR Engineering, Inc.
Houston, Texas

Prepared by:

Terracon Consultants, Inc.
League City, Texas

January 29, 2018

HDR Engineering, Inc.
4828 Loop Central Drive, Suite 800
Houston, Texas 77081

Attn: Ms. Ngoc Kim Le, P.E.
Project Manager

Re: Geotechnical Engineering Report
Blackhawk Boulevard Reconstruction Phase II
Blackhawk Boulevard
Friendswood, Texas
Terracon Project No. 91165096 Revision 2

Dear Ms. Le:

Terracon Consultants, Inc. (Terracon) is pleased to submit our geotechnical engineering report for the project referenced above in Friendswood, Texas. We trust that this report is responsive to your project needs. Please contact us if you have any questions or if we can be of further assistance.

We appreciate the opportunity to work with you on this project and look forward to providing additional geotechnical engineering and construction materials testing services in the future.

Sincerely,
Terracon Consultants, Inc.
(Texas Firm Registration No.: F-3272)

STATE OF TEXAS
BOBBIE S. HOOD
92951
LICENSED
PROFESSIONAL ENGINEER

Rehan Khan

Rehan Khan, E.I.T.
Staff Engineer (League City)

Bobbie S. Hood, P.E.
Geotechnical Services Manager (Conroe)

Copies To: Addressee: (1) Electronic

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EXECUTIVE SUMMARY

This geotechnical engineering report has been prepared for the proposed reconstruction of Blackhawk Boulevard and installation of utilities along the reconstruction alignment in Friendswood, Texas. Sixteen borings, designated B-1 through B-16, were drilled to depths that ranged from about 15 to 25 feet along the proposed pavement reconstruction alignment.

Based on the information obtained from our subsurface exploration, the site can be developed for the proposed project. A summary of our findings and recommendations is provided below.

- The existing pavement sections, as observed at the time of our field program, varied from approximately 5 to 8 inches of concrete underlain by about one to 4 inches of chemically treated subgrade.

- Groundwater was observed at boring B-3, B-13, B-15, and B-16 during dry drilling at a depth of about 12 feet. Boring B-3 subsequently caved-in after a 5-minute observation period. After an observation period of about 15 minutes, water was observed at borings B-13, B-15, and B-16 at a depth of about 9 feet. Groundwater was not observed at borings B-1, B-2, B-4 through B-12, and B-14 during or upon completion of drilling.

- Detailed traffic loads and frequencies were not made available for Blackhawk Boulevard. We have provided the following three pavement section options with the number of Equivalent 18-kip Single Axle Wheel Loads (ESALs) that these sections can support. If the traffic loadings exceed these ESALs for a given pavement section, there will be need for increased maintenance.

Reinforced Concrete (in)	Chemically Treated Subgrade (in)	ESALs
6	8	240,000
7	8	550,000
8	8	1,200,000

- Based on soil and groundwater information obtained from our field and laboratory program, the excavations to install the proposed water lines and storm sewer pipes within the clay soils may be performed without advance dewatering. Groundwater seepage, if any, is expected to be minor and can likely be managed by pumping water collected within sumps positioned at the bottom of the excavation. However, excavations that extend into the sandy soils such as those observed at borings B-3 and B-13 may require advance dewatering.

- The bedding and backfill for the proposed utilities should conform to the City of Friendswood Technical Specifications and Standard Details, latest revisions.

- We understand Cedar Gully channel, with a maximum depth of 16 feet, crosses the proposed reconstruction alignment of Blackhawk Boulevard. Based on information obtained from borings B-8 and B-9 in the vicinity of the channel, a 3.5H:1V sideslope configuration should meet the minimum required factor of safety for slope stability.

This executive summary should be used in conjunction with the entire report for design purposes. Details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **"5.0 GENERAL COMMENTS"** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
BLACKHAWK BOULEVARD RECONSTRUCTION PHASE II
BLACKHAWK BOULEVARD
FRIENDSWOOD, TEXAS

Project No. 91165096 Revision 2
January 29, 2018

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) is pleased to submit our geotechnical engineering report for the proposed reconstruction of Blackhawk Boulevard and installation of utilities along the reconstruction alignment in Friendswood, Texas. This project was authorized by Mr. David C. Weston, Vice President of HDR Engineering, Inc., through signature of the client's "Geotech Subconsultant Agreement" dated February 15, 2017. The project scope was performed in general accordance with Terracon Proposal No. P91165096, dated October 4, 2016.

The purpose of this geotechnical engineering report is to describe the subsurface conditions observed at the sixteen borings drilled for this project, analyze and evaluate the test data, and provide recommendations with respect to:

- Site and subgrade preparation;
- Pavement design guidelines;
- Utility construction considerations;
- Trenchless augering considerations; and
- Recommendations for Cedar Gully channel sideslopes at its intersection with Blackhawk Boulevard.

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Project location	The site includes the following sections along Blackhawk Boulevard in Friendswood, Texas: ■ In between FM 2351 and Friendswood Link Road, and ■ In between Thursa Lane and FM 528. See Appendix A, Exhibit A-1, Site Location Plan.
Site layout	See Appendix A, Exhibit A-2, Boring Location Plan.

Item	Description
Proposed improvements[1]	■ Approximately 8,250 linear feet of pavement reconstruction along Blackhawk Boulevard. The proposed pavement width is planned to be 25 feet back to back on each side of the median. ■ Replacement of existing water line that are not PVC and where it conflicts with the proposed storm sewer line. ■ Installation of storm sewer line at depths that range from about 4 to 16½ feet and water line at a depth of approximately 4 feet generally except for locations where the water line is proposed above or below the proposed storm sewer using open excavation and trenchless methods.

1. Information provided by client through 'Request for Proposal for Geotechnical Services', dated September 29, 2016 and email correspondences dated May 16, 2017 and May 24, 2017.

2.2 Site Description

Item	Description
Existing conditions	Blackhawk Boulevard is a four-lane concrete road consisting of two lanes in each direction separated by a grass median.
Existing topography	Relatively level.

3.0 SUBSURFACE CONDITIONS

3.1 Geology

Based on the geologic maps published by the Bureau of Economic Geology, the site for the proposed construction is located on the Beaumont formation, a deltaic nonmarine Pleistocene deposit. The Beaumont formation is heterogeneous containing thick interbedded layers of clay, fine sand, and silt.

The coastal plain in this region has a complex tectonic geology, several major features of which are: Gulf Coastal geosyncline, salt domes, and major sea level fluctuations during the glacial stages, subsidence and geologic faulting activities. Most of these geologic faulting activities have ceased for millions of years, but some are still active. A detailed geologic fault investigation and study of the site geology are beyond the scope of this report.

3.2 Typical Profile

The particular subsurface stratigraphy, as evaluated from our field and laboratory programs, is shown in detail on the Boring Logs in Appendix A. Stratification boundaries on the Boring Logs

represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual.

The existing pavement sections, as observed at the time of our field program, varied from approximately 5 to 8 inches of concrete underlain by about one to 4 inches of chemically treated subgrade. The underlying native subsurface soils generally consisted of fat clay, lean clay, lean clay with sand, clayey sand, and poorly graded sand with silt soils to the termination depth of the borings (approximately 15 to 25 feet).

The results of our field and laboratory programs can be summarized as follows:

Subsurface Soils					
Description	**Plasticity Index**	**Moisture Content (%)**	**Moisture Content vs. Plastic Limit[1]**	**Undrained Shear Strength[2] (psf)**	**Percentage of Fines[3] (%)**
Fat Clay	35 to 59	19 to 40	-3 to +23	600 to 2,800	---
Lean Clay, Lean Clay with Sand	11 to 29	17 to 23	0 to +6	1.5 to 3.5[4]	---
Clayey Sand, Poorly Graded Sand with Silt	---	22 to 24	---	---	8 to 44

1. The difference between a soil sample's moisture content and its corresponding plastic limit.
2. Based on unconfined compressive strength tests.
3. Percent passing the No. 200 sieve.
4. Hand penetrometer readings in tons per square foot (tsf).

3.3 Groundwater

The borings were advanced using dry drilling techniques to their termination depth (approximately 15 to 25 feet) in an effort to evaluate groundwater conditions at the time of our field program. Groundwater was observed at boring B-3, B-13, B-15, and B-16 during dry drilling at a depth of about 12 feet. Boring B-3 subsequently caved-in after a 5-minute observation period. After an observation period of about 15 minutes, water was observed at borings B-13, B-15, and B-16 at a depth of about 9 feet. Groundwater was not observed at borings B-1, B-2, B-4 through B-12, and B-14 during or upon completion of drilling.

These groundwater measurements are considered short-term, since the borings were open for a short time period. On a long-term basis, groundwater may be present at shallower depths and within the depths explored. Additionally, groundwater will fluctuate seasonally with climatic changes and should be evaluated at the time of construction.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The following recommendations are based upon the data obtained in our field and laboratory programs, project information provided to us, and on our experience with similar subsurface and site conditions.

4.1 Wet Weather/Soft Subgrade Considerations

Construction operations may encounter difficulties due to wet or soft surface soils becoming a general hindrance to equipment due to rutting and pumping of the soil surface, especially during and soon after periods of wet weather. If the subgrade cannot be adequately compacted to 95 percent of the maximum dry density as determined by the Standard Effort (ASTM D698) at a moisture content between optimum and 4 percent wet of optimum moisture content, one of the following measures will be required: 1) removal and replacement with select fill, 2) chemical treatment of the soil to dry and improve the condition of the subgrade, or 3) drying by natural means if the schedule allows. In our experience with similar soils in this area, chemical treatment is an efficient and effective method to improve the condition of wet and weak subgrade. Terracon should be contacted for additional recommendations if chemical treatment of the soils is needed.

4.2 Pavement Reconstruction

The proposed pavement reconstruction areas should be stripped of existing concrete pavement, vegetation, topsoil, and other debris/unsuitable material.

Once initial site stripping is completed and final subgrade elevations have been achieved, the exposed subgrade should be carefully proofrolled with a 20-ton pneumatic roller or equivalent equipment, such as a fully loaded dump truck, to detect weak zones in the subgrade. Weak areas detected during proofrolling, as well as zones containing organic matter and/or debris, should be removed and replaced with soils exhibiting similar classification, moisture content, and density as the adjacent in-situ soils. Proper site drainage should be maintained during construction so that ponding of surface runoff does not occur and cause construction delays and/or inhibit site access.

The fill soils used for grade adjustments in the new pavement areas may consist of on-site soils provided they are free of organics and debris. The fill soils should be compacted to a minimum 95 percent of the maximum dry density as determined by the Standard Effort (ASTM D698) at a moisture content between optimum and 4 percent wet of optimum moisture content in lifts not exceeding 8 inches loose measure, with compacted thickness not exceeding 6 inches.

Prior to any filling operations, samples of the proposed borrow materials should be obtained for laboratory moisture-density testing. The tests will provide a basis for evaluation of fill

compaction by in-place density testing. A qualified soil technician should perform sufficient in-place density tests during the filling operations to evaluate that proper levels of compaction are being attained.

Based on the subsurface conditions observed at this site, we anticipate that the pavement subgrade will generally consist of on-site high plasticity clay soils. We recommend that the top 6 or 8 inches of the finished subgrade soils directly beneath the pavement be chemically treated as indicated subsequently. Chemical treatment will increase the supporting value of the subgrade and decrease the effect of moisture on subgrade soils. This 6 or 8 inches of treatment is a required part of the pavement section and is not a part of site and subgrade preparation for wet/soft subgrade conditions as discussed in section **"4.1 Wet Weather/Soft Subgrade Considerations"**.

The recommended application rates for chemical treatment are for estimation and planning purposes only. Actual required quantities of chemical treatment should be evaluated at the time of construction by laboratory test on bulk samples of the subgrade. The decision about the type and proper amount of additive should be made after the subgrade is open for inspection.

Detailed traffic loads and frequencies were not available. Per recommendations provided in **City of Friendswood Design Criteria Manual**, for pavement widths 26 feet edge to edge of pavement, the pavement section should consist of a minimum 6 inches concrete slab over 6 inches of chemically treated subgrade, and for pavement widths greater than 26 feet edge to edge of pavement, the pavement section should consist of a minimum 7 inches concrete slab over 8 inches of chemically treated subgrade.

Tabulated below are the general design parameters assumed in our analysis. If any of these parameters does not reflect the actual site conditions, Terracon should be contacted so we can revise our pavement design.

Design Input	Value Assumed
Modulus of subgrade reaction	110 pounds per cubic inch
Reliability	95 percent
Standard Deviation	0.35
Initial Serviceability	4.5
Terminal Serviceability	2.5
Concrete Compressive Strength	3,500 pounds per square inch
Load Transfer Coefficient	3.2[1]
Drainage Coefficient	1.1[2]

1. Assuming Jointed Reinforced concrete pavement with dowels.
2. Assuming excellent drainage conditions or good drainage conditions with the pavement being exposed to moisture levels approaching saturation for no longer than 25 percent of the time.

We performed roadway design calculations for the following three reinforced concrete pavement sections using the design parameters presented above to evaluate the estimated 18-kip equivalent single axle loads (ESALs) that these sections would be able to support, using the 1993 AASHTO method. Provided below is the allowable traffic volume which may be used as a guide for design of the proposed street.

Reinforced Concrete (in)	Chemically Treated Subgrade (in)	ESALs
6	8	240,000
7	8	550,000
8	8	1,200,000

Presented below are our recommended material requirements for the various pavement sections.

Reinforced Concrete Pavement – The materials and properties of a portland cement concrete pavement shall meet applicable requirements in the ACI Manual of Concrete Practice. Based on the 2008 City of Friendswood Technical Specifications and 2017 City of Friendswood Paving Standards Details, the concrete should meet a minimum 28 day compressive strength of 3,500 psi.

The steel reinforcement and expansion and control joint spacing should meet the City of Friendswood or other appropriate paving design standards.

Lime Treated Subgrade – The on-site high plasticity clay soils should be treated with lime in accordance with the TxDOT 2014 Standard Specifications Item 260. Based on the classification test results, we recommend that about 7 to 8 percent lime by dry weight be used for estimating and planning. The percentages are given as application by dry weight and are typically equivalent to about 35 to 40 pounds of lime per square yard per 6-inch depth and 46 to 53 pounds of lime per square yard per 8-inch depth. The actual quantity of the lime should be determined at the time of construction based on lime determination testing conducted using bulk samples of the subgrade soils. The pulverization, mixing and curing of the lime treated subgrade is of particular importance in these plastic clays. The subgrade should be compacted to a minimum of 95 percent of the Standard Effort (ASTM D698) maximum dry density between optimum and +4 percent of the optimum moisture content.

Preferably, traffic should be kept off the treated subgrade for 7 days to facilitate curing of the soil-chemical mixture. In addition, the subgrade is not suitable for heavy construction traffic prior to paving.

The pavement design methods described above are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the

subgrade can support. The support characteristics of the subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade such as the soils encountered at this site. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

Post-construction subgrade movements and some cracking of the pavements are not uncommon for subgrade conditions such as those observed at this site. Reducing moisture changes in the subgrade is important to reduce shrink/swell movements. Although chemical treatment of the subgrade will help to reduce such movement/cracking, this movement/cracking cannot be feasibly eliminated.

Related civil design factors such as subgrade drainage, shoulder support, cross-sectional configurations, surface elevations and environmental factors which will affect the service life must be included in the preparation of the construction drawings and specifications. Normal periodic maintenance will be required.

Long-term pavement performance will be dependent upon several factors, including maintaining subgrade moisture levels and providing for preventative maintenance. The following recommendations should be implemented to help promote long-term pavement performance.

- The subgrade and the pavement surface should be designed to promote proper surface drainage, preferably at a minimum grade of 2 percent;
- Install joint sealant, and seal cracks immediately;
- Extend curbs vertically into the treated subgrade for a depth of at least 4 inches to help reduce the horizontal moisture migration from the exposed subgrade into the subgrade soils beneath the pavement section; and
- Place compacted, low permeability clayey backfill against the exterior side of the curb and gutter.

Preventative maintenance should be planned and provided for the pavements at this site. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and consist of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Prior to implementing any maintenance, additional engineering observations are recommended to determine the type and extent of preventative maintenance.

4.3 Utility Construction Considerations: Open Excavations

4.3.1 Groundwater Control

Based on groundwater information presented in section **“3.3 Groundwater”** of this report, we anticipate that excavations that extend into the near surface clay soils may be performed in the

dry. Seepage from the near-surface clay soils is expected to be minor and can be managed by pumping water collected within sumps positioned in the bottom of the excavation.

However, excavations for the deeper utility lines extending into the sandy soils, such as those observed at borings B-3 and B-13, may require advance dewatering, depending on the groundwater conditions at the time of construction. Groundwater is typically controlled by the installation of vacuum wellpoints. However, vacuum wellpoints are generally less effective below a depth of about 15 feet beneath the top of the wellpoint. In addition, dewatering with wellpoints may not be effective in zones containing significant amounts of fine-grained soils. Deeper dewatering requires eductors or deep wells with submersible pumps or multiple-stage wellpoint systems.

The suggested methods given above serve as a guideline for groundwater control. Other appropriate means may be required for groundwater control during construction. Control of groundwater should be accomplished in a manner that will preserve the strength of the soils, will not cause instability of the excavation, and will not result in damage to existing structures, if any. If necessary, the water should be lowered in advance of excavation by wellpoints, deep wells, eductors, or similar methods. Open pumping should not be permitted if it results in boils, loss of fines, softening of the subgrade, or excavation instability. Wellpoints, deep wells and eductors should be installed with suitable screen and filter so that pumping of fines does not occur.

The well system should be in operation for at least several days prior to excavating to the design depth. We recommend that the groundwater head be lowered at least 3 feet below the bottom of the excavation to provide a working area with increased stability. The dewatering should continue until the construction has been completed, and the dewatering system should be turned off in stages to allow groundwater to recover to its original level gradually, over a period of about 3 to 5 days.

Dewatering of loose to medium dense sands might cause subsidence or compression of adjacent soils and adjacent structures, in spite of safeguards and methodology selected and used. For this reason, the dewatering operations must be performed and provided with great care to ensure caution and control of the potential subsidence resulting from the dewatering operations.

To further evaluate the groundwater at the time of construction, piezometers may be set just prior to construction. As an alternative, test pits may be excavated to the planned utility depth. Based on the results, the contractor should determine effective methods of groundwater management prior to starting excavation operations.

4.3.2 Excavation Considerations

For this project, either excavated side slopes or vertical cut excavations are feasible. For vertical cut excavations greater than 5 feet in depth, excavations will require the use of a trench box or shoring and bracing to prevent sloughing and caving of the soil into the excavation. The contractor should use a trench box or shoring and bracing as necessary to maintain a safe and clean excavation which meets Occupational Safety and Health Administration (OSHA) requirements.

In lieu of shoring, bracing, or trench boxes for excavations greater than 5 feet, OSHA standards provide recommendations for the design of temporary sloped excavations with a depth less than 20 feet. The OSHA standards provide maximum allowable slopes contingent on three designated soil types: Type A, Type B, or Type C. According to OSHA standards, temporary sloped excavations should be no steeper than 0.75-horizontal on 1-vertical (0.75H:1V) for Type A soils, 1H:1V for Type B soils, and 1.5H:1V for Type C soils. The surface slopes should be protected from deterioration and weathering if they are left open for significant periods of time.

Excavations must be performed and evaluated under the supervision of the contractor's designated Competent Person. The Competent Person, (as defined by the OSHA Standard, 29 CFR Part 1926.650 to .652, Subpart P - Excavations), must evaluate the excavations at the time of construction activity to safeguard workers.

We recommend that no equipment should be operated within a horizontal distance equal to the excavation depth from the edge of the excavation and no materials should be stockpiled within this distance. Excavations should not approach closer than a horizontal distance equivalent to the excavation depth from existing structures or buried utilities without some form of protection for the facilities.

Excavations should be performed with equipment capable of providing a relatively clean bearing area. Excavating equipment should not disturb the soil beneath the design excavation bottom and should not leave loose soil in the excavation.

The bearing surface should be protected against disturbance and deterioration by completing the utility line installation and backfilling operations as quickly as possible. The excavation bottom should be properly sloped to allow water infiltrating into the excavation to be collected at a convenient location along the edge of the excavation. Water should not be allowed to stand within the bearing area. Proper berming or ditching should be done to divert any surface runoff away from the excavations.

4.3.3 Uplift Pressures

Uplift forces on below-grade structures such as manholes will be generated by a difference in water level in the soil adjacent to the structure and inside the structure. If the backfill around any buried structure is a sand or silt material, the backfill will approach saturation during periods of heavy rainfall and the effective static water level will be at the surface. The uplift pressures will be resisted by adhesion or skin friction of the soil to the wall and by the dead weight of the structure. An allowable skin friction for an engineered clay fill compacted to a minimum of 95 percent of the maximum Standard Effort (ASTM D 698) maximum dry density may be considered to be 300 psf. The upper 4 feet of skin friction should be neglected for a clay backfill due to potential for soil shrinkage away from the structure. Sand backfill, compacted to at least 70 percent of the maximum relative density (ASTM D 4253 and 4254), may be considered to have an allowable skin friction of zero at the surface varying linearly to 117 psf at a depth of 16 feet below grade.

An alternate design method would be to place a heel extending out from the utility foundation into the backfill and rely on the weight of the soil above the heel on a 4-vertical to 1-horizontal slope to resist the uplift forces. The unit weight of soil above and below the water table for a properly compacted backfill will be 120 pcf and 60 pcf, respectively. The preparation of the upper 3 feet of soil immediately above the heel is critical to reduce the possibility of an upward bearing failure. The entire thickness of fill should be compacted to the above recommended values.

4.3.4 Lateral Earth Pressures

Backfill around embedded structures will impose active to at-rest earth pressures against the embedded walls. Design lateral earth pressures for backfill are estimated to be equivalent to a fluid pressure of 90 pounds per cubic foot (pcf) for clean sand backfill and 110 pcf for in-situ native clay backfill. These pressures include hydrostatic pressures but do not include surcharge forces imposed by construction or vehicular loading. The lateral pressure produced by surcharge may be computed as 50 percent of the vertical surcharge pressure applied as a constant pressure over the full depth of the buried structure. A 2-foot compacted clay seal should be placed at the top of sand backfill to reduce the amount of infiltration of surface water.

4.3.5 Utility Bedding

The subgrade and bedding for the proposed utilities should conform to the City of Friendswood or other appropriate standards on pipeline bedding details. Standard bedding details for pipes placed in satisfactory soil conditions (non-water bearing, strong cohesive soils) and unsatisfactory conditions (wet, silty/sandy soils) are outlined in the City of Friendswood Design Criteria Manual. Standard bedding details for storm sewer lines are outlined on the Storm Sewer Standard Details. Standard bedding details for water lines are outlined on the Water Distribution Standard Details.

The excavations should be monitored to detect any variation in soil conditions from those found in the borings drilled for this project. Any changes noted in the soil stratigraphy should be brought to the attention of Terracon so that the conditions may be assessed and changes to the required bedding details made, as necessary.

4.3.6 Utility Backfill

Since the surface above the proposed utility lines is within pavement areas or within 3 horizontal feet of pavement, the backfill should consist of cement stabilized sand to within 12 inches of the top of the subgrade and compacted to at least 95 percent of the material's Standard Effort (ASTM D558) maximum dry density. On-site clean soils compacted to at least 95 percent of the material's Standard Effort (ASTM D698) maximum dry density should be placed above the cement stabilized sand.

Prior to any filling operations, samples of the proposed borrow materials should be obtained for laboratory moisture-density testing. The tests will provide a basis for evaluation of fill compaction by in-place density testing. A qualified soil technician should perform sufficient in-place density tests during the filling operations to verify that proper levels of compaction are being attained.

4.3.7 Replacement of Existing Utilities

Based on information provided by the client, we understand that some sections of the existing waterline are planned to be replaced. All utilities and associated bedding material that are planned to be abandoned should be completely removed from within the proposed pavement reconstruction areas. As an alternate to complete removal, the existing utilities may be abandoned in-place if they do not interfere with the planned construction. If the utilities are abandoned in-place, they should be properly pressure-grouted to completely fill the utility. The excavations resulting from utility removal should be properly backfilled per recommendations provided in the "**4.2 Pavement Reconstruction"** section of this report. If situations are encountered where compaction of fill would not be efficient because of the size or location of an excavation, the use of cement sand or flowable fill may be considered as a suitable alternative to fill. The compressive strength of the cement stabilized sand or flowable fill utilized should be maintained between 50 and 100 pounds per square inch (psi).

4.4 Utility Construction Considerations: Trenchless Methods

Pipe insertion into the trenchless hole will generate stresses on the pipe. The pipe should be selected by considering the construction equipment to be used. When deemed necessary by the contractor, drilling fluid, like water bentonite slurry, is used to stabilize the bore, reduce friction and thus reduce the jacking forces required, cool and lubricate the drill bit, and control soil pressures below the surface. The decision regarding whether or not drilling fluid is required

should be made by the operator of trenchless equipment. If groundwater is encountered during tunneling operations, the groundwater may be controlled as discussed in section **"4.3.1 Groundwater Control"**.

4.4.1 Geotechnical Properties

Based on the subsurface conditions observed along the proposed utility alignment and our available field and laboratory test results; the trenchless zone will likely encounter stiff to very stiff clay soils. Recommended engineering design soil parameters for the clay soils observed at this site are as follows:

Design Parameters for Clay Soils	
Soil Property	**Recommended Design Parameter**
Moist Unit Weight	115 to 130 pcf
At-Rest Coefficient of Earth Pressure, K_o	0.7
Active Coefficient of Earth Pressure, K_a	0.5
Undrained Shear Strength	550 to 2,760 psf
Poisson's Ratio	0.25 to 0.45
Young's Modulus	165 to 825 ksf

4.4.2 Pipe Design

For pipes to be installed by trenchless techniques, whereby sections of pipe are pushed forward against the surrounding soil, pipes should be designed to resist significant bending moments, along with the jacking forces exerted on the pipe during installation. These loads generally exceed the overburden pressures that are typically determined based on the prism earth load to the ground surface, plus hydrostatic pressure and surcharge loads. Therefore, pipes designed to resist construction loads during jacking operations should have adequate strength for most long-term overburden and traffic loads.

During design, allowance should be made for any external loads other than soil loads that may be exerted on the pipe. These include loads from foundations for structures located near the pipeline, and any possible future excavation to be performed near the pipe. Much of the stability of the utility system is due to the presence of relatively uniform stress conditions in the soil around the pipe. Relief of the earth loads on one side of the pipe due to subsequent adjacent excavation could cause an overstress of the pipe.

Bore pits for trenchless construction should be shored or laid back to a stable slope to provide safety for workers and adjacent structures. The bracing and sheeting for excavation shoring should be designed using the parameters presented in the **"4.2 Excavations"** section of this report.

4.4.3 Pressures on Primary Pipe and Permanent Liners

Pipe liner design is largely dependent upon the depth of the liner beneath the ground surface and additional surface loads. Surface loads may include traffic loads, foundations in proximity of the pipe, and other such loading conditions.

We recommend the vertical and horizontal pressures be taken as the following (using pressures on buried rigid pipes from “Structural Mechanics on Buried Pipes” by Reynold K. Watkins and Loren R. Anderson):

Total Liner Pressure = W + W”

$W = \gamma H K_a$

where,

W” = traffic allowance;
γ = design unit weight of soil;
H = depth of pipe from the ground surface to the top of the tunnel liner; and
K_a = active lateral earth pressure coefficient, use values given in the “**4.1.4 Lateral Earth Pressure”** section.

Tunnel liner loads along street alignments are shown on Exhibit C-3 in Appendix C. Based on the planned earth cover on the waterline, an additional traffic loading should also be considered based upon a design chart adopted from “Principles of Structural Performance of Buried Pipes”, by Reynold K. Watkins. This adopted chart is shown on Exhibit C-4 in Appendix C.

The pipe liner can be expected to deform under load from its original circular shape. The liner should be designed for the bending stresses associated with the elliptically distorted shape. In general, we recommend a maximum design distortion of:

- about 0.5 percent of the diameter for shortening in the vertical axis; and
- about 0.5 percent of the diameter for lengthening in the horizontal axis.

In addition, the pipe section should be designed to withstand the calculated installation stresses with an appropriate factor of safety.

4.4.4 Piping System Thrust Restraint

The pipes will be subjected to an unbalanced force at changes of vertical and horizontal directions, changes in cross-sectional areas, and at pipe terminations. Typically, design resistance to the unbalanced force may be provided by:

- the friction force acting on the pipe exterior surface;
- the design of the pipe dimensions and connections; or

- pipeline joint restraints or thrust blocks.

4.4.4.1 Thrust Force

The thrust restraint design recommendations contained herein are based upon the American Water Works Association (AWWA) Manual M 9 (1995), Chapter 9, Design of Thrust Restraints. Relatively large soil deformations are necessary to develop full or partial frictional resistance, and the soils surrounding the pipe may be disturbed by future construction, if any. Therefore, a conservative approach should be taken in the design of a thrust restraint.

Exhibit C-5 in Appendix C shows the thrust force generated by the pipeline flow at a bend in the pipe and the equations and definitions of parameters for computing the thrust force.

4.4.4.2 Frictional Force

The unbalanced thrust force produced by alignment changes in the pipeline can be resisted by the friction developed by the pipe in the soil.

To calculate the length of pipe required for frictional restraint within the soil for a horizontal pipe bend with tied joints, the following AWWA formulas may be used:

Restraint Pipe Length, $L = T_x / \{F_r/FS\}$

where,

T_x = $P\ A\ (1 - \cos\theta)$
P = internal pressure in pipe, psi
A = cross-sectional open area of pipe, sq. in.
θ = angle of deflection of pipe, degrees
F_r = $f\ (2\ W_e\ +\ W_w\ +\ W_p)$
f = coefficient of friction between pipe and soil (0.25 to 0.4 based on AWWA Manual)
W_e = weight of soil over pipe, lbs/ft
W_w = weight of contained water in pipe, lbs/ft
W_p = weight of pipe, lbs/ft
FS = Factor of Safety = 2

The weight of soil over the pipe, W_e, depends upon the soil unit weight and the depth of pipe below the ground surface. The weight of contained water, W_w, is normally calculated for a half filled pipe.

The pipeline structural designer can design pipe joints and lengths to accommodate the unbalanced forces produced. In this manner, no further design restraint would be necessary.

4.4.4.3 Thrust Blocks

Thrust blocks increase the ability of pipe fittings to resist adverse movement by increasing the bearing area. The size of thrust blocks may be calculated based upon the bearing capacity of the soil:

$T = (L \times B)q_a$

where,

T = thrust force, lbs
L = length of thrust block, ft
B = width of thrust block, ft
q_a = allowable bearing capacity of soil, psf (2,000 psf for natural clays and sands greater than 6 feet below existing grade at the time of our field activities)

4.5 Cedar Gully Sideslopes

We understand Cedar Gully channel, with a maximum depth of 16 feet, crosses the proposed reconstruction alignment of Blackhawk Boulevard. Based on information obtained from borings B-8 and B-9 in the vicinity of the channel and our previous experience with these soil types, a 3.5H:1V sideslope configuration should meet the minimum required factor of safety for slope stability for the 16-foot deep ditch.

If water flow is permitted along the sideslopes of the ditch, the near-surface soils will likely erode, causing gradual steepening and subsequent sloughing of the sideslopes, which may possibly allow the top of the bank to encroach into adjacent areas. Therefore, the sideslopes should be protected against sheet flow down the banks or concentrated high velocity water flow. Due to the potential for erosion, the earthen slopes will require either establishing a good vegetation cover as soon as practical and maintaining it over the life of the slope or concrete slope paving. Other erosion-control measures may include rip-rap or geofabrics. Regular maintenance of the sideslopes and vegetative cover will be necessary.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, pavement construction, and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may

not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, and bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other services should be undertaken.
For any excavation construction activities at this site, all Occupational Safety and Health Administration (OSHA) guidelines and directives should be followed by the Contractor during construction to insure a safe working environment. In regards to worker safety, OSHA Safety and Health Standards require the protection of workers from excavation instability in trench situations.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION

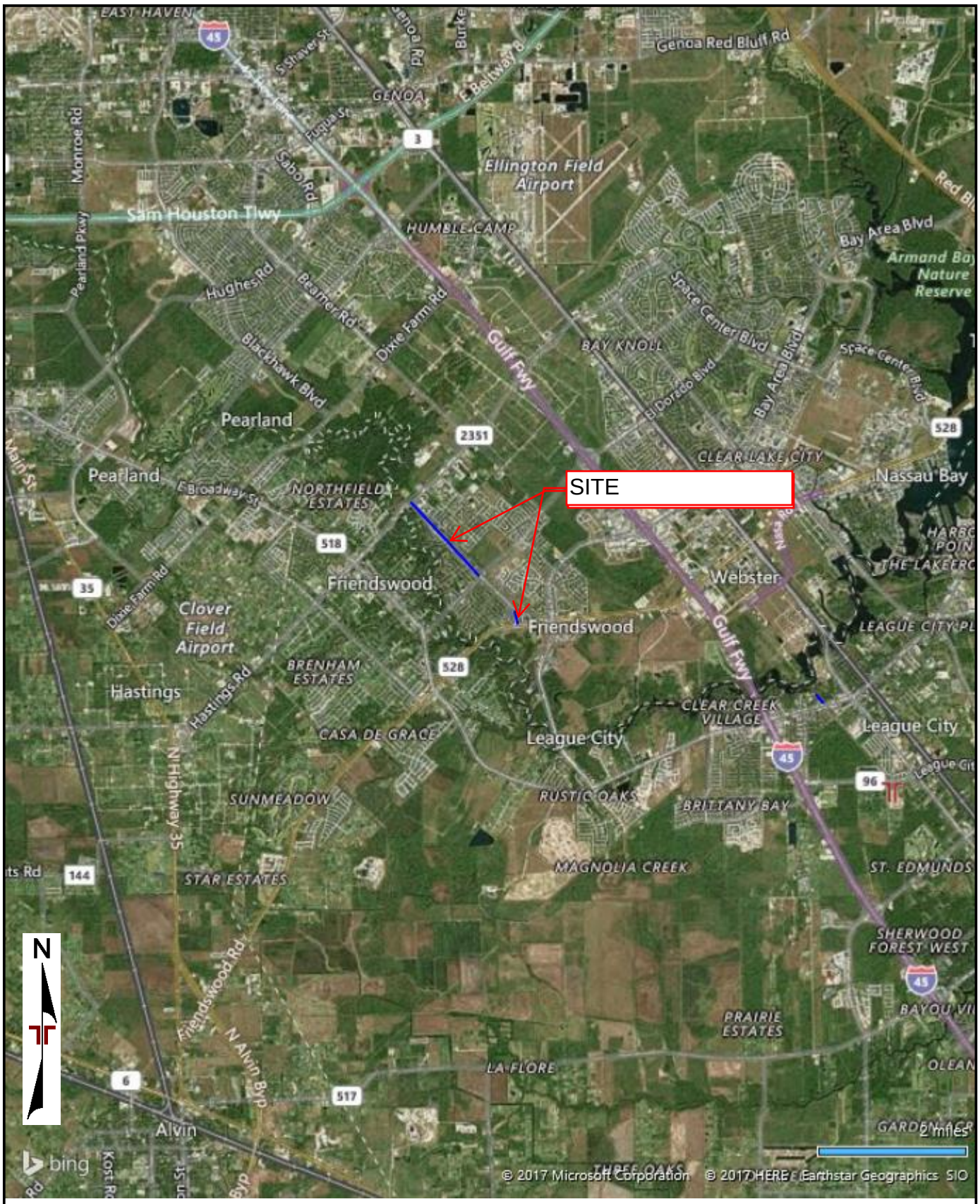


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager:	RK
Drawn by:	RK
Checked by:	BSH
Approved by:	BSH

Project No.	91165096
Scale:	AS SHOWN
File Name:	CAD
Date:	6/1/2017

Terracon
551 League City Pkwy Ste F
League City, TX 77573-5463

SITE LOCATION PLAN

Blackhawk Boulevard Reconstruction Phase II
Blackhawk Boulevard
Friendswood, Texas

Exhibit

A-1

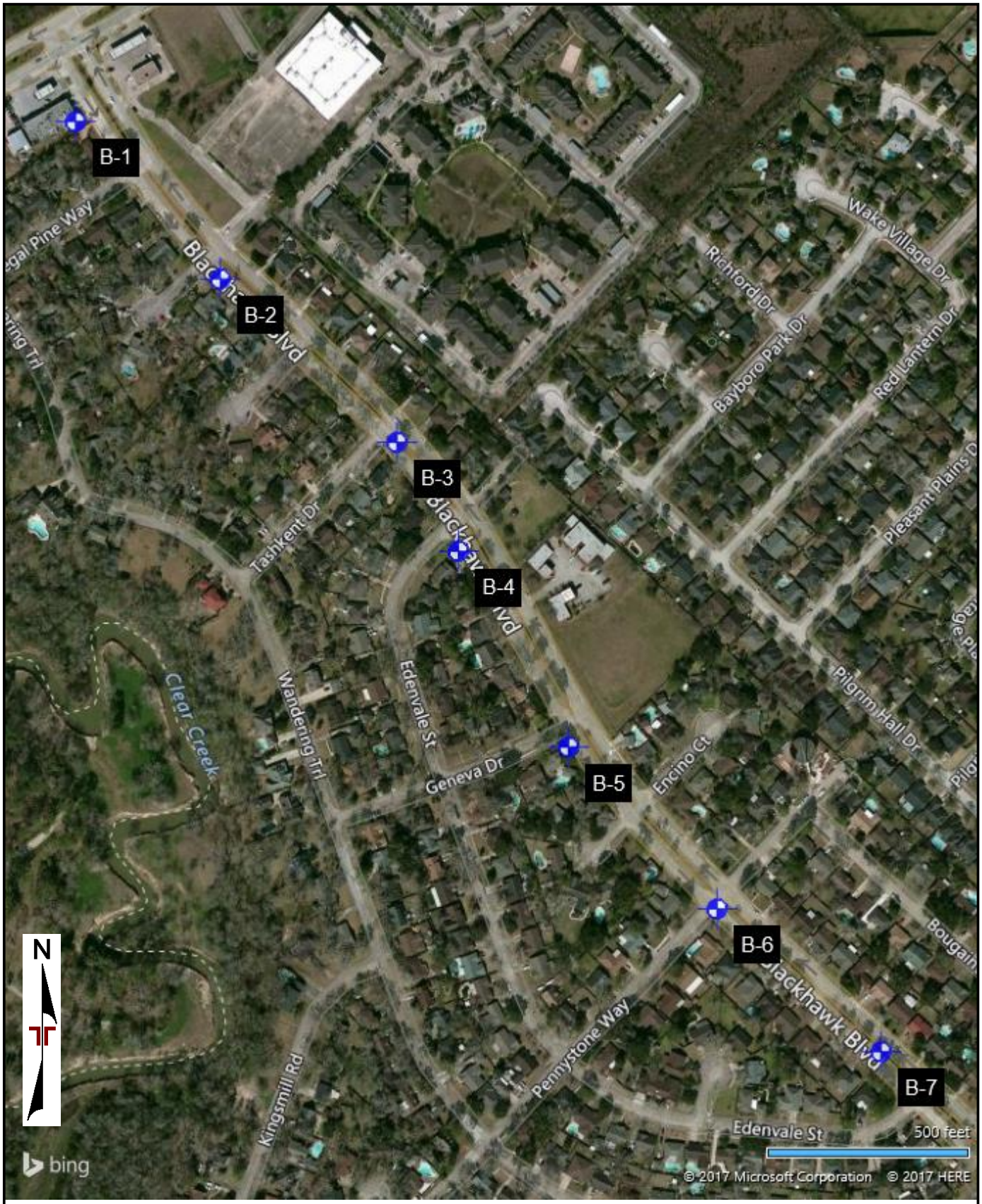


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: RK	Project No. 91165096	Terracon 551 League City Pkwy Ste F League City, TX 77573-5463	BORING LOCATION PLAN Blackhawk Boulevard Reconstruction Phase II Blackhawk Boulevard Friendswood, Texas
Drawn by: RK	Scale: AS SHOWN		
Checked by: BSH	File Name: CAD		
Approved by: BSH	Date: 5/30/2017		

Exhibit

A-2a

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: RK Drawn by: RK Checked by: BSH Approved by: BSH	Project No. 91165096 Scale: AS SHOWN File Name: CAD Date: 5/30/2017	Terracon 551 League City Pkwy Ste F League City, TX 77573-5463	BORING LOCATION PLAN Blackhawk Boulevard Reconstruction Phase II Blackhawk Boulevard Friendswood, Texas	Exhibit A-2b

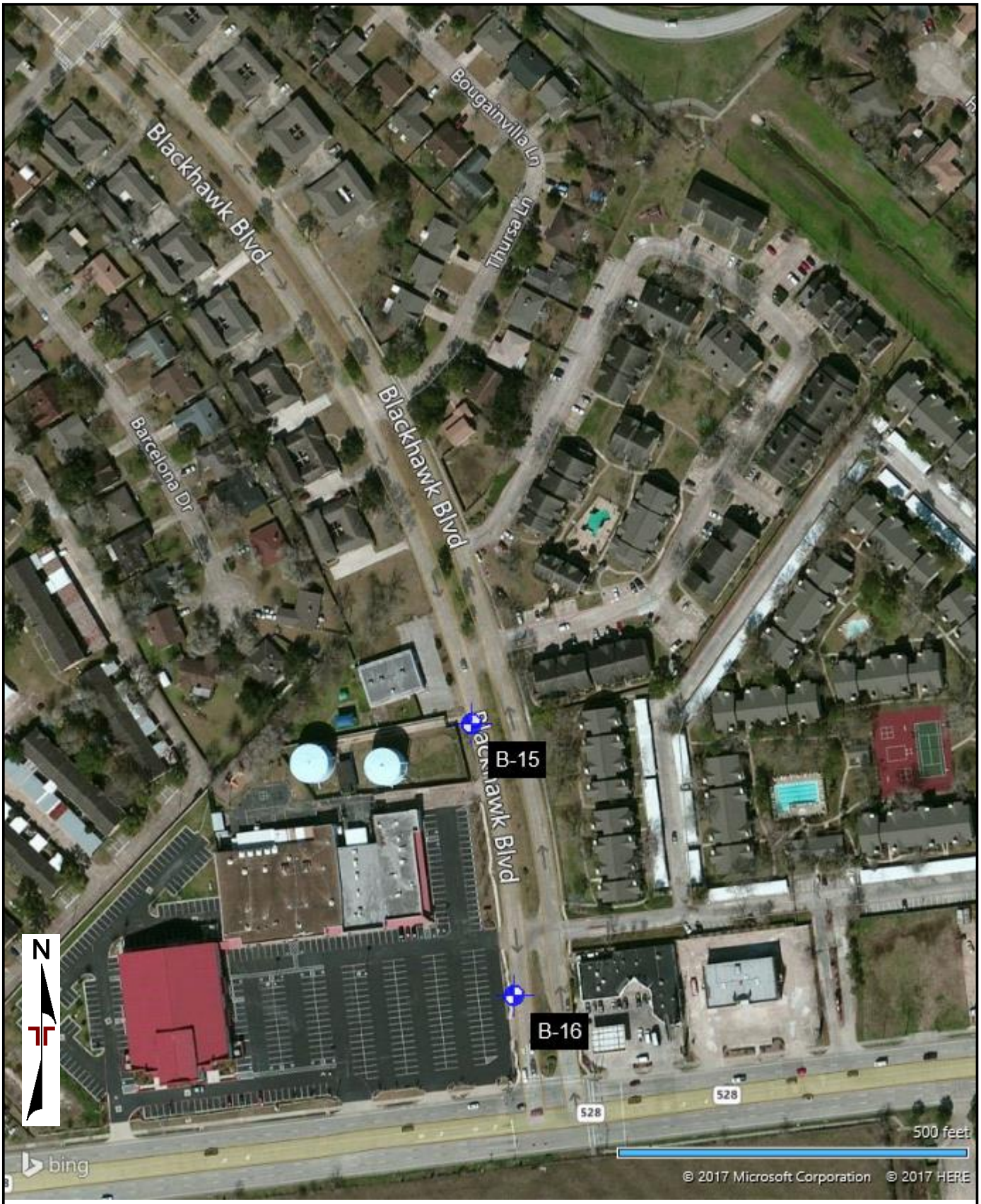


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: RK	Project No. 91165096	Terracon 551 League City Pkwy Ste F League City, TX 77573-5463	BORING LOCATION PLAN Blackhawk Boulevard Reconstruction Phase II Blackhawk Boulevard Friendswood, Texas
Drawn by: RK	Scale: AS SHOWN		
Checked by: BSH	File Name: CAD		
Approved by: BSH	Date: 5/30/2017		Exhibit A-2C

Field Exploration Description

The subsurface conditions were evaluated by drilling sixteen borings, designated B-1 through B-16, to depths that ranged from about 15 to 25 feet along the proposed pavement reconstruction alignment. The existing concrete pavements were augered and removed in order to access the underlying subgrade soils. The borings were drilled using standard truck-mounted drilling equipment at the approximate locations shown on the Boring Location Plan, Exhibits A-2A through A-2C of Appendix A. The borings were located by a hand-held GPS device with an accuracy of ±25 feet. The approximate latitude and longitude of the borings are shown on the Boring Logs. Boring depths were measured from top of the pavement at the time of our field program. Upon completion of our field program, the borings were backfilled with soil cuttings and patched at the surface with concrete.

The Boring Logs, presenting the subsurface soil descriptions, type of sampling used, and additional field data, are presented on Exhibits A-4 through A-19 of Appendix A. The General Notes, which defines the terms used on the logs, are presented on Exhibit C-1 of Appendix C. The Unified Soil Classification System is presented on Exhibit C-2 of Appendix C.

Soil samples were recovered using open-tube samplers. Hand penetrometer tests were performed on soil samples in the field to serve as a general measure of consistency.

Samples were removed from samplers in the field, visually classified, and appropriately sealed in sample containers to preserve their in-situ moisture contents. Samples were returned to our laboratory in League City, Texas.

BORING LOG NO. B-1

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.54499° Longitude: -95.19331°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8												
					1.0 (HP)							
					1.5 (HP)				32		55-17-38	
					3.0 (HP)							
		5			3.0 (HP)		0.94	6	26	102		
					2.0 (HP)							
					2.75 (HP)							
		10			4.0 (HP)				28		66-23-43	
					4.5 (HP)							
15.0		15										

PAVEMENT, Approximately 5 inches of concrete underlain by 4 inches of lime treated subgrade

FAT CLAY (CH), dark gray, medium stiff to very stiff

- gray 2 to 6 feet
- with ferrous nodules below 2 feet
- tan 6 to 8 feet
- reddish brown and light gray below 8 feet

Boring Terminated at 15 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-4-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-2

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.54392° Longitude: -95.19218°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.7												
	PAVEMENT, Approximately 5 inches of concrete underlain by 3 inches of lime treated subgrade				0.75 (HP)							
	FAT CLAY (CH), gray, medium stiff to very stiff				1.0 (HP)		1.20	15	27	99	56-19-37	
	- light gray and tan, with calcareous nodules 2 to 6 feet				1.5 (HP)							
		5			2.0 (HP)							
	- reddish brown below 6 feet				4.0 (HP)		1.64	6.3	26	102	67-24-43	
					4.5 (HP)							
		10			4.5 (HP)							
15.0					4.5 (HP)							
	Boring Terminated at 15 Feet	15										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-5-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-3

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.54281° Longitude: -95.1908°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8		**PAVEMENT**, Approximately 6 inches of concrete underlain by 4 inches of lime treated subgrade											
		FAT CLAY (CH), light gray and tan, soft to stiff				0.5 (HP)							
						1.0 (HP)				22		57-17-40	
						1.75 (HP)							
4.0													
		LEAN CLAY (CL), light gray and tan, very stiff, with ferrous and calcareous nodules	5			2.5 (HP)							
6.0													
		CLAYEY SAND (SC), light gray				4.0 (HP)						28-14-14	40
8.0													
		POORLY GRADED SAND WITH SILT (SP-SM), light gray	10										
										24			8
15.0			15										
		Boring Terminated at 15 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

12 ft While Dry Drilling

12 ft Cave-in at 5 minutes

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-6-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-4

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.54207° Longitude: -95.19032°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8												
					0.75 (HP)							
					3.5 (HP)							
					4.5 (HP)		2.76	5	20	108		
		5			4.5 (HP)							
					4.5 (HP)							
					4.5 (HP)				19		59-22-37	
		10			4.5 (HP)							
					4.5 (HP)							
15.0		15										

PAVEMENT, Approximately 7 inches of concrete underlain by 2 inches of lime treated subgrade

FAT CLAY (CH), light gray and tan, medium stiff to very stiff, with ferrous and calcareous nodules

- with sand pockets 4 to 6 feet

- reddish brown below 6 feet

Boring Terminated at 15 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-7-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-5

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.54074° Longitude: -95.18946°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.6												
	PAVEMENT, Approximately 6½ inches of concrete underlain by 1 inch of lime treated subgrade				1.0 (HP)							
	FAT CLAY (CH), gray, medium stiff to very stiff, with ferrous nodules				1.0 (HP)							
	- light gray 2 to 6 feet				1.5 (HP)							
	- with calcareous nodules below 2 feet	5			2.0 (HP)				24		60-17-43	
	- reddish brown and light gray below 6 feet				2.0 (HP)							
					3.0 (HP)							
		10			4.0 (HP)							
					4.5 (HP)		1.78	5.8	27	96		
15.0		15										
	Boring Terminated at 15 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-8-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-6

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53964° Longitude: -95.1883°

DEPTH	GRAPHIC LOG	DESCRIPTION	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.6		**PAVEMENT**, Approximately 6 inches of concrete underlain by 1 inch of lime treated subgrade		1.0 (HP)							
		FAT CLAY (CH), gray, medium stiff to very stiff, with ferrous nodules		1.0 (HP)							
				1.5 (HP)				30		60-14-46	
		- light gray 4 to 6 feet		2.0 (HP)							
5		- reddish brown and light gray, with slickensides below 6 feet		2.0 (HP)							
				4.0 (HP)							
10				4.0 (HP)		1.21	4.2	28	97		
				4.5 (HP)							
15											
				4.5 (HP)				27		59-22-37	
20.0		***Boring Terminated at 20 Feet***									
20											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 20 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-9-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-7

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53867° Longitude: -95.18702°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.5												
	PAVEMENT, Approximately 5 inches of concrete underlain by 1 inch of lime treated subgrade				1.0 (HP)							
	FAT CLAY (CH), gray, medium stiff to very stiff				1.0 (HP)							
					1.5 (HP)							
	- tan, with calcareous nodules 4 to 6 feet	5			1.5 (HP)				33		80-22-58	
	- reddish brown and light gray, with slickensides below 6 feet				3.0 (HP)							
					4.0 (HP)		1.35	3.3	26	97		
		10			4.5 (HP)							
					4.5 (HP)							
		15										
					4.5 (HP)				29		77-18-59	
20.0		20										
	Boring Terminated at 20 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 20 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-10-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-8

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53773° Longitude: -95.186°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8	**PAVEMENT**, Approximately 6 inches of concrete underlain by 4 inches of lime treated subgrade										
	FAT CLAY (CH), gray, medium stiff to very stiff			1.5 (HP)							
				1.0 (HP)							
	- light gray 2 to 4 feet			1.5 (HP)							
	- reddish brown below 4 feet			1.5 (HP)		0.55	10.8	29	94		
5				2.0 (HP)							
				3.0 (HP)				32		77-18-59	
10				3.5 (HP)							
				4.5 (HP)				30		77-18-59	
15											
				4.5 (HP)							
20.0											
	Boring Terminated at 20 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 20 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/1/2017 Boring Completed: 3/1/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-11-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-9

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53659° Longitude: -95.18482°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8											
				1.0 (HP)							
				1.5 (HP)		0.56	2.8	40	82	52-17-35	
				2.0 (HP)							
5				3.0 (HP)		1.17	10.2	30	89		
				2.5 (HP)							
				3.0 (HP)		0.91	7.7	35	87		
10				3.0 (HP)							
				4.0 (HP)							
15											
				4.5 (HP)							
20											
				4.0 (HP)							
25											

PAVEMENT, Approximately 8½ inches of concrete underlain by 1 inch of lime treated subgrade

FAT CLAY (CH), gray, medium stiff to very stiff, with ferrous nodules

- reddish brown and light gray, with calcareous nodules 8 to 20 feet

- light gray below 20 feet

25.0

Boring Terminated at 25 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 25 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 | Boring Completed: 3/2/2017

Drill Rig: Truck | Driller: Herman Drilling

Project No.: 91165096 | Exhibit: A-12-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-10

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53584° Longitude: -95.1839°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8											
				1.0 (HP)							
				1.0 (HP)							
				1.5 (HP)				36		73-21-52	
				1.75 (HP)							
5				3.0 (HP)							
				4.0 (HP)							
10				4.0 (HP)		0.84	1.8	30	96		
				4.5 (HP)							
15											
				4.5 (HP)							
20											
				4.0 (HP)				24		74-20-54	
25											

PAVEMENT, Approximately 8 inches of concrete underlain by 1 inch of lime treated subgrade

FAT CLAY (CH), gray, medium stiff to very stiff, with ferrous nodules

- light gray 2 to 4 feet
- reddish brown 4 to 20 feet
- with slickensides below 4 feet
- light gray below 20 feet

25.0

Boring Terminated at 25 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 25 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-13-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-11

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53459° Longitude: -95.18226°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
1.0												
					2.0 (HP)							
					2.5 (HP)							
		5			2.5 (HP)				27		73-16-57	
					3.0 (HP)							
					3.0 (HP)							
		10			4.0 (HP)				29		76-21-55	
					4.5 (HP)							
		15										
					4.5 (HP)							
20.0		20										

PAVEMENT, Approximately 8 inches of concrete underlain by 4 inches of lime treated subgrade

FAT CLAY (CH), gray, stiff to very stiff, with ferrous nodules

- light gray 4 to 6 feet

- tan 6 to 10 feet

- reddish brown and light gray below 10 feet

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 20 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-14-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-12

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53387° Longitude: -95.18155°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.7											
				0.75 (HP)							
				1.0 (HP)							
				1.0 (HP)		1.02	3.9	31	93		
5				2.0 (HP)							
				3.0 (HP)				24		74-16-58	
				3.5 (HP)							
10				4.0 (HP)							
				4.5 (HP)							
15											
				4.5 (HP)							
20											

PAVEMENT, Approximately 7 inches of concrete underlain by 1 inch of lime treated subgrade

FAT CLAY (CH), gray, medium stiff to very stiff, with ferrous nodules

- light gray and tan 4 to 8 feet

- reddish brown and light gray below 8 feet

20.0

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 20 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-15-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-13

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.5328° Longitude: -95.18039°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8		**PAVEMENT**, Approximately 8 inches of concrete underlain by 2 inches of lime treated subgrade											
		FAT CLAY (CH), gray, stiff, with ferrous nodules				1.5 (HP)							
						1.5 (HP)							
						1.5 (HP)							
			5			2.0 (HP)							
		- light gray 6 to 8 feet				2.0 (HP)		1.54	15	23	103		
8.0		**LEAN CLAY (CL)**, reddish brown and light gray, stiff to very stiff, with calcareous nodules				3.0 (HP)							
			10			1.75 (HP)							
						2.5 (HP)				17		30-17-13	
			15										
16.0		**CLAYEY SAND (SC)**, reddish brown, with silt and sand seams											
						1.5 (HP)				22			44
20.0		***Boring Terminated at 20 Feet***	20										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 20 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- *12 ft While Dry Drilling*
- *10.5 ft at 5 Minutes*
- *9 ft at 15 Minutes*

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-16-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-14

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.53173° Longitude: -95.17906°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.7		**PAVEMENT**, Approximately 7 inches of concrete underlain by 1 inch of lime treated subgrade				1.0 (HP)							
		FAT CLAY (CH), gray, medium stiff to very stiff				1.0 (HP)				30		66-18-48	
						1.0 (HP)							
		- light gray 4 to 6 feet	5			1.5 (HP)							
		- tan 6 to 10 feet				1.5 (HP)							
						3.5 (HP)				19		52-14-38	
		- reddish brown and light gray below 10 feet	10			4.0 (HP)							
15.0			15			4.0 (HP)							
		Boring Terminated at 15 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-17-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-15

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.52304° Longitude: -95.16994°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8	**PAVEMENT**, Approximately 6 inches of concrete underlain by 3 inches of lime treated subgrade										
	FAT CLAY (CH), gray, medium stiff to very stiff, with ferrous nodules			1.0 (HP)							
				1.0 (HP)							
	- light gray 2 to 6 feet			1.5 (HP)							
5				2.5 (HP)		1.29	15	24	104		
	- reddish brown and light gray 6 to 10 feet			3.5 (HP)							
10.0		▼		2.5 (HP)							
10	**LEAN CLAY (CL)**, tan and light gray, stiff, with silt seams	▽		1.5 (HP)				23		28-17-11	86
15.0		▽		2.0 (HP)							
15	***Boring Terminated at 15 Feet***										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- ▽ *12 ft While Dry Drilling*
- ▽ *10 ft at 5 Minutes*
- ▼ *9 ft at 15 Minutes*

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-18-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

BORING LOG NO. B-16

PROJECT: Backhawk Boulevard Reconstruction Phase II

CLIENT: HDR Engineering, Inc. Houston, Texas

SITE: Blackhawk Boulevard Friendswood, Texas

LOCATION See Exhibit A-2

Latitude: 29.52198° Longitude: -95.16975°

DEPTH	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
0.8	**PAVEMENT**, Approximately 6 inches of concrete underlain by 4 inches of lime treated subgrade										
	FAT CLAY (CH), gray, medium stiff to vry stiff, with ferrous nodules			1.0 (HP)							
				1.5 (HP)				29		74-20-54	
	- light gray 2 to 6 feet			2.0 (HP)							
5				3.0 (HP)							
	- tan, with calcareous nodules 6 to 8 feet			3.0 (HP)							
8.0											
	LEAN CLAY WITH SAND (CL), tan, very stiff	▼		2.5 (HP)				21		44-15-29	74
10		▽		3.5 (HP)							
		▽									
15.0				2.5 (HP)							
15	***Boring Terminated at 15 Feet***										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Dry augered to 15 feet.

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched at the surface with concrete.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

- ▽ *12 ft While Dry Drilling*
- ▽ *10.5 ft at 5 Minutes*
- ▼ *9 ft at 15 Minutes*

Terracon
551 League City Pkwy Ste F
League City, TX

Boring Started: 3/2/2017 Boring Completed: 3/2/2017

Drill Rig: Truck Driller: Herman Drilling

Project No.: 91165096 Exhibit: A-19-

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 03135153A-PROJ LOG 91165096.GPJ TERRACON_DATATEMPLATE.GDT 6/5/17

APPENDIX B

LABORATORY TESTING

Laboratory Testing

Soil samples were tested in the laboratory to measure their dry unit weight (ASTM D7263) and natural water content (ASTM D2216). Unconfined compressive strength tests (ASTM D2166) were performed on selected samples and a calibrated hand penetrometer was used to estimate the approximate unconfined compressive strength of some cohesive samples. The calibrated hand penetrometer values have been correlated with unconfined compression tests and provide a better estimate of soil consistency than visual examination alone. Selected samples were also classified using the results of Atterberg limits (ASTM D4318) and amount of soil finer than No. 200 sieve (ASTM D1140). The test results are provided on the Boring Logs included in Appendix A and in **"3.2 Typical Profile"** section of this report.

ASTM procedural standards noted above are for reference methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Descriptive classifications of the soils indicated on the Boring Logs are in general accordance with the enclosed General Notes and the Unified Soil Classification System. Also shown are estimated Unified Soil Classification Symbols. A brief description of this classification system is attached to this report. Classification of the soil samples was generally determined by visual manual procedures.

Samples not tested in the laboratory will be stored for a period of 30 days subsequent to submittal of this report and will be discarded after this period, unless we are notified otherwise.

APPENDIX C

SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

Auger Cuttings

Shelby Tube

WATER LEVEL

Water Initially Encountered

Water Level After a Specified Period of Time

Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

N	**Standard Penetration Test Resistance (Blows/Ft.)**
(HP)	**Hand Penetrometer**
(T)	**Torvane**
(DCP)	**Dynamic Cone Penetrometer**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Terracon

Exhibit: C-1

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

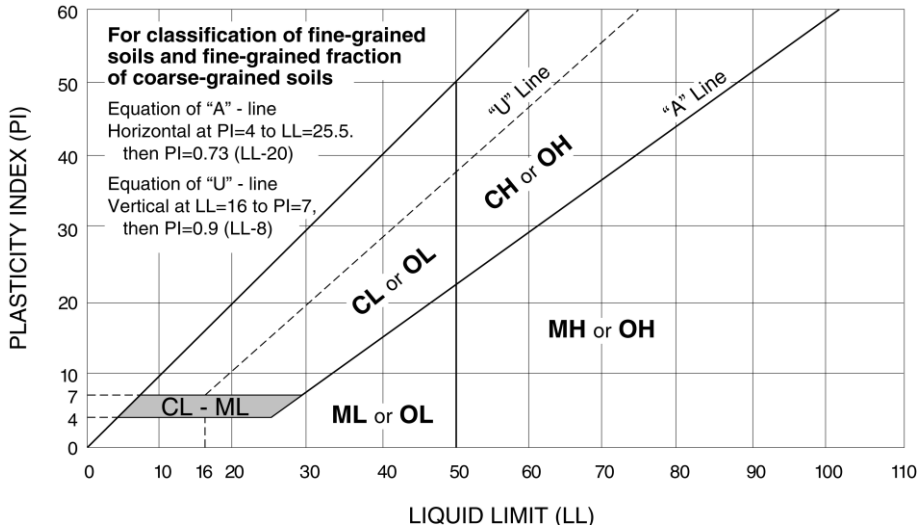
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

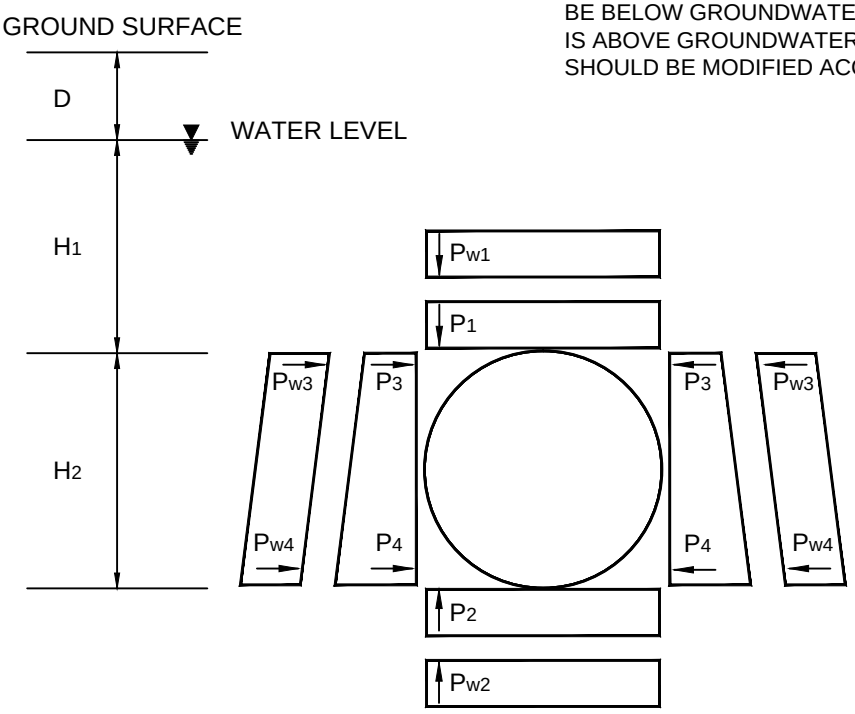
[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



NOTE: THE EQUATIONS PRESENTED ON THIS SHEET ASSUME THE TUNNEL TO BE BELOW GROUNDWATER. IF TUNNEL IS ABOVE GROUNDWATER, THE EQUATIONS SHOULD BE MODIFIED ACCORDINGLY.

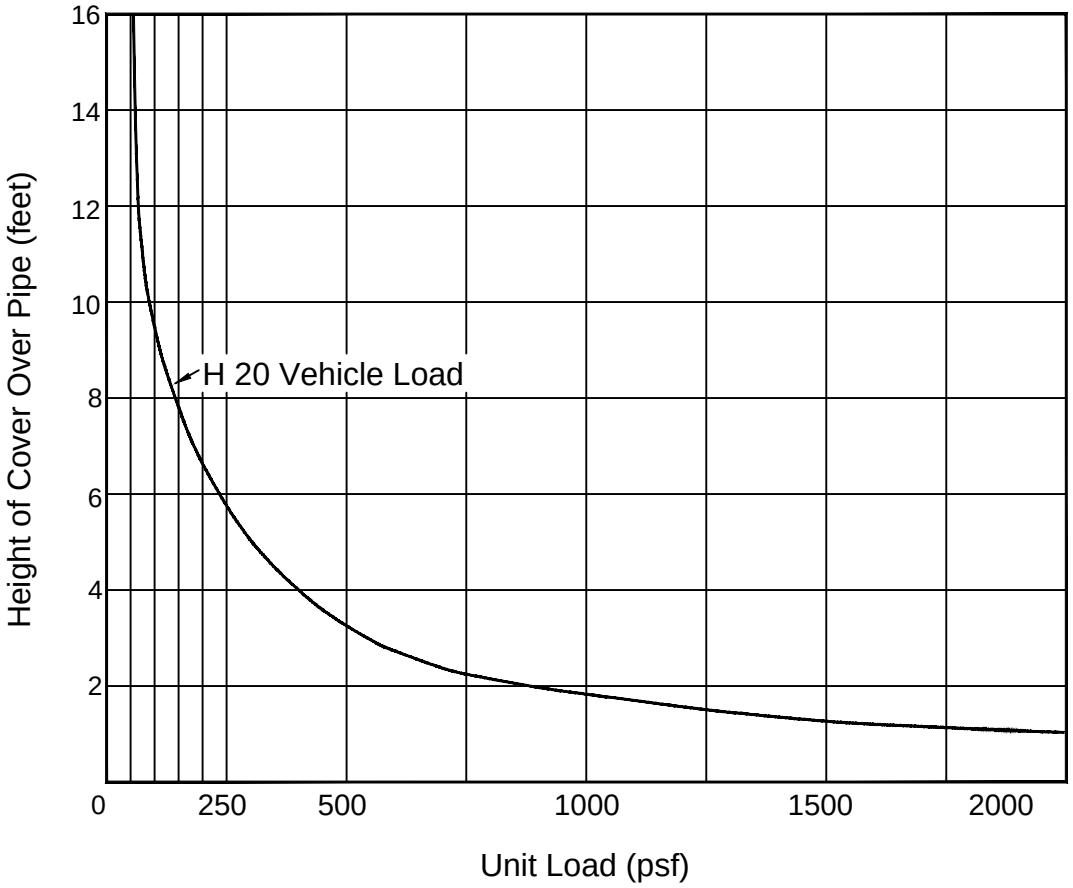


γ_b = Soil Buoyant Density(pcf)
γ_d = Soil Dry Density (pcf)
γ_t = Soil Wet Density (pcf)
γ_{water} = Water Density (pcf)
K_a = Coefficient of Active Earth Pressure
D = Depth to Water Table(ft)
q = Surcharge Load

Vertical Pressure	P_1	$= \gamma_w D + (\gamma_w - \gamma_{water})H_1 + q$
Water Pressure (top)	P_{W1}	$= H_1 \gamma_{water}$
Over Burden Pressure		$= P_1 + P_{W1}$
Soil Pressure (bottom)	P_2	$= P_1 + (\gamma_w - \gamma_{water})H_2$
Water Pressure (bottom)	P_{W2}	$= P_{W1} + \gamma_{water} H_2$
$P_{W1} = P_{W3}$		$P_{W2} = P_{W4}$
Lateral Soil Pressure (top)	P_3	$= K_a P_1$
Lateral Soil Pressure (bottom)	P_4	$= K_a P_2$
Total Lateral Pressure (top)		$= P_{W3} + P_3$
Total Lateral Pressure (bottom)		$= P_{W4} + P_4$

F:\Projects_2014\018_TERRACON\018-006_LEAGUE_CITY\018-006-91145038_Countryside Force Main and Lift Station\Working_Drawings\91145038 C-3.dwg

Project Mng. DM	Project No. 91145038	Terracon Consulting Engineers & Scientists	TUNNEL LINER LOADS	Exhibit
Drawn By: CSI. INC	Scale: NOT TO SCALE		Blackhawk Boulevard Reconstruction Friendswood, Texas	C-3
Checked By: BP	File No: 91145038 C-3.dwg			
Approved By: TS	Date: 06-26-2014	511 Link Road, Suite F League City, Texas 77573 PH. (281) 557-2900 FAX. (281) 557-2990		



REFERENCE: PRINCIPLES OF STRUCTURAL PERFORMANCE OF BURIED PIPES
REYNOLD K. WATKINS (1977)

Project Mng. DM	Project No. 91145038	Terracon Consulting Engineers & Scientists	TUNNEL LINER LOADS,H20 HIGHWAY LOAD	Exhibit
Drawn By: CSI.INC	Scale: NOT TO SCALE		Blackhawk Boulevard Reconstruction Friendswood, Texas	C-4
Checked By: BP	File No: 91145038 C-4.dwg			
Approved By: TS	Date: 06-26-2014	511 Link Road, Suite F League City, Texas 77573 PH. (281) 557-2900 FAX. (281) 557-2990		

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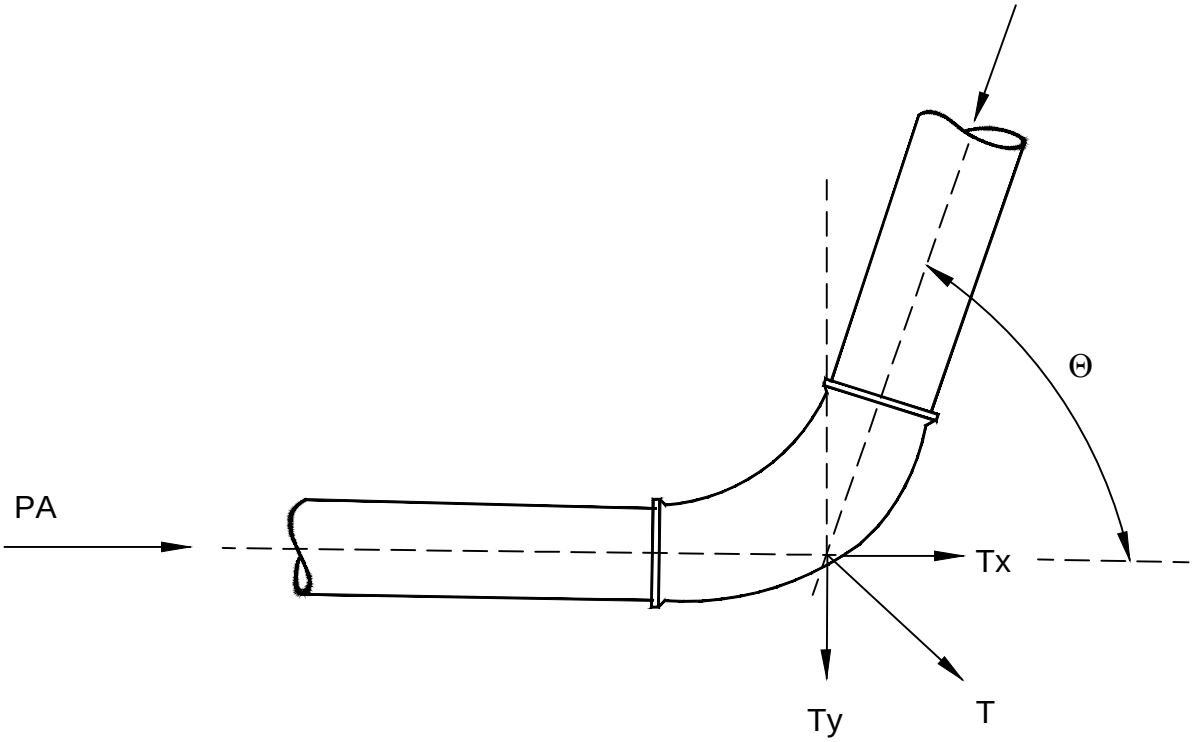

$$Tx = PA(1 - \cos\Theta)$$

$$Ty = PA(\sin\Theta)$$

$$T = 2PA(\sin\Theta/2)$$

Where:

T = Resultant Thrust Force acting on the pipe bend
Tx = Component of Thrust Force in x-direction
Ty = Component of Thrust Force in y-direction
P = Maximum sustained pressure
A = Cross-sectional area of the pipe
Θ = Angle of pipe bend

REFERENCE: AMERICAN WATER WORKS ASSOCIATION MANUAL M9 (1995)
CHAPTER 9: DESIGN OF THRUST RESTRAINTS.

Project Mng.: DM	Project No.: 91145038	Terracon Consulting Engineers & Scientists	THRUST FORCE ACTING ON A PIPE BEND
Drawn By: CSI.INC	Scale: NOT TO SCALE	511 Link Road, Suite F League City, Texas 77573	Blackhawk Boulevard Reconstruction
Checked By: BP	File No: 91145038 C-5.dwg	PH. (281) 557-2900 FAX. (281) 557-2990	Friendswood, Texas
Approved By: TS	Date: 06-26-2014		Exhibit C-5

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APPENDIX B

ENVIRONMENTAL SITE ASSESSMENT-1 REPORT

Memorandum

Date:	Friday, June 07, 2024
Project:	Blackhawk Boulevard Reconstruction Project
To:	City of Friendswood
From:	Angie Quiroga Torres, HDR Engineering Inc. & Todd Wilson, HDR Engineering Inc.
CC:	Ngoc Le, HDR Engineering Inc
Subject:	**Phase I Environmental Site Assessment Memorandum Update**

BACKGROUND

HDR Engineering, Inc. (HDR) has conducted a Phase I Environmental Site Assessment (Phase I ESA) on February 2023, and a Phase II ESA on March 2023 of the Blackhawk Boulevard Reconstruction Phase II Package B and C Project (Project) located in Friendswood, Harris County, Texas. The Phase I ESA Memorandum Update has been prepared for the City of Friendswood (City) for the purpose of updating previous ESA findings prior to demolition and reconstruction of Blackhawk Boulevard Package C.

The property, referenced herein as the "Project Corridor", consists of a 0.79-mile, non-contiguous section of Blackhawk Boulevard including a four-lane divided street with raised, vegetated medians, and concrete middle turning lanes at regular intervals. The Project Corridor begins and ends at two major roadway intersections, farm-to-market (FM) 2351 and FM 528, respectively, and is intersected frequently by minor residential streets. The properties adjacent to the Project Corridor are residential homes constructed in the 1970s, commercial strip malls, and fuel stations. Depth to groundwater in the Project Corridor ranges from approximately 9 to 18 feet below land surface. Surface water flows to the southwest, toward Clear Creek.

The Blackhawk Boulevard Reconstruction Phase II Project is split into two packages, Package B and Package C:

- Package "B" is currently under construction and aims to reconstruct Blackhawk boulevard from the intersection with Geneva Drive southeast to Edenvale Street (0.24-mile).

- Package "C" is proposed to reconstruct Blackhawk from the intersection with FM 2351 and tie to Package B project limits just before the Geneva Drive intersection (0.39-mile), and from FM 528 to the southern boundary of Thursa Lane (0.16-mile). Reconstruction of Package C includes installation of storm sewer (24-inch to 42-inch reinforced concrete pipe and 5 by 3 feet reinforced concrete box culverts) and 2-inch to 12-inch water main ranging from approximately 5 to 10 feet depths below ground surface. The Project also includes the installation of a 24-inch transmission water line extending from FM 2351 to Edenvale Street. Installation of the proposed water line will consist of trenchless and open cut excavations ranging from approximately 8 to 18 feet depths below ground surface.

Please refer to the Project Location and Project Detail Maps in **Attachment A** (Figures 1 and 2) for further detail.

This Phase I ESA Memorandum Update was performed to identify new Recognized Environmental Conditions (RECs) and verify the status of previous RECs that may adversely affect the Project Corridor. This Phase I ESA Memorandum Update was completed by requesting an updated database and completion of a new site reconnaissance, which conform to ASTM International (ASTM) Practice E1527-21. This report includes a summary of the site reconnaissance conducted on May 6, 2024, a review of environmental databases, a review of historical data sources, and a summary of new findings. Any exceptions to or deletions from these ASTM practices are described later in this report.

The following sections discuss previous Phase I ESA and Phase II ESA findings, as well as updates and new findings from a review of an Environmental Data Resources (EDR) database report dated on April 9, 2024 (**Attachment B**).

SUMMARY OF PREVIOUS PHASE I AND PHASE II ESA FINDINGS

Based on a review of the Phase I ESA report performed in February 2023, no RECs were identified for Package B of the Blackhawk Boulevard Reconstruction Phase II Project plans. However, six RECs were previously identified for Package C of the Blackhawk Boulevard Reconstruction Phase II Project plans. These RECs are listed below:

- Randolph Park / Frankie Carter Randolph (5100 FM 2351) is considered to be a REC based on the active Leaking Petroleum Storage Tank (LPST) cleanup, impacted groundwater, and pending Final Site Closure Report, which was due to the Texas Commission on Environmental Quality (TCEQ) on December 20, 2022.
- 1.49 Jet Cleaners (3670 FM 528) is considered to be a REC based on the active Groundwater Contamination Case (GCC) and associated Voluntary Cleanup Program (VCP) for remediation of Total Petroleum Hydrocarbon (TPH), Semi-volatile Organic Compounds (SVOCs), chlorinated solvents, and metals.
- Circle K 2741409 / Valero Energy Station and Corner Store (5091 FM 2351) is considered to be a REC based on the age, high capacity of gasoline and diesel, and proximity to the Project Corridor of the three active Underground Storage Tanks (USTs).
- Corner Food Mart (3698 FM 528) is considered to be a REC based on the age, high capacity of gasoline and diesel, and proximity to the Project Corridor of the three active USTs.
- Speedy Food Mart (3702 FM 528) is considered to be a REC based on the site history of a LPST and completed cleanup with final concurrence issued on February 15, 2017. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.
- Smart Stop Food Mart 5103 (5103 FM 2351) is considered to be a REC based on the site history of an LPST and completed cleanup with final concurrence issued on June 28, 2017. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.

Due to the presence of RECs in the vicinity of the Project Corridor, a Phase II ESA investigation was performed in March 2023 to further review potential for soil contaminants on site. The soil investigation consisted of five soil boring samples collected from a depth interval between 0 to 10 feet using a direct push drill rig. Soil boring samples were laboratory tested for Volatile Organic Compounds (VOCs), SVOCs / Polycyclic aromatic hydrocarbons (PAH), TPH, RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), Polychlorinated Biphenyls (PCBs), and pH. Results from the soil investigation determined that concentration levels for all samples were below residential action levels and no TCEQ notification or reporting was required.

GOVERNMENT DATABASE SEARCH PERFORMED ON APRIL 2024

A government database search (**Attachment B**) was conducted by EDR on April 9, 2024. The EDR report listed fifty-eight (58) regulatory records, of which twelve (12) are new listings. The new database listings are attributed to two additional databases, UST FINDER and UST FINDER RELEASE that were incorporated in the EDR report in 2023, and a groundwater contamination case (GCC) not listed previously. **Table 1** below summarizes the twelve (12) new regulatory records and database descriptions for each new listing.

Table 1. Environmental Database Descriptions and New Listings

Database	Description	Listings located within the Search Radius
UST FINDER	The Environmental Protection Agency (EPA) developed the UST Finder, a web map application containing a comprehensive, state-sourced national map of underground storage tank (UST) and leaking UST (LUST) data. It provides the attributes and locations of active and closed USTs, UST facilities, and LUST sites from states and from Tribal lands and US territories. UST Finder contains information about proximity of UST facilities and LUST sites to surface and groundwater public drinking water protection areas; estimated number of private domestic wells and number of people living nearby; and flooding and wildfires.	6
UST FINDER RELEASE	US EPA's UST Finder data is a national composite of leaking underground storage tanks. This data contains information about, and locations of, leaking underground storage tanks. Data was collected from state sources and standardized into a national profile by EPA's Office of Underground Storage Tanks, Office of Research and Development, and the Association of State and Territorial Solid Waste Management Officials.	5
GCC	Texas Water Code, Section 26.406 requires the annual report to describe the current status of groundwater monitoring activities conducted or required by each agency at regulated facilities or associated with regulated activities. The report is required to contain a description of each case of groundwater contamination documented during the previous calendar year. Also, to be included, is a description of each case of contamination documented during previous periods for which voluntary clean up action was incomplete at the time the preceding report was issued. The report is also required to indicate the status of enforcement action for each listed case.	1

The twelve (12) regulatory records consist of six (6) listings for the UST FINDER database, five (5) listings for the UST FINDER RELEASE database, and one (1) for the GCC database. Eight (8) of the listings, which are associated with five sites, were determined to be listings of concern to the Project Corridor. The remaining listings were determined to not be of concern to the Project Corridor based on distance, hydraulic gradient, geology, or clean-up status. A summary of the five sites of concern to the Project Corridor and their respective listings is included below.

- Randolph Park / Frankie Carter Randolph Park (5100 FM 2351) registered one (1) active groundwater contamination case in the TCEQ GCC database (TCEQ, 2024[1]) and was registered in the UST FINDER database. The GCC was identified in a previous Phase I ESA investigation but was not registered in the EDR Report GCC database listing. GCC reports noted that an investigation has been issued in 2020 to address contamination incidents, and engineering controls were required to prevent further gasoline leaking. The TCEQ listed the leaking tank as temporarily out of service in September 2022. A Final Site Closure Report was submitted to the TCEQ on December 19, 2022. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.
- Circle K 2741409 / Valero Energy Station and Corner Store (5091 FM 2351) is listed in the UST FINDER database. The site contains three active 12,000 gallon USTs installed in 1991. The facility reported a violation for not meeting the criteria for tank cathodic protection. In 2021, TCEQ received compliance documentation and issued a resolution of the violation.
- Corner Food Mart (3698 FM 528) is listed in the UST FINDER database. The site contains one (1) active 4,000 and two (2) active 8,000-gallon USTs installed in 1987. In October 2021, the facility reported violations for not updating out of service tank registrations, and not providing documentation for rectifier inspections, operator certificates, and corrosion protection tests. All violations were resolved in November 2021.
- Speedy Food Mart (3702 FM 528) is listed in the UST FINDER and UST FINDER RELEASE databases. The site is identified in the databases as it contained three inactive USTs, which were removed from the ground in 2006, and had an LPST with final concurrence issued on February 15, 2017.
- Smart Stop Food Mart/ Sams Mart 5/ Smart Stop 6 (5103 FM 2351) is listed in the UST FINDER and UST FINDER RELEASE databases. The site is identified in the databases as it contains three active 10,000-gallon USTs and had a LPST with final concurrence issued on June 28, 2017.

The Orphan Summary (unmappable sites due to insufficient address information) listed 145 sites within the buffer zone. The sites were determined to not be of concern to the Project Corridor based on distance, database type, and additional historic records review. Conditions for site 1.49

[1] TCEQ. 2024. Texas Groundwater Contamination Viewer. Available online: https://www.tceq.texas.gov/gis/groundwater-contamination-viewer

Jet Cleaners (3670 FM 528) remain unchanged and no new records or updates were identified other that those discussed in the previous Phase I ESA report dated in February 2023.

HISTORICAL AERIAL PHOTOGRAPH REVIEW

Historical aerial photographs from 2017 to 2024 were reviewed. A summary is provided below.

2017: Clear Creek located northwest of the Project Corridor was flooded likely due to hurricane Harvey.

2018: Clear Creek returns to its regular size.

2019: The western vegetated portion containing trees and located adjacent to Clear Creek had been cleared and construction equipment was noted.

2020: Imperial Drive Loop, west of Clear Creek had been disconnected and is no longer a single road. A small, vegetated portion located southwest of the Project Corridor had been cleared and construction equipment was noted.

2021: Cleared vegetation adjacent to Clear Creek had been revegetated with grass and had been labeled as a storm water bank. Two access roads had been constructed within the storm water bank. Clear Creek Community Church 528 campus was constructed in the previously cleared vegetation portion located southwest of the Project Corridor.

2022-2024: The Project Corridor was relatively unchanged.

SITE RECONNAISSANCE AND PHOTOS

A site reconnaissance was conducted by HDR environmental personnel, Laura Duffie on May 6, 2024. A review of the Project Corridor noted the following conditions:

- The Project Corridor was adjacent to majority single-family residential homes and a few multi-family residential homes, convenience stores, and fueling stations. Underground pipelines, transmission lines with pole-mounted transformers, and subsurface utilities markers were noted within the Project Corridor.
- No visible exposed hazardous waste was observed within the road Right Of Way.
- No large areas of stressed vegetation, unusual odors, or large indicators of spills were identified.
- Two active gas stations were located at the northern end of the Project Corridor. An inactive gas station was located at the southern end of the Project Corridor.
- Corner Food Mart is now a closed Food Mart Beer and Wine convenience store. The Shell gas station UST, associated with the Corner Food Mart, has been removed and the site is under construction.
- Construction of Package “B” of Blackhawk Boulevard was noted from the intersection with Geneva Drive southeast to Edenvale Street. Construction best management practices (BMPs) installed wattles near stormwater drains within the Package B area.

Photographs of the Project Corridor taken during the site visit are included in **Attachment C**.

RECOGNIZED ENVIRONMENTAL CONDITIONS (RECS)

The ASTM E 1527-21 defines a REC as: "The presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not recognized environmental conditions."

ASTM E 1527-21 defines release as a release of any hazardous substance or petroleum product shall have the same meaning as the definition of "release" in CERCLA 42 U.S.C. § 9601(22)).

The ASTM definition of a REC is being used in this evaluation to identify environmental conditions that could impact the Project Corridor, but it is limited to only the data gathered and outlined in this memorandum.

FINDINGS

This section includes a summary of the site reconnaissance conducted on May 6, 2024, a review of environmental databases, and a review of historical data sources. Findings of the Project Corridor are noted below:

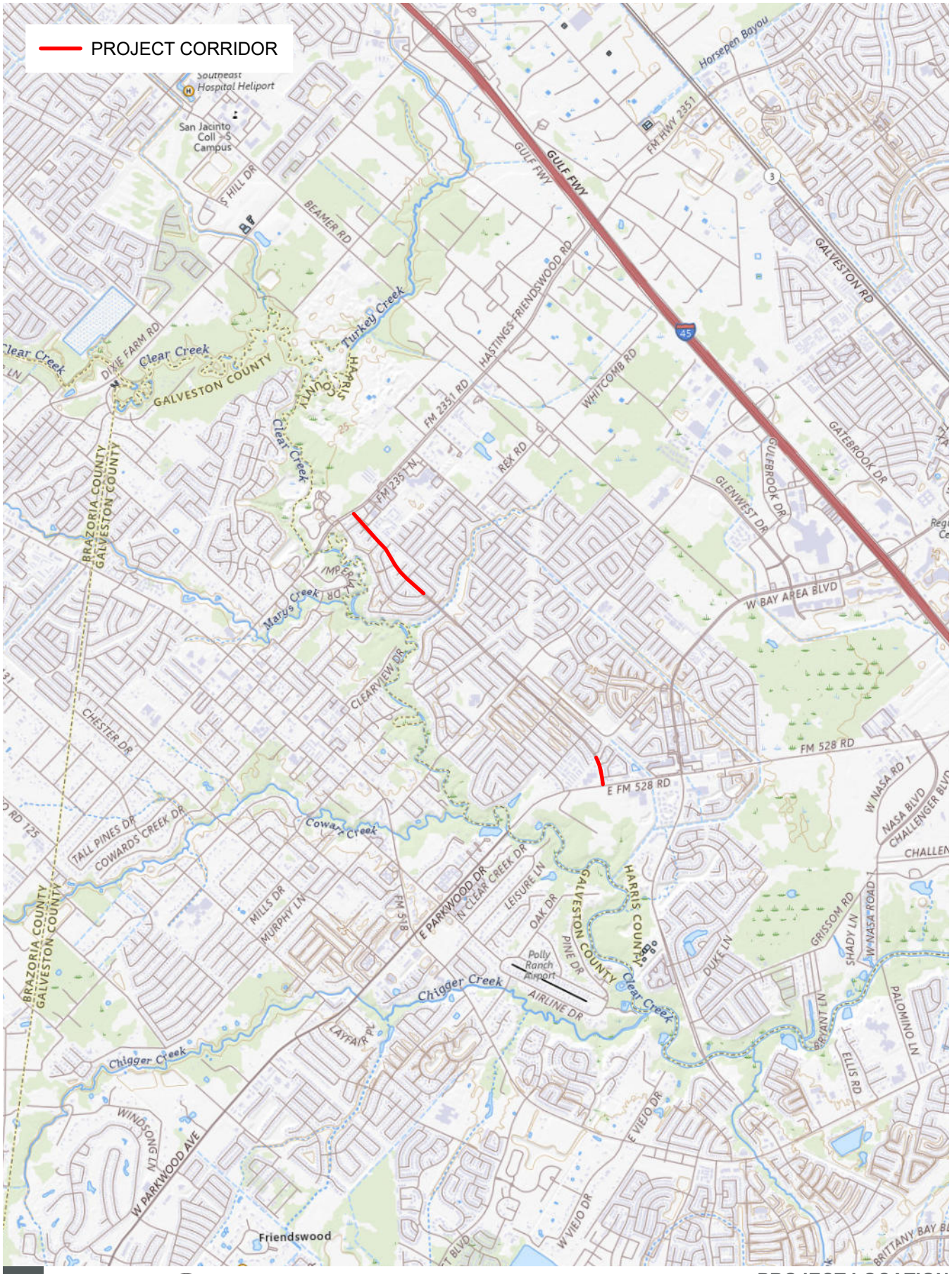
- Twelve (12) new records were listed in the EDR Report under the GCC, UST FINDER, and UST FINDER RELEASE databases. The records were associated with previous identified RECs.
- Eight (8) new Orphan Summary sites were listed in the EDR Report. New sites were determined to not be of concern to the Project Corridor based on distance, database type, and additional historic records review.
- Sites Circle K 2741409 / Valero Energy Station and Corner Store (5091 FM 2351); Corner Food Mart (3698 FM 528); Speedy Food Mart (3702 FM 528); and Smart Stop Food Mart/ Sams Mart 5/ Smart Stop 6 (5103 FM 2351) have documented compliance documentation and resolved violations. Site Randolph Park / Frankie Carter Randolph Park (5100 FM 2351) provided a Final Site Closure Report to the TCEQ on December 19, 2022. However, this site still appears active in the GCC database. Site 1.49 Jet Cleaners (3670 FM 528) still has an active GCC unresolved case.
- A review of historical aerial photographs from 2017 to 2024 resulted in no major landscape changes within the Project Corridor. A storm water bank and Clear Creek Community Church were constructed northwest and southwest of the Project Corridor respectively.
- The site reconnaissance was conducted on May 6, 2024. Similarly to previous Phase I ESA reports, the Project Corridor was adjacent to majority single-family residential homes and a few multi-family residential homes, convenience stores, and fueling stations. Underground pipelines, transmission lines with pole-mounted transformers and subsurface utilities markers were noted within the Project Corridor. Construction of Package "B" of Blackhawk Boulevard was noted from the intersection with Geneva Drive southeast to Edenvale Street.

- Phase II ESA investigations determined lack of VOCs, SVOCs/PAH, TPH, RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), and PCBs presence in the Project Corridor subsurface. Results determined that concentration levels for all samples were below residential action levels and no TCEQ notification or reporting was required.

CONCLUSION

Other than previously discussed RECs, no new RECs were identified in this Phase I ESA Memorandum Update. No new GCC or LPST not previously discussed were identified in this review. Based on results of the Phase II ESA performed in March 2023, no contaminants for the analytes tested were identified within the Project Corridor. HDR recommends a materials management plan and health and safety plan be completed. Each plan directs construction personnel on the known risks and provides guidance on proper management of soil disposal as required, if encountered. Previous Phase I ESA reports, Phase II ESA reports, and materials management plans can be supporting documentation to bid specifications along with this Phase I ESA Memorandum Update. These plans can also help constructors develop an appropriate health and safety plan for construction.

ATTACHMENT A – PROJECT LOCATION FIGURES



0 2,000 Feet

PROJECT LOCATION

BLACKHAWK BOULEVARD PHASE I ESA MEMORANDUM UPDATE

FIGURE 1

O:\10357152_10191_BLACKHAWK_BLVD_RECONSTRUCTION\7.2_WIP\MAP_DOCS\ESA\ESA2.APRX DATE: 5/7/2024

0 1,500 FEET

PROJECT DETAIL

BLACKHAWK BOULEVARD PHASE I ESA MEMORANDUM UPDATE

FIGURE 2

O:\10357152_10191_BLACKHAWK_BLVD_RECONSTRUCTION\7.2_WIP\MAP_DOCS\ESA\ESA2.APRX DATE: 5/7/2024

ATTACHMENT B – GOVERNMENTAL DATABASE SEARCH

(APRIL 2024)

Blackhawk Boulevard Reconstruction
Blackhawk Boulevard Reconstruction
Friendswood, TX 77546

Inquiry Number: 7618799.1s
April 09, 2024

EDR Area / Corridor Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527 - 21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E2247 - 16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E1528 - 22) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

SUBJECT PROPERTY INFORMATION

ADDRESS

BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

TARGET PROPERTY SEARCH RESULTS

The Target Property was identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

STANDARD ENVIRONMENTAL RECORDS

Lists of state and tribal leaking storage tanks

LPST: Leaking Petroleum Storage Tank Listing

A review of the LPST list, as provided by EDR, and dated 09/25/2023 has revealed that there is 1 LPST site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	***5100 FM 2351 RD***	***A1 / 4***	***21***
LPST Id: 121158			
CA Status: 6A - FINAL CONCURRENCE ISSUED			

RDR: Release Determination Report Listing

A review of the RDR list, as provided by EDR, and dated 01/08/2024 has revealed that there are 2 RDR sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	***5100 FM 2351 RD***	***A1 / 4***	***21***
FRANKIE CARTER RANDO	5100 FM 2351	A4 / 4	58

EXECUTIVE SUMMARY

Lists of state and tribal registered storage tanks

UST: Petroleum Storage Tank Database

A review of the UST list, as provided by EDR, and dated 12/07/2023 has revealed that there is 1 UST site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	***5100 FM 2351 RD***	***A1 / 4***	***21***
Facility Status: ACTIVE Facility Id: 42239 Facility Num: 80352 AI Number: 391010132002139			

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

CENTRAL REGISTRY: CENTRAL REGISTRY

A review of the CENTRAL REGISTRY list, as provided by EDR, and dated 09/30/2022 has revealed that there is 1 CENTRAL REGISTRY site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	5100 FM 2351 RD	A3 / 4	57

Other Ascertainable Records

FINDS: Facility Index System/Facility Registry System

A review of the FINDS list, as provided by EDR, and dated 11/03/2023 has revealed that there is 1 FINDS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO Registry ID:: 110033995318	5100 FM 2351 RD	A6 / 4	60

Financial Assurance: Financial Assurance Information Listing

A review of the Financial Assurance list, as provided by EDR, has revealed that there is 1 Financial Assurance site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	***5100 FM 2351 RD***	***A1 / 4***	***21***
Database: Financial Assurance 2, Date of Government Version: 12/07/2023 Facility Id: 80352 AI: 42239			

Finass ID: 286183
Finass ID: 269984
Finass ID: 286181
Finass ID: 251030
Finass ID: 251992
**Additional key fields are available in the Map Findings section*

GCC: Groundwater Contamination Cases

A review of the GCC list, as provided by EDR, and dated 12/31/2022 has revealed that there is 1 GCC site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	***5100 FM 2351 RD***	***A1 / 4***	***21***

TIER 2: Tier 2 Chemical Inventory Reports

A review of the TIER 2 list, as provided by EDR, and dated 12/31/2012 has revealed that there are 2 TIER 2 sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
RANDOLPH PARK	5100 FM 2351	A2 / 4	45
Facility Id/Name: FATR20114ZPJTY02MFY0			
Facility Id/Name: FATR20084ZPJTY02MFY0			
Facility Id/Name: FATR20094ZPJTY02MFY0			
Facility Id/Name: FATR20104ZPJTY02MFY0			
Facility Id/Name: FATR20124ZPJTY02MFY0			
**Additional key fields are available in the Map Findings section*			
CITY OF FRIENDSWOOD	17160 BLACKHAWK DRIV	7 / 4	60
Facility Id/Name: FATR20052VZ1WU00UMWK			
Facility Id/Name: FATR20062VZ1WU00UMWK			
Facility Id/Name: FATR20082VZ1WU00UMWK			

UST FINDER: UST Finder Database

A review of the UST FINDER list, as provided by EDR, and dated 06/08/2023 has revealed that there is 1 UST FINDER site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FRANKIE CARTER RANDO	5100 FM 2351 RD	A5 / 4	59

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there is 1 EDR Hist

EXECUTIVE SUMMARY

Cleaner site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
JET CLEANERS	3670M E FM 528 RD	B8 / 4	62

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Lists of state and tribal leaking storage tanks

LPST: Leaking Petroleum Storage Tank Listing

A review of the LPST list, as provided by EDR, and dated 09/25/2023 has revealed that there are 5 LPST sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
SPEEDY FOOD MART	***3702 E FM 528 RD***	***WSW 0 - 1/8 (0.024 mi.)***	***D20 / 4***	***120***
LPST Id: 117144 CA Status: 6A - FINAL CONCURRENCE ISSUED Facility ID: 0061693 Status Code: PREASSESSMENT/RELEASE DETERMINATION				
SMART STOP FOOD MART	***5103 FM 2351 RD***	***SW 0 - 1/8 (0.025 mi.)***	***A23 / 4***	***137***
LPST Id: 120078 CA Status: 6P - FINAL PENDING WELL PLUG				
SOUTHERN STATE BANK	3502 E FM 528 RD	E 1/8 - 1/4 (0.204 mi.)	F29 / 5	170
LPST Id: 093439 CA Status: 6A - FINAL CONCURRENCE ISSUED Status Code: FINAL CONCURRENCE ISSUED, CASE CLOSED				
DIAMOND SHAMROCK 251	***3860 FRIENDSWOOD LIN***	***SW 1/8 - 1/4 (0.206 mi.)***	***G32 / 4***	***172***
LPST Id: 091203 CA Status: 6A - FINAL CONCURRENCE ISSUED Facility ID: 0035241 Status Code: FINAL CONCURRENCE ISSUED, CASE CLOSED				
WEBSTER EXXON 60458	***2932 W BAY AREA BLVD***	***ENE 1/4 - 1/2 (0.461 mi.)***	***H36 / 5***	***184***
LPST Id: 117418 CA Status: 6A - FINAL CONCURRENCE ISSUED Facility ID: 0026151 Status Code: FINAL CONCURRENCE ISSUED, CASE CLOSED				

EXECUTIVE SUMMARY

RDR: Release Determination Report Listing

A review of the RDR list, as provided by EDR, and dated 01/08/2024 has revealed that there are 7 RDR sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
CIRCLE K 2741409	5091 FM 2351 RD	NE 0 - 1/8 (0.021 mi.)	C12 / 4	67
CIRCLE K STORE #2741	5091 FM 2351 RD	NE 0 - 1/8 (0.021 mi.)	C14 / 4	69
SPEEDY FOOD MART	***3702 E FM 528 RD***	***WSW 0 - 1/8 (0.024 mi.)***	***D20 / 4***	***120***
SMART STOP 5103	5103 FM 2351 RD	SW 0 - 1/8 (0.025 mi.)	A25 / 4	165
FORMER STOP N GO 251	3860 FRIENDSWOOD LIN	SW 1/8 - 1/4 (0.206 mi.)	G34 / 4	183
EXXON	2932 W BAY AREA BLVD	ENE 1/4 - 1/2 (0.461 mi.)	H37 / 5	186
EXXON 60458	2932 W BAY AREA BLVD	ENE 1/4 - 1/2 (0.461 mi.)	H38 / 5	186

Lists of state and tribal registered storage tanks

UST: Petroleum Storage Tank Database

A review of the UST list, as provided by EDR, and dated 12/07/2023 has revealed that there are 5 UST sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
CIRCLE K STORE 27414 Facility Status: ACTIVE Facility Id: 62181 Facility Num: 74769 AI Number: 754743362002149	***5091 FM 2351 RD***	***NE 0 - 1/8 (0.021 mi.)***	***C16 / 4***	***71***
CORNER FOOD MART Facility Status: ACTIVE Facility Id: 44610 Facility Num: 69870 AI Number: 295568792002087	***3698 E FM 528 RD***	***ENE 0 - 1/8 (0.023 mi.)***	***B17 / 4***	***98***
SPEEDY FOOD MART Facility Status: INACTIVE Facility Id: 61693 Facility Num: 91778 AI Number: 657700562002268	***3702 E FM 528 RD***	***WSW 0 - 1/8 (0.024 mi.)***	***D20 / 4***	***120***
SMART STOP FOOD MART Facility Status: ACTIVE Facility Id: 39821 Facility Num: 61239 AI Number: 949246192002139	***5103 FM 2351 RD***	***SW 0 - 1/8 (0.025 mi.)***	***A23 / 4***	***137***
DIAMOND SHAMROCK 251 Facility Status: INACTIVE Facility Id: 35241 Facility Num: 60749 AI Number: 94315462002087	***3860 FRIENDSWOOD LIN***	***SW 1/8 - 1/4 (0.206 mi.)***	***G32 / 4***	***172***

Lists of state and tribal voluntary cleanup sites

VCP: Voluntary Cleanup Program Database

A review of the VCP list, as provided by EDR, has revealed that there is 1 VCP site within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
1.49 JET CLEANERS	***3670 E FM 528 RD***	***ENE 0 - 1/8 (0.012 mi.)***	***B9 / 4***	***63***
Database: VCP TCEQ, Date of Government Version: 12/12/2023 Facility ID: 1863				

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

Ind. Haz Waste: Industrial & Hazardous Waste Database

A review of the Ind. Haz Waste list, as provided by EDR, and dated 11/08/2023 has revealed that there are 2 Ind. Haz Waste sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
AIRCRAFT BRAKE SVC Registration Number: 61651	***16427 TIBET RD***	***SW 0 - 1/8 (0.096 mi.)***	***E26 / 4***	***165***
DORSETTS TRUCK AND A Registration Number: 61668	3508 E FM 528 RD	ENE 1/8 - 1/4 (0.126 mi.)	28 / 5	168

PST STAGE 2: PST Stage 2

A review of the PST STAGE 2 list, as provided by EDR, and dated 07/17/2019 has revealed that there are 3 PST STAGE 2 sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
VALERO CORNER STORE	5091 FM 2351 RD	NE 0 - 1/8 (0.021 mi.)	C15 / 4	70
CORNER FOOD MART	***3698 E FM 528 RD***	***ENE 0 - 1/8 (0.023 mi.)***	***B17 / 4***	***98***
SMART STOP FOOD MART	***5103 FM 2351 RD***	***SW 0 - 1/8 (0.025 mi.)***	***A23 / 4***	***137***

UST FINDER RELEASE: UST Finder Releases Database

A review of the UST FINDER RELEASE list, as provided by EDR, and dated 06/08/2023 has revealed that there are 5 UST FINDER RELEASE sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
FORMER SPEEDY FOOD M	3702 E FM 528 RD	WSW 0 - 1/8 (0.024 mi.)	D19 / 4	120
SMART STOP 6	5103 FM 2351 RD	SW 0 - 1/8 (0.025 mi.)	A24 / 4	164
SOUTHERN STATE BANK	3502 E FM 528 RD	E 1/8 - 1/4 (0.204 mi.)	F30 / 5	171
DIAMOND SHAMROCK COR	3860 FRIENDSWOOD LIN	SW 1/8 - 1/4 (0.206 mi.)	G31 / 4	172
WEBSTER EXXON 60458	2932 W BAY AREA BLVD	ENE 1/4 - 1/2 (0.461 mi.)	H35 / 5	184

EXECUTIVE SUMMARY

UST FINDER: UST Finder Database

A review of the UST FINDER list, as provided by EDR, and dated 06/08/2023 has revealed that there are 5 UST FINDER sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
CORNER STORE 1409	5091 FM 2351 RD	NE 0 - 1/8 (0.021 mi.)	C11 / 4	66
CORNER FOOD MART	3698 E FM 528 RD	ENE 0 - 1/8 (0.023 mi.)	B18 / 4	118
SPEEDY FOOD MART	3702 E FM 528 RD	WSW 0 - 1/8 (0.024 mi.)	D21 / 4	134
SAMS MART 5	5103 FM 2351 RD	SW 0 - 1/8 (0.025 mi.)	A22 / 4	136
DIAMOND SHAMROCK 251	3860 FRIENDSWOOD LIN	SW 1/8 - 1/4 (0.206 mi.)	G33 / 4	182

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR Exclusive Historical Auto Stations

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 2 EDR Hist Auto sites within approximately 0.125 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
VALERO ENERGY STATIO	5091 FM 2351 RD	NE 0 - 1/8 (0.021 mi.)	C13 / 4	69
SAMINA BUSINESS INC	16418 TIBET RD	SW 0 - 1/8 (0.121 mi.)	E27 / 4	168

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there is 1 EDR Hist Cleaner site within approximately 0.125 miles of the requested target property.

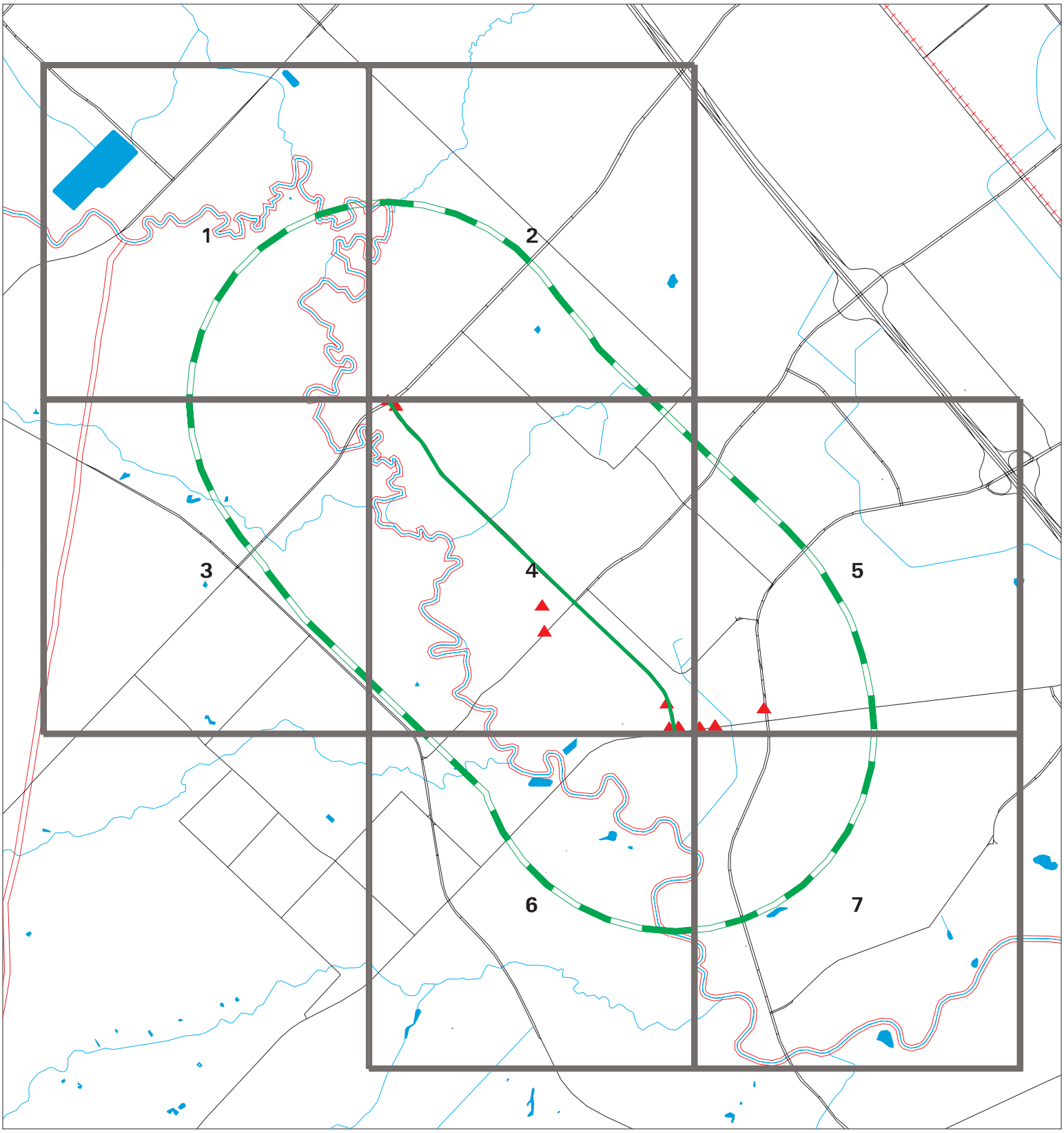
Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
STAR CLEANERS INC	5105 FM 2351 RD	SW 0 - 1/8 (0.020 mi.)	A10 / 4	66

MAPPED SITES SUMMARY

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
A1 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	LPST, UST, Financial Assurance, GCC, RDR	TP
A2 / 4	RANDOLPH PARK	5100 FM 2351	TIER 2	TP
A3 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	CENTRAL REGISTRY	TP
A4 / 4	FRANKIE CARTER RANDO	5100 FM 2351	RDR	TP
A5 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	UST FINDER	TP
A6 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	FINDS	TP
7 / 4	CITY OF FRIENDSWOOD	17160 BLACKHAWK DRIV	TIER 2	TP
B8 / 4	JET CLEANERS	3670M E FM 528 RD	EDR Hist Cleaner	TP
B9 / 4	1.49 JET CLEANERS	3670 E FM 528 RD	VCP, GCC	61 0.012 ENE
A10 / 4	STAR CLEANERS INC	5105 FM 2351 RD	EDR Hist Cleaner	107 0.020 SW
C11 / 4	CORNER STORE 1409	5091 FM 2351 RD	UST FINDER	113 0.021 NE
C12 / 4	CIRCLE K 2741409	5091 FM 2351 RD	RDR	113 0.021 NE
C13 / 4	VALERO ENERGY STATIO	5091 FM 2351 RD	EDR Hist Auto	113 0.021 NE
C14 / 4	CIRCLE K STORE #2741	5091 FM 2351 RD	RDR	113 0.021 NE
C15 / 4	VALERO CORNER STORE	5091 FM 2351 RD	PST STAGE 2	113 0.021 NE
C16 / 4	CIRCLE K STORE 27414	5091 FM 2351 RD	UST, Financial Assurance	113 0.021 NE
B17 / 4	CORNER FOOD MART	3698 E FM 528 RD	UST, Financial Assurance, PST STAGE 2	121 0.023 ENE
B18 / 4	CORNER FOOD MART	3698 E FM 528 RD	UST FINDER	121 0.023 ENE
D19 / 4	FORMER SPEEDY FOOD M	3702 E FM 528 RD	UST FINDER RELEASE	129 0.024 WSW
D20 / 4	SPEEDY FOOD MART	3702 E FM 528 RD	LPST, UST, Financial Assurance, GCC, RDR	129 0.024 WSW
D21 / 4	SPEEDY FOOD MART	3702 E FM 528 RD	UST FINDER	129 0.024 WSW
A22 / 4	SAMS MART 5	5103 FM 2351 RD	UST FINDER	134 0.025 SW
A23 / 4	SMART STOP FOOD MART	5103 FM 2351 RD	LPST, UST, Financial Assurance, GCC, PST...	134 0.025 SW
A24 / 4	SMART STOP 6	5103 FM 2351 RD	UST FINDER RELEASE	134 0.025 SW
A25 / 4	SMART STOP 5103	5103 FM 2351 RD	RDR	134 0.025 SW
E26 / 4	AIRCRAFT BRAKE SVC	16427 TIBET RD	Ind. Haz Waste, CENTRAL REGISTRY	507 0.096 SW
E27 / 4	SAMINA BUSINESS INC	16418 TIBET RD	EDR Hist Auto	638 0.121 SW
28 / 5	DORSETTS TRUCK AND A	3508 E FM 528 RD	Ind. Haz Waste	666 0.126 ENE
F29 / 5	SOUTHERN STATE BANK	3502 E FM 528 RD	LPST	1078 0.204 East
F30 / 5	SOUTHERN STATE BANK	3502 E FM 528 RD	UST FINDER RELEASE	1078 0.204 East
G31 / 4	DIAMOND SHAMROCK COR	3860 FRIENDSWOOD LIN	UST FINDER RELEASE	1086 0.206 SW
G32 / 4	DIAMOND SHAMROCK 251	3860 FRIENDSWOOD LIN	LPST, UST, Financial Assurance	1086 0.206 SW
G33 / 4	DIAMOND SHAMROCK 251	3860 FRIENDSWOOD LIN	UST FINDER	1086 0.206 SW
G34 / 4	FORMER STOP N GO 251	3860 FRIENDSWOOD LIN	RDR	1086 0.206 SW
H35 / 5	WEBSTER EXXON 60458	2932 W BAY AREA BLVD	UST FINDER RELEASE	2436 0.461 ENE
H36 / 5	WEBSTER EXXON 60458	2932 W BAY AREA BLVD	LPST, GCC	2436 0.461 ENE
H37 / 5	EXXON	2932 W BAY AREA BLVD	RDR	2436 0.461 ENE
H38 / 5	EXXON 60458	2932 W BAY AREA BLVD	RDR	2436 0.461 ENE

Key Map - 7618799.1s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/2 1 Miles

SITE NAME: Blackhawk Boulevard Reconstruction	CLIENT: HDR Engineering Inc.
ADDRESS: Blackhawk Boulevard Reconstruction	CONTACT: Angie Torres
CITY/STATE: Friendswood TX	INQUIRY #: 7618799.1s
ZIP: 77546	DATE: 04/09/24 3:13 PM

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	0	NR	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
Lists of state- and tribal (Superfund) equivalent sites								
SHWS	1.000		0	0	0	0	NR	0
Lists of state and tribal landfills and solid waste disposal facilities								
SWF/LF	0.500		0	0	0	NR	NR	0
DEBRIS	0.500		0	0	0	NR	NR	0
CLI	0.500		0	0	0	NR	NR	0
WASTE MGMT	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Lists of state and tribal leaking storage tanks								
INDIAN LUST	0.500		0	0	0	NR	NR	0
LPST	0.500	1	2	2	1	NR	NR	6
RDR	0.500	2	4	1	2	NR	NR	9
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250	1	4	1	NR	NR	NR	6
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
TANKS	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
AUL	0.500		0	0	0	NR	NR	0
Lists of state and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		1	0	0	NR	NR	1
Lists of state and tribal brownfield sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
SWRCY	0.500		0	0	0	NR	NR	0
HIST LF	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
PRIORITYCLEANERS	0.500		0	0	0	NR	NR	0
DEL SHWS	1.000		0	0	0	0	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
CENTRAL REGISTRY	TP	1	NR	NR	NR	NR	NR	1
Local Lists of Registered Storage Tanks								
NON REGIST PST	0.250		0	0	NR	NR	NR	0
Local Land Records								
HIST LIENS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
MINES MRDS	0.250		0	0	NR	NR	NR	0
FINDS	TP	1	NR	NR	NR	NR	NR	1
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
PFAS NPL	0.250		0	0	NR	NR	NR	0
PFAS FEDERAL SITES	0.250		0	0	NR	NR	NR	0
PFAS TSCA	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
PFAS TRIS	0.250		0	0	NR	NR	NR	0
PFAS RCRA MANIFEST	0.250		0	0	NR	NR	NR	0
PFAS ATSDR	0.250		0	0	NR	NR	NR	0
PFAS WQP	0.250		0	0	NR	NR	NR	0
PFAS NPDES	0.250		0	0	NR	NR	NR	0
PFAS ECHO	0.250		0	0	NR	NR	NR	0
PFAS ECHO FIRE TRAINING	0.250		0	0	NR	NR	NR	0
PFAS PART 139 AIRPORT	0.250		0	0	NR	NR	NR	0
AQUEOUS FOAM NRC	0.250		0	0	NR	NR	NR	0
BIOSOLIDS	TP		NR	NR	NR	NR	NR	0
PFAS	0.250		0	0	NR	NR	NR	0
AQUEOUS FOAM	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
APAR	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
COAL ASH	0.500		0	0	0	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
ED AQUIF	TP		NR	NR	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP	1	NR	NR	NR	NR	NR	1
GCC	TP	1	NR	NR	NR	NR	NR	1
IOP	TP		NR	NR	NR	NR	NR	0
LEAD	TP		NR	NR	NR	NR	NR	0
Ind. Haz Waste	0.250		1	1	NR	NR	NR	2
MSD	0.500		0	0	0	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
RWS	TP		NR	NR	NR	NR	NR	0
TIER 2	TP	2	NR	NR	NR	NR	NR	2
UIC	TP		NR	NR	NR	NR	NR	0
IHW CORR ACTION	0.250		0	0	NR	NR	NR	0
PST STAGE 2	0.250		3	0	NR	NR	NR	3
COMP HIST	TP		NR	NR	NR	NR	NR	0
OCPCASES	TP		NR	NR	NR	NR	NR	0
PETRO STOR CAVERNS	TP		NR	NR	NR	NR	NR	0
RRC OCP	TP		NR	NR	NR	NR	NR	0
LAND PERMIT	TP		NR	NR	NR	NR	NR	0
UST FINDER RELEASE	0.500		2	2	1	NR	NR	5
UST FINDER	0.250	1	4	1	NR	NR	NR	6
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		2	NR	NR	NR	NR	2
EDR Hist Cleaner	0.125	1	1	NR	NR	NR	NR	2
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LF	TP		NR	NR	NR	NR	NR	0
- Totals --		12	24	8	4	0	0	48

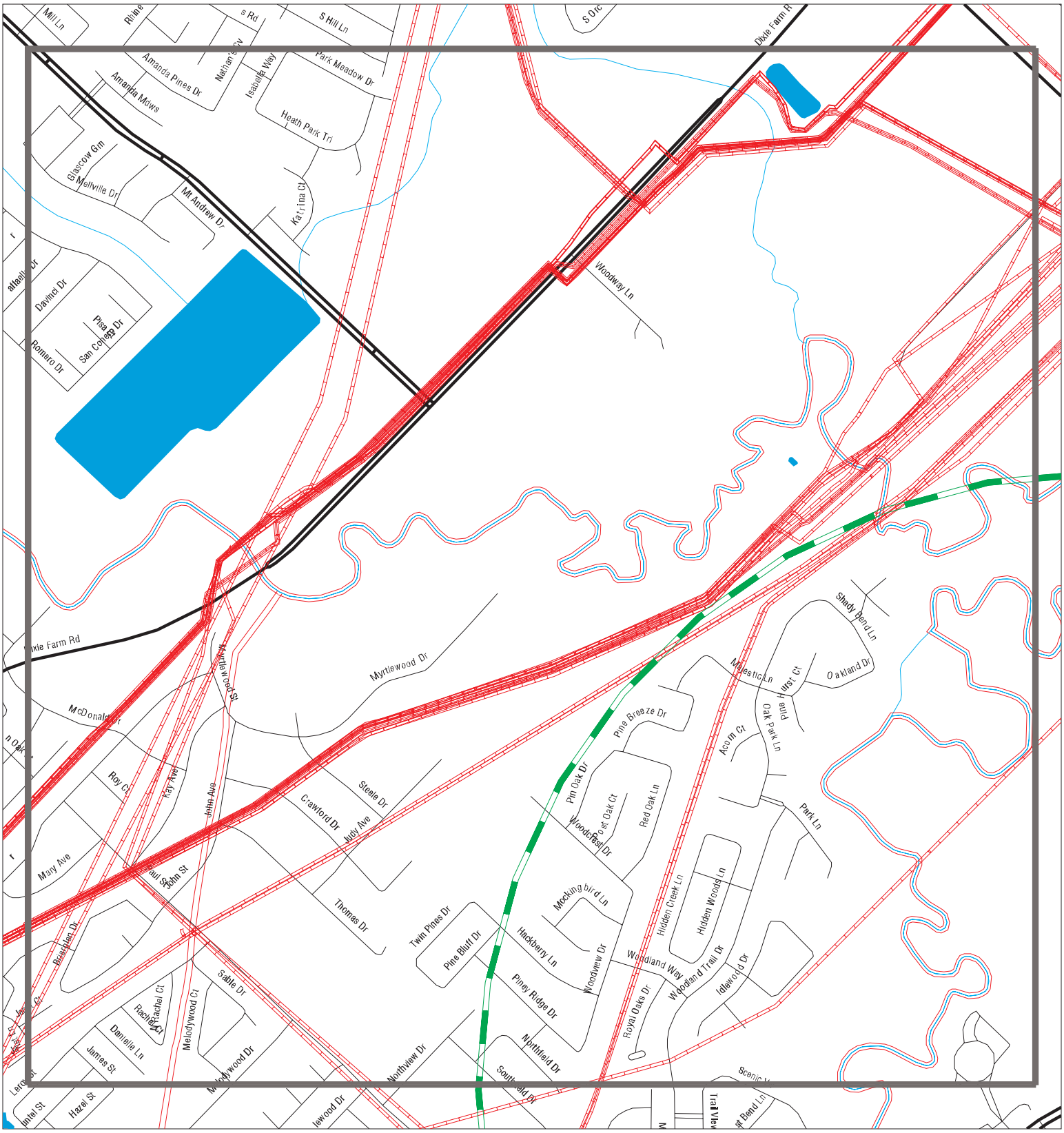
NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Focus Map - 1 - 7618799.1s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME:	Blackhawk Boulevard Reconstruction
ADDRESS:	Blackhawk Boulevard Reconstruction
CITY/STATE:	Friendswood TX
ZIP:	77546

CLIENT:	HDR Engineering Inc.
CONTACT:	Angie Torres
INQUIRY #:	7618799.1s
DATE:	04/09/24

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MAPPED SITES SUMMARY - FOCUS MAP 1

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 2 - 7618799.1s

Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Blackhawk Boulevard Reconstruction	CLIENT: HDR Engineering Inc.
ADDRESS: Blackhawk Boulevard Reconstruction	CONTACT: Angie Torres
CITY/STATE: Friendswood TX	INQUIRY #: 7618799.1s
ZIP: 77546	DATE: 04/09/24

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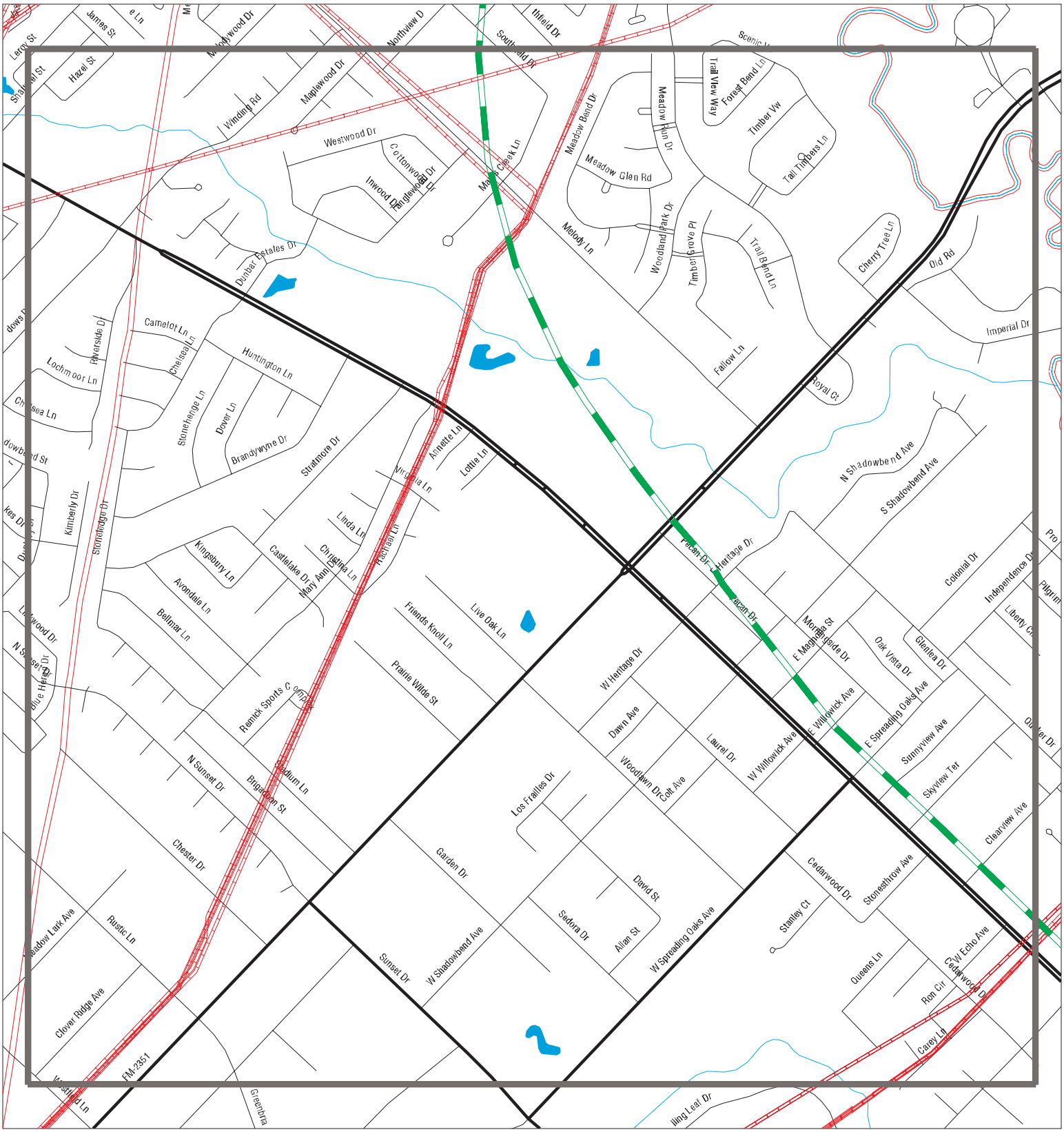
MAPPED SITES SUMMARY - FOCUS MAP 2

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 3 - 7618799.1s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME:	Blackhawk Boulevard Reconstruction
ADDRESS:	Blackhawk Boulevard Reconstruction
CITY/STATE:	Friendswood TX
ZIP:	77546

CLIENT:	HDR Engineering Inc.
CONTACT:	Angie Torres
INQUIRY #:	7618799.1s
DATE:	04/09/24

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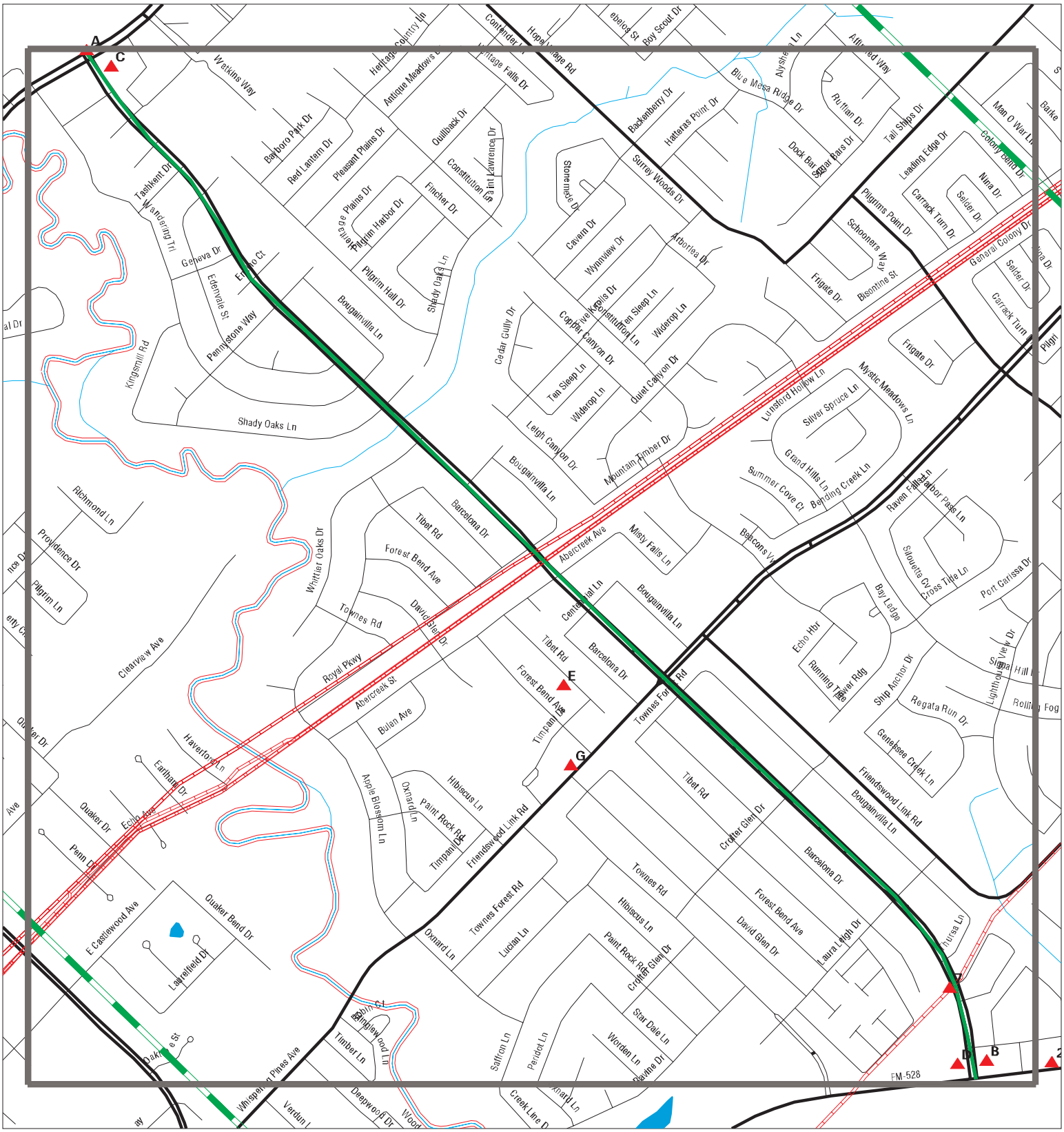
MAPPED SITES SUMMARY - FOCUS MAP 3

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 4 - 7618799.1s


A
C
E
G
D
B
FM-528
Watkins Way
Tashkent Dr
Wandering Trl
Geneva Dr
Penny Stone Way
Kingsmill Rd
Shady Oaks Ln
Bougainvilla Ln
Pilgrim Hall Dr
Pilgrim Harbor Dr
Pleasant Plains Dr
Red Lantern Dr
Barboro Park Dr
Quiltback Dr
Constitution Cir
Lawrence Dr
Fincher Dr
Shady Oaks Ln
Cedar Gully Dr
Cavern Dr
Wynnview Dr
Arborlea Dr
Ten Sleep Ln
Widerop Ln
Quiet Canyon Dr
Leigh Canyon Dr
Mountain Timber Dr
Lunsford Hollow Ln
Mystic Meadows Ln
Silver Spruce Ln
Grand Hills Ln
Summer Cove Ct
Barking Creek Ln
Misty Falls Ln
Abercreek Ave
Tibet Rd
Barcelona Dr
Forest Bend Ave
Townes Rd
Davidglen Dr
Whittier Oaks Dr
Richmond Ln
Providence Dr
Pilgrim Ln
Clearview Ave
Royal Pkwy
Abercreek St
Bulen Ave
Timpani Dr
Haverford Ln
Earthart Dr
Echo Ave
Quaker Dr
Penn Dr
E Castlewood Ave
Quaker Bend Dr
Lattrelfield Dr
Oak Leaf St
Whispering Pines Ave
Timber Ln
Timbercrest Ln
Robin Ct
Apple Blossom Ln
Oxnard Ln
Paint Rock Rd
Hibiscus Ln
Friendswood Link Rd
Townes Forest Rd
Lucian Ln
Saffron Ln
Peridot Ln
Crofter Glen Dr
Star Dale Ln
Worden Ln
Bayne Dr
David Glen Dr
Laura Leigh Dr
Thursea Ln
Creek Line Dr
Knauf Ln
Daspwood Dr
Verdun
Centennial Ln
Bougainvilla Ln
Friendswood Link Rd
Crofter Glen Dr
Barcelona Dr
Forest Bend Ave
Townes Rd
Hibiscus Ln
Paint Rock Rd
Timpani Dr
Oxnard Ln
Apple Blossom Ln
Bulen Ave
Abercreek St
Royal Pkwy
Davidglen Dr
Tibet Rd
Barcelona Dr
Forest Bend Ave
Townes Rd
Whittier Oaks Dr
Abercreek Ave
Misty Falls Ln
Bougainvilla Ln
Centennial Ln
Townes Forest Rd
Bougainvilla Ln
Friendswood Link Rd
Tibet Rd
Crofter Glen Dr
Barcelona Dr
Forest Bend Ave
David Glen Dr
Laura Leigh Dr
Townes Rd
Hibiscus Ln
Paint Rock Rd
Crofter Glen Dr
Star Dale Ln
Worden Ln
Bayne Dr
Thursea Ln
Saffron Ln
Peridot Ln
Oxnard Ln
Townes Forest Rd
Lucian Ln
Timber Ln
Timbercrest Ln
Robin Ct
Apple Blossom Ln
Oxnard Ln
Paint Rock Rd
Timpani Dr
Friendswood Link Rd
Bougainvilla Ln

MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
A1 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	LPST, UST, Financial Assurance, GCC, RDR	TP
A2 / 4	RANDOLPH PARK	5100 FM 2351	TIER 2	TP
A3 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	CENTRAL REGISTRY	TP
A4 / 4	FRANKIE CARTER RANDO	5100 FM 2351	RDR	TP
A5 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	UST FINDER	TP
A6 / 4	FRANKIE CARTER RANDO	5100 FM 2351 RD	FINDS	TP
7 / 4	CITY OF FRIENDSWOOD	17160 BLACKHAWK DRIV	TIER 2	TP
B8 / 4	JET CLEANERS	3670M E FM 528 RD	EDR Hist Cleaner	TP
B9 / 4	1.49 JET CLEANERS	3670 E FM 528 RD	VCP, GCC	61 0.012 ENE
A10 / 4	STAR CLEANERS INC	5105 FM 2351 RD	EDR Hist Cleaner	107 0.020 SW
C11 / 4	CORNER STORE 1409	5091 FM 2351 RD	UST FINDER	113 0.021 NE
C12 / 4	CIRCLE K 2741409	5091 FM 2351 RD	RDR	113 0.021 NE
C13 / 4	VALERO ENERGY STATIO	5091 FM 2351 RD	EDR Hist Auto	113 0.021 NE
C14 / 4	CIRCLE K STORE #2741	5091 FM 2351 RD	RDR	113 0.021 NE
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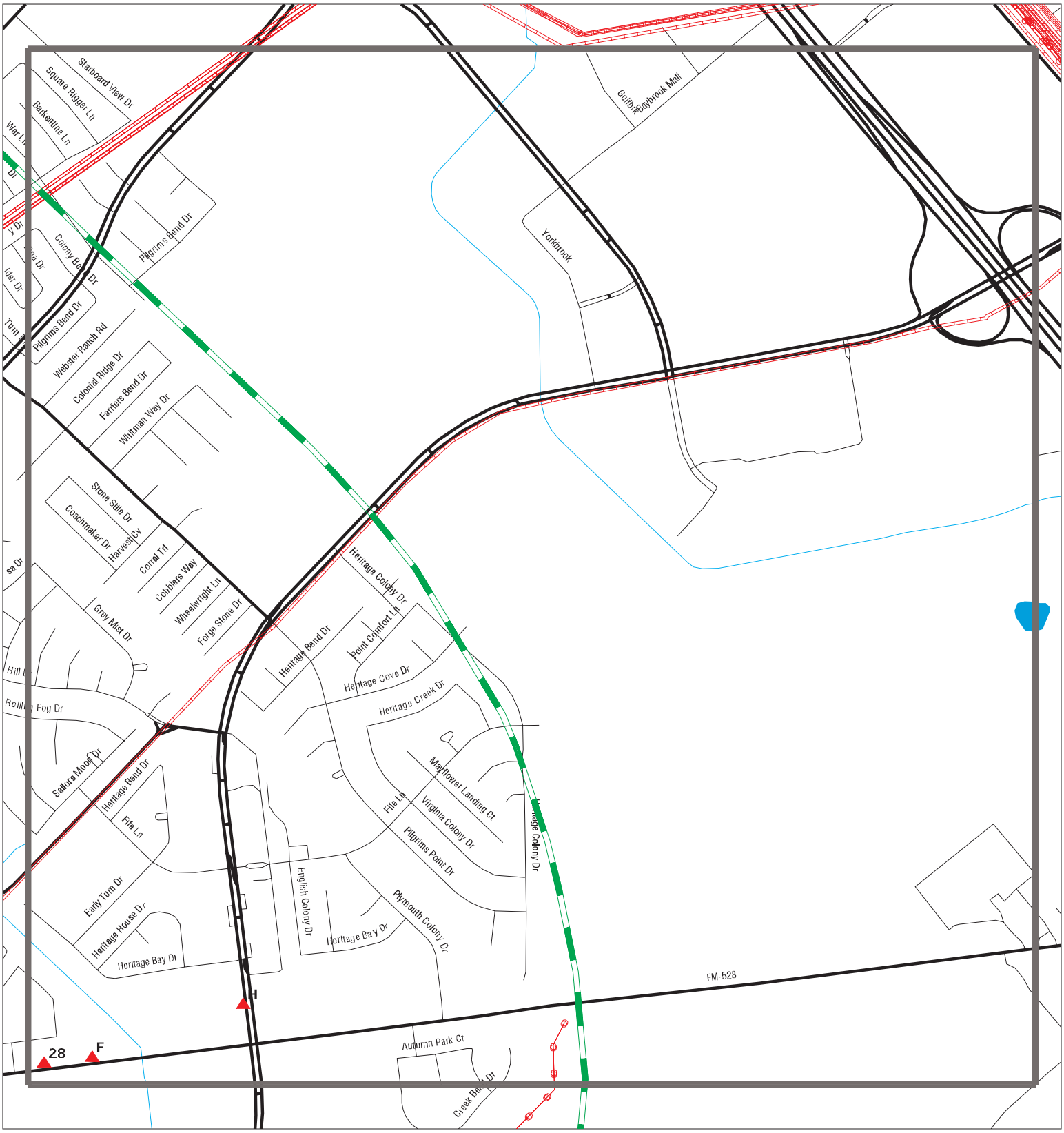
C16 / 4	CIRCLE K STORE 27414	5091 FM 2351 RD	UST, Financial Assurance	113 0.021 NE
B17 / 4	CORNER FOOD MART	3698 E FM 528 RD	UST, Financial Assurance, PST STAGE 2	121 0.023 ENE
B18 / 4	CORNER FOOD MART	3698 E FM 528 RD	UST FINDER	121 0.023 ENE
D19 / 4	FORMER SPEEDY FOOD M	3702 E FM 528 RD	UST FINDER RELEASE	129 0.024 WSW
D20 / 4	SPEEDY FOOD MART	3702 E FM 528 RD	LPST, UST, Financial Assurance, GCC, RDR	129 0.024 WSW
D21 / 4	SPEEDY FOOD MART	3702 E FM 528 RD	UST FINDER	129 0.024 WSW
A22 / 4	SAMS MART 5	5103 FM 2351 RD	UST FINDER	134 0.025 SW
A23 / 4	SMART STOP FOOD MART	5103 FM 2351 RD	LPST, UST, Financial Assurance, GCC, PST...	134 0.025 SW
A24 / 4	SMART STOP 6	5103 FM 2351 RD	UST FINDER RELEASE	134 0.025 SW
A25 / 4	SMART STOP 5103	5103 FM 2351 RD	RDR	134 0.025 SW
E26 / 4	AIRCRAFT BRAKE SVC	16427 TIBET RD	Ind. Haz Waste, CENTRAL REGISTRY	507 0.096 SW
E27 / 4	SAMINA BUSINESS INC	16418 TIBET RD	EDR Hist Auto	638 0.121 SW
G31 / 4	DIAMOND SHAMROCK COR	3860 FRIENDSWOOD LIN	UST FINDER RELEASE	1086 0.206 SW
G32 / 4	DIAMOND SHAMROCK 251	3860 FRIENDSWOOD LIN	LPST, UST, Financial Assurance	1086 0.206 SW
G33 / 4	DIAMOND SHAMROCK 251	3860 FRIENDSWOOD LIN	UST FINDER	1086 0.206 SW
G34 / 4	FORMER STOP N GO 251	3860 FRIENDSWOOD LIN	RDR	1086 0.206 SW

Focus Map - 5 - 7618799.1s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Blackhawk Boulevard Reconstruction	CLIENT: HDR Engineering Inc.
ADDRESS: Blackhawk Boulevard Reconstruction	CONTACT: Angie Torres
CITY/STATE: Friendswood TX	INQUIRY #: 7618799.1s
ZIP: 77546	DATE: 04/09/24

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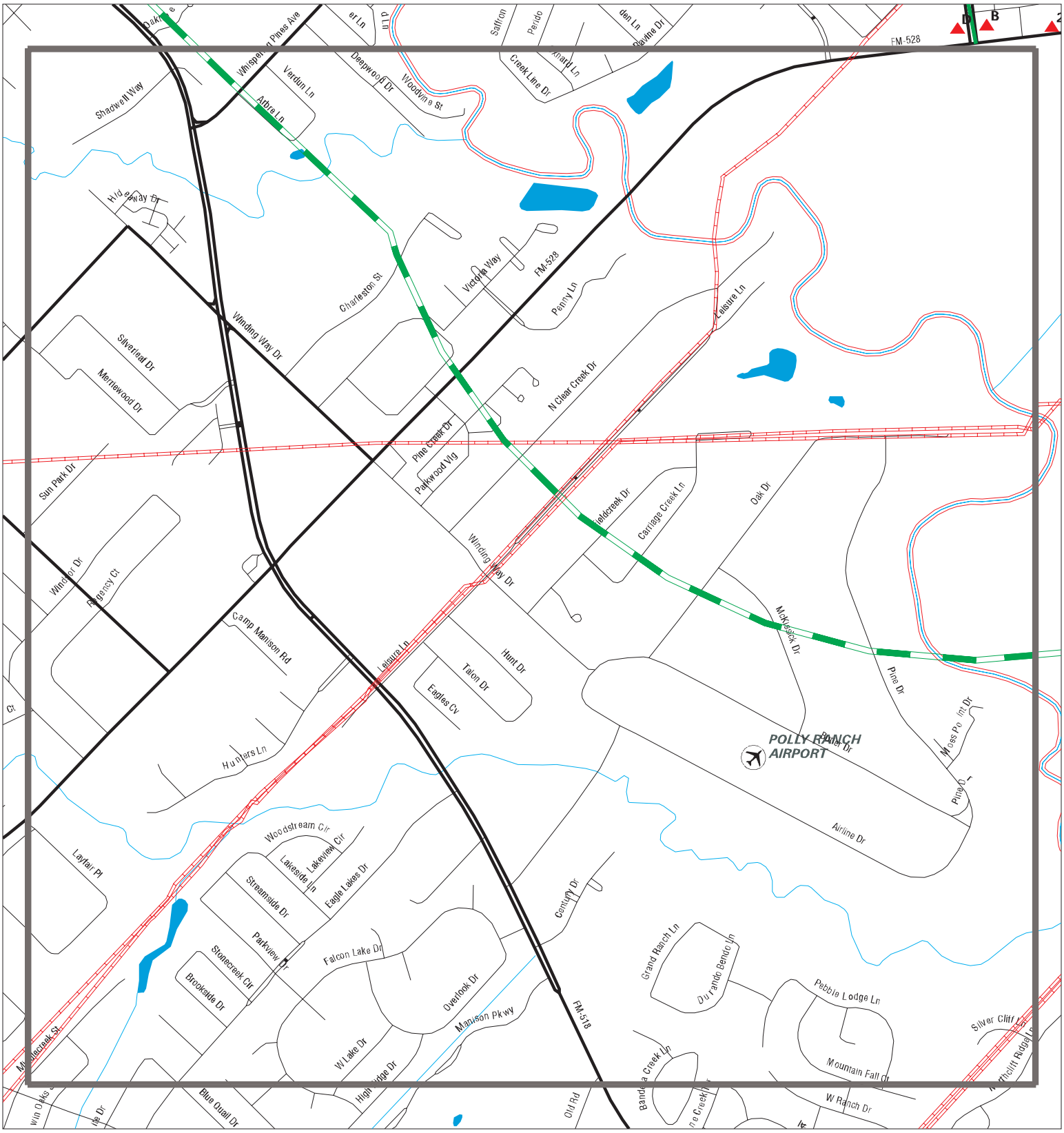
MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
28 / 5	DORSETTS TRUCK AND A	3508 E FM 528 RD	Ind. Haz Waste	666 0.126 ENE
F29 / 5	SOUTHERN STATE BANK	3502 E FM 528 RD	LPST	1078 0.204 East
F30 / 5	SOUTHERN STATE BANK	3502 E FM 528 RD	UST FINDER RELEASE	1078 0.204 East
H35 / 5	WEBSTER EXXON 60458	2932 W BAY AREA BLVD	UST FINDER RELEASE	2436 0.461 ENE
H36 / 5	WEBSTER EXXON 60458	2932 W BAY AREA BLVD	LPST, GCC	2436 0.461 ENE
H37 / 5	EXXON	2932 W BAY AREA BLVD	RDR	2436 0.461 ENE
H38 / 5	EXXON 60458	2932 W BAY AREA BLVD	RDR	2436 0.461 ENE

Focus Map - 6 - 7618799.1s



SITE NAME: Blackhawk Boulevard Reconstruction	CLIENT: HDR Engineering Inc.
ADDRESS: Blackhawk Boulevard Reconstruction	CONTACT: Angie Torres
CITY/STATE: Friendswood TX	INQUIRY #: 7618799.1s
ZIP: 77546	DATE: 04/09/24

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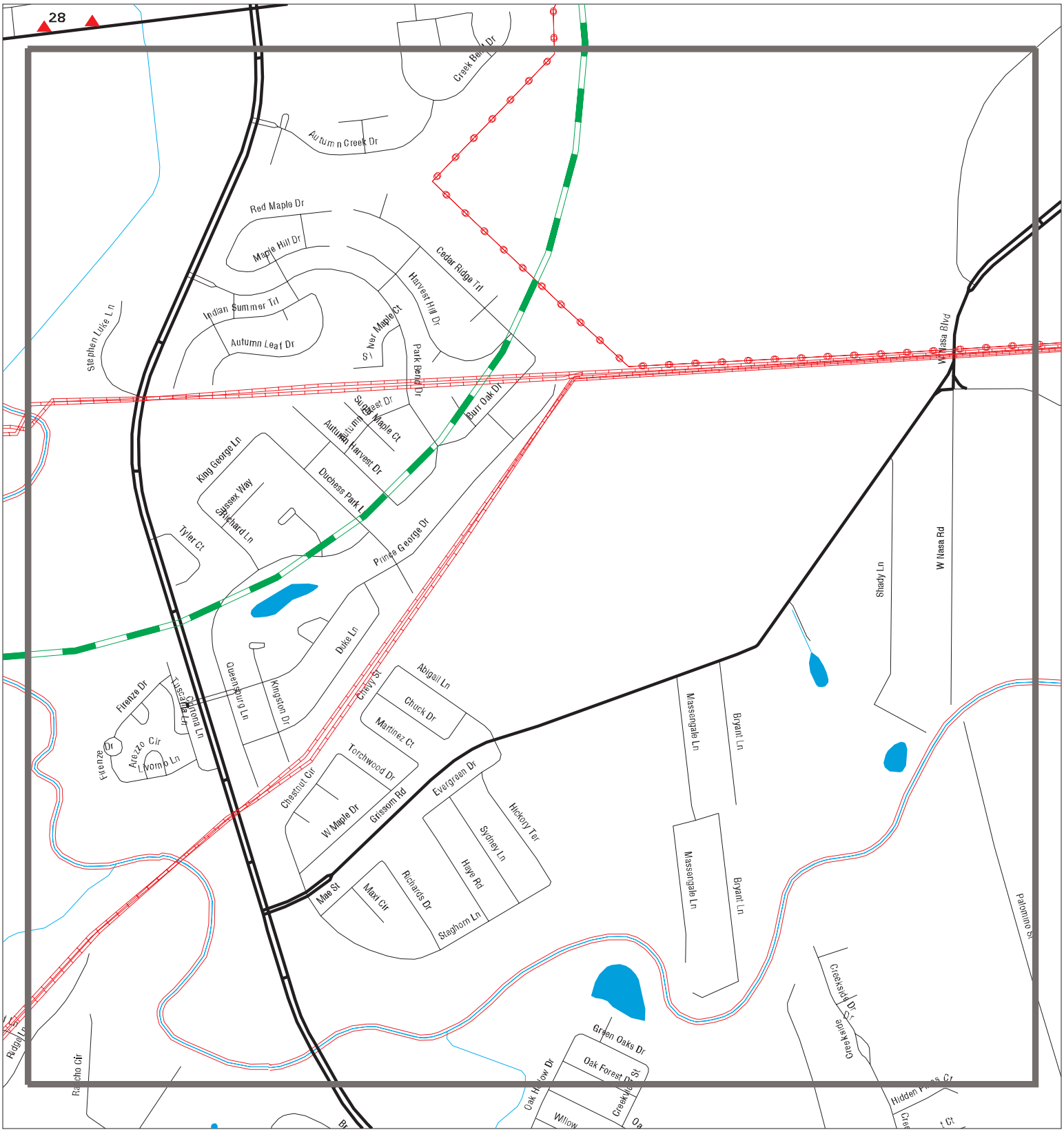
MAPPED SITES SUMMARY - FOCUS MAP 6

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 7 - 7618799.1s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME:	Blackhawk Boulevard Reconstruction
ADDRESS:	Blackhawk Boulevard Reconstruction
CITY/STATE:	Friendswood TX
ZIP:	77546

CLIENT:	HDR Engineering Inc.
CONTACT:	Angie Torres
INQUIRY #:	7618799.1s
DATE:	04/09/24

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MAPPED SITES SUMMARY - FOCUS MAP 7

Target Property:
BLACKHAWK BOULEVARD RECONSTRUCTION
FRIENDSWOOD, TX 77546

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

A1 **FRANKIE CARTER RANDOLPH PARK** **LPST** **U001274431**
Target **5100 FM 2351 RD** **UST** **N/A**
Property **FRIENDSWOOD, TX 77546** **Financial Assurance**
GCC
Site 1 of 11 in cluster A **RDR**

Actual:
31 ft.

Focus Map:
4

LPST:

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Facility ID:	Not reported
LPST Id:	121158
Facility Location:	Not reported
TCEQ Region# and City:	REGION 12 - HOUSTON
Region City:	Not reported
Discovered Date:	07/03/2020
Entered Date:	03/26/2021
Reported Date:	07/04/2020
Closure Date:	10/18/2022
Priority:	3.1 - GW IMPACT PUB/DOM WATER SUPPLY WELL W/IN .25 - .5MI
Program:	1 - RPR
CA Status:	6A - FINAL CONCURRENCE ISSUED
Priority Description:	Not reported
Status:	**Not reported**
Coordinators Primary:	Not reported
Coordinators RPR:	Not reported
Responsible Party Name:	Not reported
Responsible Party Contact:	Not reported
Responsible Party Address:	Not reported
Responsible Party City,St,Zip:	Not reported
Responsible Party Telephone:	Not reported
Reported Date:	07/04/2020
Case Start Date:	10/18/2022
Reference Number:	RN102249307
Project Manager:	EMCHEN

UST:

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 775462810
AI Number:	42239
Facility Type:	FLEET REFUELING
Facility Begin Date:	01/01/1983
Facility Status:	ACTIVE
Additional ID:	391010132002139
Facility Exempt Status:	N
Records Off-Site:	Yes
UST Financial Assurance Required:	No
Number Of Active UST:	2
Site Location Description:	Not reported
Site Location (Nearest City Name):	FRIENDSWOOD
Site Location (County Name):	HARRIS
Site Location (Tceq Region):	12
Site Location (Location Zip):	77546
Contact Name/Title:	CHARLIE NEWSOM,
Contact Organization Name:	FRANKIE CARTER RANDOLPH PARK
Contact Mailing Address1:	Not reported
Contact Mailing Address2:	Not reported
Contact Mailing City/State/Zip:	Not reported

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Contact Telephone:	7138760186
Facility Contact Address Deliverable:	Not reported
Contact Fax Number:	Not reported
Contact Email Address:	ITCFUELSERVICES@HCTX.NET
Signature Date On Earliest Reg Form:	05/15/2023
Signature Name/Title On Earliest Reg Form:	DWAYNE ROGERS,MANAGER ENVIRONMENTAL SERVICES
Application Received Date On Earliest Reg Form:	05/22/2023
Signature Role On Earliest Reg Form:	LEGAL AUTH REP OWNER
Signature Company On Earliest Reg Form:	Not reported
Enforcement Action:	No
Facility Not Inspectable:	No

Operator:

Princ ID:	897356642004222
Additional ID:	391010132002139
Ai Number:	42239
Operator CN:	CN602680423
Operator Name:	HARRIS COUNTY
Operator Effective Begin Date:	09/01/1988
Operator Type:	CY
Operator Role:	OWNOPRCON
Contact Name:	/
Contact Organization Name:	HARRIS COUNTY
Contact Mailing Address (Delivery):	1001 PRESTON ST STE 950
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	HOUSTON TX 77002-1868
Contact Phone Country Code:	1
Contact Phone Area Code:	713
Contact Phone Number:	7556400
Contact Phone Extension:	0
Contact Fax Country Code:	Not reported
Contact Fax Area Code:	Not reported
Contact Fax Number:	Not reported
Contact Fax Extension:	Not reported
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported

Owner:

Owner CN:	CN602680423
Owner Last Name:	HARRIS COUNTY
Owner First Name:	Not reported
Owner Middle Name:	Not reported
Owner Type:	CY
Contact Mailing Address (Delivery):	1001 PRESTON ST STE 950
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City:	HOUSTON
Contact Mailing State:	TX
Contact Mailing Zip:	77002
Contact Mailing Zip5:	1868
Contact Phone Number/Ext:	1 713 7556400/0
Contact Fax Country Code:	Not reported
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported
Princ ID:	897356642004222
Additional ID:	391010132002139
AI Number:	42239

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Owner Effective Begin Date:	09/01/1988
State Tax ID:	Not reported
Contact Role:	OWNOPRCON
Contact Name/Title:	/
Contact Organization Name:	HARRIS COUNTY

Self Certification:

Self Cert ID:	80352
Cert ID:	372161
AI Number:	42239
Self Certification Date:	05/18/2022
Signature Name/Title:	DWAYNE ROGERS INT DIR ENV SER
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2023
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	80352
Cert ID:	354427
AI Number:	42239
Self Certification Date:	05/16/2021
Signature Name/Title:	NICK RUSSO III ENV COMP OFF
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2022
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	80352
Cert ID:	339574
AI Number:	42239
Self Certification Date:	07/07/2020
Signature Name/Title:	NICK RUSSIO III ENV COMP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	AMENDMENT
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2021

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	337609
AI Number:	42239
Self Certification Date:	05/20/2020
Signature Name/Title:	NICK RUSSIO III ENV COMP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2021
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	321284
AI Number:	42239
Self Certification Date:	05/28/2019
Signature Name/Title:	NICK RUSSO III ENV COMP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2020
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	304179
AI Number:	42239
Self Certification Date:	05/21/2018
Signature Name/Title:	JOHN BLOUNT CO ENG
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2019

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	287115
AI Number:	42239
Self Certification Date:	05/17/2017
Signature Name/Title:	JOHN BLOUNT CO ENG
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2018
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	269770
AI Number:	42239
Self Certification Date:	05/12/2016
Signature Name/Title:	JOHN BLOUNT CO ENG
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2017
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	253881
AI Number:	42239
Self Certification Date:	05/28/2015
Signature Name/Title:	JOHN R BLOUNT COUNTY ENG
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2016

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	237636
AI Number:	42239
Self Certification Date:	06/09/2014
Signature Name/Title:	JOHN R BLOUNT DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2015
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	80352
Cert ID:	220684
AI Number:	42239
Self Certification Date:	05/30/2013
Signature Name/Title:	JOHN R BLOUNT D
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2014
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	N
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	N
Self Cert ID:	80352
Cert ID:	131119
AI Number:	42239
Self Certification Date:	05/24/2012
Signature Name/Title:	JOHN R BLOUNT DIRECTOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2013

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131118
AI Number:	42239
Self Certification Date:	05/13/2011
Signature Name/Title:	JOHN R BLOUNT DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2012
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131117
AI Number:	42239
Self Certification Date:	05/25/2010
Signature Name/Title:	JOHN R BLOUNT PE DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2011
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131116
AI Number:	42239
Self Certification Date:	05/11/2009
Signature Name/Title:	DEBORAH M VAUGHN DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2010

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131115
AI Number:	42239
Self Certification Date:	06/06/2008
Signature Name/Title:	DEBORAH M VAUGHN DIRECTOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2009
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131114
AI Number:	42239
Self Certification Date:	06/05/2007
Signature Name/Title:	DEBORAH M VAUGHN P E DIRECTOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2008
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131113
AI Number:	42239
Self Certification Date:	06/01/2006
Signature Name/Title:	JACKIE L FREEMAN PE DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2007

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131112
AI Number:	42239
Self Certification Date:	05/16/2005
Signature Name/Title:	JACKIE L FREEMAN P E DIRECTOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2006
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131111
AI Number:	42239
Self Certification Date:	05/26/2004
Signature Name/Title:	JACKIE L FREEMAN PE DIRECTOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2005
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131110
AI Number:	42239
Self Certification Date:	06/02/2003
Signature Name/Title:	JACKIE L FREEMAN PE DIRECTOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2004

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131109
AI Number:	42239
Self Certification Date:	06/25/2002
Signature Name/Title:	JACKIE L FREEMAN DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2003
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	80352
Cert ID:	131108
AI Number:	42239
Self Certification Date:	01/22/2001
Signature Name/Title:	JACKIE L FREEMAN DIR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	06/30/2002
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Tank:

Install Date:	01/01/1983
Tank Registration Date:	05/08/1986
Number of Compartments:	1
Tank Capacity:	4000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	S
UST ID:	111759
Facility ID:	80352
Ai Number:	42239
Tank Id:	1

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Tank Status (Current):	TEMP OUT OF SERVICE
Tank Status Date:	09/08/2022
Empty:	Y
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	Y
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	Y
Tank Tested Flag:	N
Installation Signature Date:	04/18/1990

Compartment Records:

Tank ID:	1
Tank Capacity:	4000
UST Comprt ID:	114673
UST ID:	111759
AI Number:	42239

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Compartment ID:	A
Substance Stored1:	EMPTY
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	Y
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	Not reported
Stage 1 Installation Date:	Not reported

More Self Certification:

Self Cert ID:	16583
Cert ID:	45739
UST Comprt ID:	149541
UST ID:	46810
AI Number:	42239
Tank ID:	4
Compartment ID:	A

Install Date:	01/01/1983
Tank Registration Date:	05/08/1986
Number of Compartments:	1
Tank Capacity:	4000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	S
UST ID:	111758
Facility ID:	80352
Ai Number:	42239

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Tank Id:	2
Tank Status (Current):	TEMP OUT OF SERVICE
Tank Status Date:	07/06/2020
Empty:	Y
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	Y
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	Y
Tank Tested Flag:	N
Installation Signature Date:	04/18/1990

Compartment Records:

Tank ID:	2
Tank Capacity:	4000
UST Comprt ID:	114672
UST ID:	111758

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

AI Number:	42239
Compartment ID:	A
Substance Stored1:	EMPTY
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	Y
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	Not reported
Stage 1 Installation Date:	Not reported

More Self Certification:

Self Cert ID:	16583
Cert ID:	45739
UST Comprt ID:	149541
UST ID:	46810
AI Number:	42239
Tank ID:	4
Compartment ID:	A

Construction Notification:

NOC ID:	36768
Facility ID:	80352
AI Number:	42239
Application Received Date:	07/29/2020
Scheduled Construction Date:	07/29/2020
UST Improvement:	N
UST Installation:	N

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

UST Removal:	N
UST Repair:	N
UST Return To Service:	Y
UST Replacement:	N
UST Abandonment:	N
UST Stage I:	N
AST Installation:	N
AST Stage I:	N
Historical Tracking Number:	Not reported
Waiver Flag:	N
Late Filing Flag:	Y
Form Received Date:	07/29/2020
Signature Date On Form:	07/28/2020
Signature Name On Form:	WILLIAM GUARANIERE
Signature Company On Form:	Not reported
Signature Title On Form:	PRES
Signature Role:	Not reported
Owner Name At Time Of Construction:	HARRIS COUNTY;HARRIS COUNTY
Owner CN At Time Of Construction:	CN602680423,CN602680423
Owner AR At Time Of Construction:	25186A,25186U
General Desc Of Prop Construct:	TANK TEST & STAGE I TEST OF UNLEADED TANK #2 PIPING IS EUROPEAN SUCTION

Contractor, Consultant and Installer:

Cont/Cons/Installer ID:	87346
UST ID:	Not reported
NOC ID:	36768
AI Number:	42239
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	Not reported
Company Name:	UST SERVICES INC
Representative Name:	WILLIAM GUARNIERE
Mailing Address (Delivery):	1141 BRITTMOORE RD
Mailing Address (Internal Delivery):	Not reported
Mailing City:	HOUSTON
Mailing State:	TX
Mailing Zip:	77043
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	1
Phone Number Area Code:	713
Phone Number:	4674244
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported

Facility Billing Contacts:

Contact Organization Name:	HARRIS COUNTY
Contact Mailing Address (Delivery):	1111 FANNIN ST FL 11
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	HOUSTON, TX 77002 6925
Phone Number/Ext:	713 2743666/0
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Contact Address Deliverable:	Y
Facility ID:	80352
Additional ID:	391010132002139
Princ ID:	897356642004222
AI Number:	42239
Facility Name:	FRANKIE CARTER RANDOLPH PARK
AR Number:	25186
AR UST Number Suffix:	A
AR AST Number Suffix:	U
Contact Name/Title:	DWAYNE J ROGERS/

TX Financial Assurance 2:

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	286183
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	SURETY BOND
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/28/2023
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	08/28/2024
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	269984
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	SURETY BOND
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/03/2022
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Coverage Expiration Date:	09/03/2023
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	286181
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	SURETY BOND
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/28/2023
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	08/28/2023
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	251030
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/11/2021
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	08/11/2022
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Finass ID:	251992
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	SURETY BOND
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/11/2021
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/11/2022
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	232103
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/13/2020
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	09/13/2021
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	214901
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Financial Assurance Begin Date:	05/20/2019
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	09/20/2020
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	197494
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/14/2018
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	09/14/2019
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	180088
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/15/2017
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	09/15/2017
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	162133
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/04/2016
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	09/04/2017
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	144883
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/15/2015
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/15/2016
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	129018
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/05/2014
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	06/05/2015
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	109489
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/13/2013
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/13/2014
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	73053
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/23/2012
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	Not reported
Issuer Phone:	1 713 7555370

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Policy Number:	None
Coverage Amount:	1000000
Coverage Expiration Date:	05/23/2013
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	9257
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/19/2011
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 713 7555370
Policy Number:	None
Coverage Amount:	1000000
Coverage Expiration Date:	11/19/2012
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	73054
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/19/2011
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 713 7555370
Policy Number:	None
Coverage Amount:	1000000
Coverage Expiration Date:	05/19/2012
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Region:	2
Facility ID:	80352
Finass ID:	73055
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/21/2010
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 713 7557894
Policy Number:	None
Coverage Amount:	10000000
Coverage Expiration Date:	06/21/2011
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	73056
AI:	42239
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	LOCAL GOV FIN TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/03/2008
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 713 7557894
Policy Number:	None
Coverage Amount:	0
Coverage Expiration Date:	06/03/2009
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	80352
Finass ID:	73057
AI:	42239
Mechanism Type Other:	LOCAL GOV. BOND RATING TEST
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	OTHER

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	01/01/1901
Date Financial Assurance Form Rec:	05/22/2023
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

GCC:

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Division:	REM/PST
New Cases:	*
File Number:	121158
Contamination Description: GASOLINE	
Date Of Earliest Known Contamination Confirmation:	7/4/2020
Enforcement Status - Level Of Agency Response:	2 - Staff Action
Enforcement Status - Site Activity Status:	2A -
Data Quality 1:	E,Q
Section 5236:	Not reported
Type: Not reported	
Agency:	Not reported
Section:	Not reported
Year Deleted:	Not reported
Location:	Not reported
Data Quality 2:	Not reported

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Division:	REM/PST
New Cases:	Not reported
File Number:	121158
Contamination Description: GASOLINE	
Date Of Earliest Known Contamination Confirmation:	7/4/2020
Enforcement Status - Level Of Agency Response:	2 - Staff Action
Enforcement Status - Site Activity Status:	6 - Action Completed
Data Quality 1:	E,Q
Section 5236:	Not reported
Type: Not reported	
Agency:	Not reported
Section:	Not reported
Year Deleted:	Not reported
Location:	Not reported
Data Quality 2:	Not reported

RDR:

RDR ID:	29196
Facility ID:	42239
RN:	Not reported
CN:	Not reported

FRANKIE CARTER RANDOLPH PARK (Continued) **U001274431**

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	1/5/2021
Due Date:	1/5/2021
Tank Owner:	HARRIS COUNTY
Contact Person:	NICK J RUSSO III
Report:	Suspected Release
Latest TCEQ Letter:	New LPST
Date of Latest TCEQ Letter:	3/29/2021
Project Manager:	Saul Garza
Team:	#N/A
New LPST Number:	121158
Pre-Existing LPST Number:	Not reported
Comments:	ORIG REC 11/30/2020; DWS REC 01/05/2021
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

A2 **RANDOLPH PARK** **TIER 2** **S108881465**
Target **5100 FM 2351** **N/A**
Property **FRIENDSWOOD, TX 77546**

Site 2 of 11 in cluster A

Actual: **31 ft.**

Focus Map: **4**

TIER 2:

Facility Id/Name:	FATR20124ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2012
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	5/10/2013
Date Tier 2 Signed:	2/26/2013
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	True
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Rusty Lees/ Safety Manager
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported

RANDOLPH PARK (Continued) **S108881465**

Additional Mail Addr:	Not reported
Facility Id/Name:	FATR20114ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2011
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	5/16/2012
Date Tier 2 Signed:	2/29/2012
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	True
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Rusty Lees/ Safety Manager
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported
Facility Id/Name:	FATR20104ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2010
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	6/1/2011
Date Tier 2 Signed:	Not reported
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	True
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Not reported
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported

RANDOLPH PARK (Continued) **S108881465**

Fire District:	Not reported
Additional Mail Addr:	Not reported
Facility Id/Name:	FATR20094ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2009
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	5/24/2010
Date Tier 2 Signed:	2/15/2010
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	True
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Rusty Lees/Safety Manager
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported
Facility Id/Name:	FATR20084ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2008
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	6/30/2009
Date Tier 2 Signed:	Not reported
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	Not reported
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Not reported
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	T
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported

RANDOLPH PARK (Continued) **S108881465**

Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported
Facility Id/Name:	FATR20074ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2007
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	8/5/2008
Date Tier 2 Signed:	Not reported
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	Not reported
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Not reported
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	T
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported
Facility Id/Name:	FATR20064ZPJTY02MFY0/RANDOLPH PARK
Reporting Year:	2006
Facility Country:	USA
Facility Department:	Pct. 1
Facility Date Modified:	10/10/2007
Date Tier 2 Signed:	4/19/2007
Mailing Address:	Not reported
Mailing City/State/Country:	Not reported
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	Not reported
State Fees Total:	200.00
Number Of Employess On Site:	Not reported
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Rusty Lees Safety Manager
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported

RANDOLPH PARK (Continued) **S108881465**

Mail City: Not reported
Mail State Req.: Not reported
Fire District: Not reported
Additional Mail Addr: Not reported

Facility Info:
Id: 92114
Id Type: NAICS
Description: Executive and Legislative Offices, Combined
Last Modified: 3/9/2007
Id: 9131
Id Type: SIC
Description: EXEC & LEGIS OFFICES COMBINED
Last Modified: 4/19/2007

Contact:
Contact Email: vhines@hctx.net
Contact Mail Address: 7901 El Rio Blvd.
Contact City/State/Zip: Houston, TX 77089
Contact Mail Country: USA
Contact Type 1: Emergency Contact
Contact Name: Valencia Hines
Title: Safety Coordinator
Modification Date: 3/1/2012

Contact:
Contact Email: rusty.lees@ms.hctx.net
Contact Mail Address: 1310 Prairie Ste. 400
Contact City/State/Zip: Houston, TX 77002
Contact Mail Country: USA
Contact Type 1: Owner / Operator
Contact Name: Rusty Lees
Title: Safety Manager
Modification Date: 3/1/2012

Chemical Inventory:
Facility Id: FATR20114ZPJTY02MFY0
Chemical Name: Petroleum Hydrocarbons
Chemical Inv Record Id: CVTR201152BFTX00R8V0
CAS Number: 8006-61-9
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 3/1/2012
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: Not reported
Sudden Release Of Pressure Haz: Not reported

RANDOLPH PARK (Continued) **S108881465**

Pure Form:	T
Reactive Hazard:	Not reported
Solid:	Not reported
Trade Secret:	Not reported
Contact Label:	Not reported
Label Code:	TX2011
Trade Secret:	Not reported

Chemical Inventory Location:

Record Key:	CLTR201152BFWG00SGQZ
Chemical Inventory Record Id:	CVTR201152BFTX00R8V0
Amt Of Sub Stored Or Transported:	Not reported
Amount Units:	pounds
Type Of Storage:	Below ground tank
Number Code/Storage Pressure:	1
Number Code/Storage Temperature:	4
Desc of Loc(Or Transported) Subs:	5100 FM 2351
Last Modified:	3/1/2012

Facility Id:	FATR20114ZPJTY02MFY0
Chemical Name:	Mixed Hydrocarbons
Chemical Inv Record Id:	CVTR201152BFYF00T6QY
CAS Number:	68476-34-6
Chemical Same As Last Year:	T
Acute Health Risks:	T
Average Daily Amount:	10,000 - 99,999 pounds
Max Daily Amount:	10,000 - 99,999 pounds
Max Amount In Largest Container:	Not reported
Chronic Health Risks:	T
EHS Substance:	Not reported
Last Modified:	3/1/2012
Days On Site:	365
Fire Hazard:	T
Gas:	Not reported
Liquid:	T
Mixture Form:	T
Sudden Release Of Pressure Haz:	Not reported
Pure Form:	Not reported
Reactive Hazard:	Not reported
Solid:	Not reported
Trade Secret:	Not reported
Contact Label:	Not reported
Label Code:	TX2011
Trade Secret:	Not reported

Chemical Inventory Location:

Record Key:	CLTR201152BFZY00UGT3
Chemical Inventory Record Id:	CVTR201152BFYF00T6QY
Amt Of Sub Stored Or Transported:	Not reported
Amount Units:	pounds
Type Of Storage:	Below ground tank
Number Code/Storage Pressure:	1
Number Code/Storage Temperature:	4
Desc of Loc(Or Transported) Subs:	5100 FM 2351
Last Modified:	3/1/2012

RANDOLPH PARK (Continued) **S108881465**

Notes: Not reported
Validation: Not reported

Facility Info:
Id: 9131
Id Type: SIC
Description: EXEC & LEGIS OFFICES COMBINED
Last Modified: 4/19/2007
Id: 92114
Id Type: NAICS
Description: Executive and Legislative Offices, Combined
Last Modified: 3/9/2007

Contact:
Contact Email: Not reported
Contact Mail Address: 1310 Prairie Ste. 400
Contact City/State/Zip: Houston, TX 77002
Contact Mail Country: USA
Contact Type 1: Owner / Operator
Contact Name: Rusty Lees
Title: Safety Manager
Modification Date: 3/14/2010

Contact:
Contact Email: Not reported
Contact Mail Address: 7901 El Rio Blvd.
Contact City/State/Zip: Houston, TX 77089
Contact Mail Country: USA
Contact Type 1: Emergency Contact
Contact Name: Valencia Hines
Title: Safety Coordinator
Modification Date: 3/3/2010

Chemical Inventory:
Facility Id: FATR20094ZPJTY02MFY0
Chemical Name: Petroleum Hydrocarbons
Chemical Inv Record Id: CVTR200952BFTX00R8V0
CAS Number: 8006-61-9
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 3/3/2010
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: Not reported
Sudden Release Of Pressure Haz: Not reported
Pure Form: T
Reactive Hazard: Not reported

RANDOLPH PARK (Continued) **S108881465**

Solid: Not reported
Trade Secret: Not reported
Contact Label: Not reported
Label Code: TX2009
Trade Secret: Not reported

Chemical Inventory Location:
Record Key: CLTR200952BFWG00SGQZ
Chemical Inventory Record Id: CVTR200952BFTX00R8V0
Amt Of Sub Stored Or Transported: Not reported
Amount Units: pounds
Type Of Storage: Below ground tank
Number Code/Storage Pressure: 1
Number Code/Storage Temperature: 4
Desc of Loc(Or Transported) Subs: 5100 FM 2351
Last Modified: 3/3/2010

Facility Id: FATR20094ZPJTY02MFY0
Chemical Name: Mixed Hydrocarbons
Chemical Inv Record Id: CVTR200952BFYF00T6QY
CAS Number: 68476-34-6
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 3/3/2010
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: T
Sudden Release Of Pressure Haz: Not reported
Pure Form: Not reported
Reactive Hazard: Not reported
Solid: Not reported
Trade Secret: Not reported
Contact Label: Not reported
Label Code: TX2009
Trade Secret: Not reported

Chemical Inventory Location:
Record Key: CLTR200952BFZY00UGT3
Chemical Inventory Record Id: CVTR200952BFYF00T6QY
Amt Of Sub Stored Or Transported: Not reported
Amount Units: pounds
Type Of Storage: Below ground tank
Number Code/Storage Pressure: 1
Number Code/Storage Temperature: 4
Desc of Loc(Or Transported) Subs: 5100 FM 2351
Last Modified: 3/3/2010

Notes: Not reported

RANDOLPH PARK (Continued) **S108881465**

Validation: This facility passed all validation checks.

Notes: Not reported
Validation: Not reported

Facility Info:
Id: 9131
Id Type: SIC
Description: EXEC & LEGIS OFFICES COMBINED
Last Modified: 4/19/2007
Id: 92114
Id Type: NAICS
Description: Executive and Legislative Offices, Combined
Last Modified: 3/9/2007

Contact:
Contact Email: vhines@hctx.net
Contact Mail Address: 7901 El Rio Blvd.
Contact City/State/Zip: Houston, TX 77089
Contact Mail Country: USA
Contact Type 1: Emergency Contact
Contact Name: Valencia Hines
Title: Safety Coordinator
Modification Date: 4/4/2011

Contact:
Contact Email: rusty_lees@hctx.net
Contact Mail Address: 1310 Prairie Ste. 400
Contact City/State/Zip: Houston, TX 77002
Contact Mail Country: USA
Contact Type 1: Owner / Operator
Contact Name: Rusty Lees
Title: Safety Manager
Modification Date: 4/4/2011

Chemical Inventory:
Facility Id: FATR20104ZPJTY02MFY0
Chemical Name: Petroleum Hydrocarbons
Chemical Inv Record Id: CVTR201052BFTX00R8V0
CAS Number: 8006-61-9
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 2/14/2011
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: Not reported

RANDOLPH PARK (Continued) **S108881465**

Sudden Release Of Pressure Haz: Not reported
Pure Form: T
Reactive Hazard: Not reported
Solid: Not reported
Trade Secret: Not reported
Contact Label: Not reported
Label Code: TX2010
Trade Secret: Not reported

Chemical Inventory Location:
Record Key: CLTR201052BFWG00SGQZ
Chemical Inventory Record Id: CVTR201052BFTX00R8V0
Amt Of Sub Stored Or Transported: Not reported
Amount Units: pounds
Type Of Storage: Below ground tank
Number Code/Storage Pressure: 1
Number Code/Storage Temperature: 4
Desc of Loc(Or Transported) Subs: 5100 FM 2351
Last Modified: 2/15/2010

Facility Id: FATR20104ZPJTY02MFY0
Chemical Name: Mixed Hydrocarbons
Chemical Inv Record Id: CVTR201052BFYF00T6QY
CAS Number: 68476-34-6
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 2/14/2011
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: T
Sudden Release Of Pressure Haz: Not reported
Pure Form: Not reported
Reactive Hazard: Not reported
Solid: Not reported
Trade Secret: Not reported
Contact Label: Not reported
Label Code: TX2010
Trade Secret: Not reported

Chemical Inventory Location:
Record Key: CLTR201052BFZY00UGT3
Chemical Inventory Record Id: CVTR201052BFYF00T6QY
Amt Of Sub Stored Or Transported: Not reported
Amount Units: pounds
Type Of Storage: Below ground tank
Number Code/Storage Pressure: 1
Number Code/Storage Temperature: 4
Desc of Loc(Or Transported) Subs: 5100 FM 2351
Last Modified: 2/15/2010

RANDOLPH PARK (Continued) **S108881465**

Notes: Not reported
Validation: Not reported

Facility Info:
Id: 9131
Id Type: SIC
Description: EXEC & LEGIS OFFICES COMBINED
Last Modified: 4/19/2007
Id: 92114
Id Type: NAICS
Description: Executive and Legislative Offices, Combined
Last Modified: 3/9/2007

Contact:
Contact Email: vhines@hctx.net
Contact Mail Address: 7901 El Rio Blvd.
Contact City/State/Zip: Houston, TX 77089
Contact Mail Country: USA
Contact Type 1: Emergency Contact
Contact Name: Valencia Hines
Title: Safety Coordinator
Modification Date: 3/8/2013

Contact:
Contact Email: rusty.lees@ms.hctx.net
Contact Mail Address: 1310 Prairie Ste. 400
Contact City/State/Zip: Houston, TX 77002
Contact Mail Country: USA
Contact Type 1: Owner / Operator
Contact Name: Rusty Lees
Title: Safety Manager
Modification Date: 3/9/2013

Chemical Inventory:
Facility Id: FATR20124ZPJTY02MFY0
Chemical Name: Petroleum Hydrocarbons
Chemical Inv Record Id: CVTR201252BFTX00R8V0
CAS Number: 8006-61-9
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 3/8/2013
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: Not reported
Sudden Release Of Pressure Haz: Not reported
Pure Form: T
Reactive Hazard: Not reported

RANDOLPH PARK (Continued) **S108881465**

Solid: Not reported
Trade Secret: Not reported
Contact Label: Not reported
Label Code: TX2012
Trade Secret: Not reported

Chemical Inventory Location:
Record Key: CLTR201252BFWG00SGQZ
Chemical Inventory Record Id: CVTR201252BFTX00R8V0
Amt Of Sub Stored Or Transported: Not reported
Amount Units: pounds
Type Of Storage: Below ground tank
Number Code/Storage Pressure: 1
Number Code/Storage Temperature: 4
Desc of Loc(Or Transported) Subs: 5100 FM 2351
Last Modified: 3/8/2013

Facility Id: FATR20124ZPJTY02MFY0
Chemical Name: Mixed Hydrocarbons
Chemical Inv Record Id: CVTR201252BFYF00T6QY
CAS Number: 68476-34-6
Chemical Same As Last Year: T
Acute Health Risks: T
Average Daily Amount: 10,000 - 99,999 pounds
Max Daily Amount: 10,000 - 99,999 pounds
Max Amount In Largest Container: Not reported
Chronic Health Risks: T
EHS Substance: Not reported
Last Modified: 3/8/2013
Days On Site: 365
Fire Hazard: T
Gas: Not reported
Liquid: T
Mixture Form: T
Sudden Release Of Pressure Haz: Not reported
Pure Form: Not reported
Reactive Hazard: Not reported
Solid: Not reported
Trade Secret: Not reported
Contact Label: Not reported
Label Code: TX2012
Trade Secret: Not reported

Chemical Inventory Location:
Record Key: CLTR201252BFZY00UGT3
Chemical Inventory Record Id: CVTR201252BFYF00T6QY
Amt Of Sub Stored Or Transported: Not reported
Amount Units: pounds
Type Of Storage: Below ground tank
Number Code/Storage Pressure: 1
Number Code/Storage Temperature: 4
Desc of Loc(Or Transported) Subs: 5100 FM 2351
Last Modified: 3/8/2013

Notes: Not reported

RANDOLPH PARK (Continued) **S108881465**

Validation: Not reported

Notes: Not reported
Validation: Not reported

Notes: Not reported

Validation: Signature is required for submission. Date Signed is required for submission. State field (TXT2 Number:) required for submission. State field (TXT2 Number:) is required to be a 5-digit number.

A3 **FRANKIE CARTER RANDOLPH PARK** **CENTRAL REGISTRY** **S126568334**
Target **5100 FM 2351 RD** **N/A**
Property **FRIENDSWOOD, TX 77546**

Site 3 of 11 in cluster A

Actual: **31 ft.**

Focus Map: **4**

CENTRAL REGISTRY:

Regulated Entity Number:	RN102249307
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
Address 2:	Not reported
City,State,Zip:	FRIENDSWOOD, TX 77546-2810
Status:	ACTIVE
Status Date:	5/19/2002
Customer Number:	CN602680423
Customer Name:	HARRIS COUNTY
Customer Legal Name:	Harris County
Customer Ownership Type:	COUNTY GOVERNMENT
Affiliation Begin Date:	9/1/1988
Affiliation End Date:	12/31/3000
Customer Status:	ACTIVE
Primary NAICS Industry Type Code:	Not reported
Primary NAICS Industry Type Description:	Not reported
Physical Location Description:	Not reported

Regulated Entity Number:	RN102249307
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
Address 2:	Not reported
City,State,Zip:	FRIENDSWOOD, TX 77546-2810
Status:	ACTIVE
Status Date:	5/19/2002
Customer Number:	CN602680423
Customer Name:	HARRIS COUNTY
Customer Legal Name:	Harris County
Customer Ownership Type:	COUNTY GOVERNMENT
Affiliation Begin Date:	9/1/1988
Affiliation End Date:	12/31/3000
Customer Status:	ACTIVE
Primary NAICS Industry Type Code:	Not reported
Primary NAICS Industry Type Description:	Not reported
Physical Location Description:	Not reported

Regulated Entity Number: RN102249307

FRANKIE CARTER RANDOLPH PARK (Continued) **S126568334**

Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
Address 2:	Not reported
City,State,Zip:	FRIENDSWOOD, TX 77546-2810
Status:	ACTIVE
Status Date:	5/19/2002
Customer Number:	CN602680423
Customer Name:	HARRIS COUNTY
Customer Legal Name:	Harris County
Customer Ownership Type:	COUNTY GOVERNMENT
Affiliation Begin Date:	9/1/1988
Affiliation End Date:	12/31/3000
Customer Status:	ACTIVE
Primary NAICS Industry Type Code:	Not reported
Primary NAICS Industry Type Description:	Not reported
Physical Location Description:	Not reported

Regulated Entity Number:	RN102249307
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
Address 2:	Not reported
City,State,Zip:	FRIENDSWOOD, TX 77546-2810
Status:	ACTIVE
Status Date:	2002-05-19
Customer Number:	CN602680423
Customer Name:	HARRIS COUNTY
Customer Legal Name:	Harris County
Customer Ownership Type:	COUNTY GOVERNMENT
Affiliation Begin Date:	1988-09-01
Affiliation End Date:	3000-12-31
Customer Status:	ACTIVE
Primary NAICS Industry Type Code:	Not reported
Primary NAICS Industry Type Description:	Not reported
Physical Location Description:	Not reported

A4 **FRANKIE CARTER RANDOLPH PARK** **RDR** **S127532886**
Target **5100 FM 2351** **N/A**
Property **FRIENDSWOOD, TX**

Site 4 of 11 in cluster A

Actual: **31 ft.**
Focus Map: **4**

RDR:

RDR ID:	28866
Facility ID:	42239
RN:	Not reported
CN:	Not reported
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	8/17/2020
Due Date:	8/17/2020
Tank Owner:	HARRIS COUNTY
Contact Person:	NICK RUSSO
Report:	Suspected Release
Latest TCEQ Letter:	No System/Site Check
Date of Latest TCEQ Letter:	10/16/2020
Project Manager:	Kristine Elliott
Team:	Team 3

FRANKIE CARTER RANDOLPH PARK (Continued) **S127532886**

New LPST Number:	Not reported
Pre-Existing LPST Number:	Not reported
Comments:	Not reported
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

A5 **FRANKIE CARTER RANDOLPH PARK** **UST FINDER** **1028772352**
Target **5100 FM 2351 RD** **N/A**
Property **FRIENDSWOOD, TX 77546**

Site 5 of 11 in cluster A

Actual: **31 ft.**

Focus Map: **4**

UST FINDER:

Object ID:	438905
Facility ID:	TX80352
Name:	FRANKIE CARTER RANDOLPH PARK
Address:	5100 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Address Match Type:	StreetAddress
Open USTs:	2
Closed USTs:	0
TOS USTs:	0
Population 1500ft:	1073
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Open Space
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	6
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.1936162699999
Y Coord:	29.545644
Latitude:	29.545644
Longitude:	-95.19361627

UST FINDER:

Object ID:	1905135
Facility ID:	TX80352
Tank ID:	TX111758
Tank Status:	Open
Installation Date:	1983/01/01 16:00:00+00

FRANKIE CARTER RANDOLPH PARK (Continued) **1028772352**

Removal Date:	Not reported
Tank Capacity:	4000
Substances:	Not reported
Tank Wall Type:	Single
Object ID:	1905136
Facility ID:	TX80352
Tank ID:	TX111759
Tank Status:	Open
Installation Date:	1983/01/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	4000
Substances:	Not reported
Tank Wall Type:	Single

A6 **FRANKIE CARTER RANDOLPH PARK** **FINDS** **1010748930**
Target **5100 FM 2351 RD** **N/A**
Property **FRIENDSWOOD, TX 77546**

Site 6 of 11 in cluster A

Actual: **31 ft.**
Focus Map: **4**

FINDS:
Registry ID: 110033995318

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
The Texas Commission on Environmental Quality (TCEQ) - Agency Central Registry is a computer application that allows the TCEQ to use a single, centralized area to record common information, such as the company names, addresses, and telephone numbers of those the TCEQ regulates. It also contains additional IDs (permits, registrations, authorizations, etc) and their status.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

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7 **CITY OF FRIENDSWOOD WATER WELL # 1** **TIER 2** **S108450943**
Target **17160 BLACKHAWK DRIVE** **N/A**
Property **FRIENDSWOOD, TX 77546**

Actual: **25 ft.**
Focus Map: **4**

TIER 2:

Facility Id:	FATR20082VZ1WU00UMWK
Facility Name:	CITY OF FRIENDSWOOD WATER WELL # 1
Reporting Year:	2008
Facility Country:	USA
Facility Department:	Water treatment well 1
Facility Date Modified:	6/30/2009
Date Tier 2 Signed:	2/23/2009
Mailing Address:	910 S. Friendswood
Mailing City/State/Country:	Friendswood, TX USA
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	True
State Fees Total:	7.14
Number Of Employess On Site:	4
Site Map:	Not reported
Fire District:	Not reported

CITY OF FRIENDSWOOD WATER WELL # 1 (Continued) **S108450943**

Submitted By:	Norm Stuart Safety and Training Coordinator
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported

Facility Id:	FATR20062VZ1WU00UMWK
Facility Name:	CITY OF FRIENDSWOOD WATER WELL # 1
Reporting Year:	2006
Facility Country:	USA
Facility Department:	Water treatment well 1
Facility Date Modified:	10/10/2007
Date Tier 2 Signed:	01/10/2007
Mailing Address:	910 S. Friendswood
Mailing City/State/Country:	Friendswood, TX USA
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	Not reported
State Fees Total:	50.00
Number Of Employess On Site:	4
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Norm Stuart Safety and Training Coordinator
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported

Facility Id:	FATR20052VZ1WU00UMWK
Facility Name:	CITY OF FRIENDSWOOD WATER WELL # 1
Reporting Year:	2005
Facility Country:	USA
Facility Department:	Water treatment well 1
Facility Date Modified:	2/27/2007
Date Tier 2 Signed:	Not reported
Mailing Address:	910 S. Friendswood
Mailing City/State/Country:	Friendswood, TX USA
Dikes/Other Safeguard Meas Emp:	Not reported
All Chemicals Same As Last Year:	Not reported
State Fees Total:	50

CITY OF FRIENDSWOOD WATER WELL # 1 (Continued) **S108450943**

Number Of Employess On Site:	4
Site Map:	Not reported
Fire District:	Not reported
Submitted By:	Norm Stuart Safety and Training Coordinator
Latitude:	Not reported
Longitude:	Not reported
Lat/Long Location Desc:	Not reported
Lat/Long Method:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Number Of Emp. Required:	Not reported
Fail Valid:	Not reported
Site Coordinate Abbr Submitted:	Not reported
Mail Address:	Not reported
Mail City:	Not reported
Mail State Req.:	Not reported
Fire District:	Not reported
Additional Mail Addr:	Not reported

Notes: Not reported
Validation: Not reported

Notes: This fee covers the 6 water wells that have Chlorine in the City of Friendswood. Each well has one 150 pound Chlorine cylinder.

Validation: This facility passed all validation checks.

Notes: Not reported
Validation: Not reported

B8 **JET CLEANERS** **EDR Hist Cleaner** **1020013536**
Target **3670M E FM 528 RD** **N/A**
Property **FRIENDSWOOD, TX 77546**

Site 1 of 4 in cluster B

Actual: EDR Hist Cleaner
22 ft.

Focus Map:
4

Year:	Name:	Type:
1999	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC
2000	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC
2001	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC
2002	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC
2003	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC
2004	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC
2005	JET CLEANERS	Drycleaning Plants, Except Rugs, NEC

B9 **1.49 JET CLEANERS** **VCP** **S122570427**
ENE **3670 E FM 528 RD** **GCC** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.012 mi.
61 ft. **Site 2 of 4 in cluster B**

Actual:
22 ft.

Focus Map:
4

VCP TCEQ:

Name:	1.49 JET CLEANERS
Address:	3670 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	REGION 12 - HOUSTON
Facility ID:	1863
VCP Record Date:	09/07/2005
Facility Type:	DRY CLEANER
PCA Number:	34062
Project Manager:	CSWIDERS
Phase:	REMEDIATION
Acres at Site:	0.58
REM Program:	VCP
RN Number:	RN103008066
Former Facility Type:	Not reported
Site Address Description:	3670 FM 528 West in Freindswood
Near City Name:	FRIENDSWOOD
Administrative Status:	ACTIVE
Region Notified of Application:	09/07/2005
RCRIS Number:	Not reported
Air REM Method:	Not reported
GW REM Method:	Not reported
EPA Texas ID/CERCLIS Registration:	Not reported
Soil REM Method:	Not reported
Surf Water REM Method:	Not reported
CCOC Date:	Not reported
Risk Reduction or Petroleum Storage Tank:	Not reported
Air Inst Eng Controls:	Not reported
TNRCC Solid Waste Registration:	Not reported
GW Inst Eng Controls:	Not reported
TX Risk Reduction Program:	Not reported
Sediment Inst Eng Controls:	Not reported
Soil Inst Eng Controls:	Not reported
Certificate of Completion Date:	Not reported
Standards:	Not reported
Surf Water Inst Eng Controls:	Not reported
Remedy Type:	Not reported
Air Target COC Class:	Not reported
Date Cashier Check Received:	09/06/2005
GW Target COC Class:	TPH; SVOCS; CHLORINATED SOLVENTS; METALS
Sediment Target COC Class:	Not reported
Application Accepted?:	Not reported
Application Accepted Date:	2005-10-05 00:00:00
Soil Target COC Class:	CHLORINATED SOLVENTS
Surface Water Target COC Class:	Not reported
Alternate VCP ID:	1863
Leaking Petroleum Storage Registration Tank:	Not reported
Project Number:	340620
Off Site?:	Not reported
Media:	PAPER
IOP Number:	Not reported
File Location:	D/211; D/200-37
Latitude:	29.52

1.49 JET CLEANERS (Continued) **S122570427**

Longitude: -95.17

GCC:

Name: 1.49 JET CLEANERS
Address: 3670 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/VC
New Cases: Not reported
File Number: 1863
Contamination Description: TPH, SVOCS, METALS
Date Of Earliest Known Contamination Confirmation: 9/7/2005
Enforcement Status - Level Of Agency Response: -
Enforcement Status - Site Activity Status: 0B/L2 -
Data Quality 1: E
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: 1.49 JET CLEANERS
Address: 3670 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/VCP
New Cases: Not reported
File Number: 1863
Contamination Description: TPH, SVOCS, METALS
Date Of Earliest Known Contamination Confirmation: 9/7/2005
Enforcement Status - Level Of Agency Response: 0B -
Enforcement Status - Site Activity Status: 5 -
Data Quality 1: Not reported
Section 5236: Not reported
Type: 2019 GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: 1.49 JET CLEANERS
Address: 3670 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/VCP
New Cases: Not reported
File Number: 1863
Contamination Description: TPH, SVOCS, METALS
Date Of Earliest Known Contamination Confirmation: 9/7/2005
Enforcement Status - Level Of Agency Response: 0B -
Enforcement Status - Site Activity Status: 5 - Monitor Action
Data Quality 1: E
Section 5236: Not reported
Type: Not reported
Agency: Not reported

1.49 JET CLEANERS (Continued) **S122570427**

Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: 1.49 JET CLEANERS
Address: 3670 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/VCP
New Cases: Not reported
File Number: 1863
Contamination Description: TPH, SVOCS, METALS
Date Of Earliest Known Contamination Confirmation: 9/7/2005
Enforcement Status - Level Of Agency Response: 0B -
Enforcement Status - Site Activity Status: 5 -
Data Quality 1: E
Section 5236: Not reported
Type: Not reported
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: 1.49 JET CLEANERS
Address: 3670 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/VCP
New Cases: Not reported
File Number: 1863
Contamination Description: TPH, SVOCS, METALS
Date Of Earliest Known Contamination Confirmation: 9/7/2005
Enforcement Status - Level Of Agency Response: 0B -
Enforcement Status - Site Activity Status: 5 -
Data Quality 1: E
Section 5236: Not reported
Type: Not reported
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: 1.49 JET CLEANERS
Address: 3670 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/VC
New Cases: Not reported
File Number: 1863
Contamination Description: SVOCS, METALS, TPH
Date Of Earliest Known Contamination Confirmation: 09/07/2005
Enforcement Status - Level Of Agency Response: 0B -
Enforcement Status - Site Activity Status: 5 -
Data Quality 1: E
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

1.49 JET CLEANERS (Continued) **S122570427**

Agency:	Not reported
Section:	Not reported
Year Deleted:	Not reported
Location:	Not reported
Data Quality 2:	Not reported

A10 **STAR CLEANERS INC** **EDR Hist Cleaner** **1020094040**
SW **5105 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.020 mi.
107 ft. **Site 7 of 11 in cluster A**

Actual: EDR Hist Cleaner
30 ft.

Focus Map: Year: Name: Type:
4 2011 STAR CLEANERS INC Drycleaning Plants, Except Rugs
2012 STAR CLEANERS INC Drycleaning Plants, Except Rugs

C11 **CORNER STORE 1409** **UST FINDER** **1028767175**
NE **5091 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.021 mi.
113 ft. **Site 1 of 6 in cluster C**

Actual: UST FINDER:
30 ft.

Focus Map:
4

Object ID:	438906
Facility ID:	TX74769
Name:	CORNER STORE 1409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Address Match Type:	PointAddress
Open USTs:	3
Closed USTs:	0
TOS USTs:	0
Population 1500ft:	1135
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	6
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.19294709
Y Coord:	29.54565891
Latitude:	29.54565891

CORNER STORE 1409 (Continued) **1028767175**

Longitude: -95.19294709

UST FINDER:

Object ID: 1900262
Facility ID: TX74769
Tank ID: TX144448
Tank Status: Open
Installation Date: 1991/10/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 12000
Substances: Not reported
Tank Wall Type: Single

Object ID: 1900263
Facility ID: TX74769
Tank ID: TX144447
Tank Status: Open
Installation Date: 1991/10/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 12000
Substances: Not reported
Tank Wall Type: Single

Object ID: 1900264
Facility ID: TX74769
Tank ID: TX144446
Tank Status: Open
Installation Date: 1991/10/01 15:59:59+00
Removal Date: Not reported
Tank Capacity: 12000
Substances: Not reported
Tank Wall Type: Single

C12 **CIRCLE K 2741409** **RDR** **S127536827**
NE **5091 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX**
0.021 mi.
113 ft. **Site 2 of 6 in cluster C**

Actual:
30 ft.

Focus Map:
4

RDR:
RDR ID: 28335
Facility ID: 62181
RN: Not reported
CN: Not reported
Name: CIRCLE K 2741409
Address: 5091 FM 2351 RD
City,State,Zip: FRIENDSWOOD, TX
Date Report Received: 3/3/2020
Due Date: 3/3/2020
Tank Owner: CIRCLE K STORES INC
Contact Person: VERONICA RIVERA
Report: SUSPECTED RELEASE
Latest TCEQ Letter: No system/site check
Date of Latest TCEQ Letter: 3/30/2020
Project Manager: Corbin Reyes
Team: #N/A
New LPST Number: Not reported

CIRCLE K 2741409 (Continued) **S127536827**

Pre-Existing LPST Number:	Not reported
Comments:	Not reported
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

RDR ID:	29295
Facility ID:	62181
RN:	Not reported
CN:	Not reported
Name:	CIRCLE K 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	12/8/2020
Due Date:	12/8/2020
Tank Owner:	CIRCLE K STORES INC
Contact Person:	VERONICA RIVERA
Report:	Suspected Release
Latest TCEQ Letter:	No System/Site Check
Date of Latest TCEQ Letter:	2/3/2021
Project Manager:	Reagan Stephens
Team:	Team 1
New LPST Number:	Not reported
Pre-Existing LPST Number:	Not reported
Comments:	Not reported
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

RDR ID:	29410
Facility ID:	62181
RN:	Not reported
CN:	Not reported
Name:	CIRCLE K 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	12/29/2020
Due Date:	12/29/2020
Tank Owner:	CIRCLE K STORES INC
Contact Person:	KEVIN PAGSOLINGAN
Report:	Suspected Release
Latest TCEQ Letter:	No System/Site Check
Date of Latest TCEQ Letter:	2/26/2021
Project Manager:	Reagan Stephens
Team:	Team 1
New LPST Number:	Not reported
Pre-Existing LPST Number:	Not reported

CIRCLE K 2741409 (Continued) **S127536827**

Comments:	Not reported
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

C13 **VALERO ENERGY STATION** **EDR Hist Auto** **1022007437**
NE **5091 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.021 mi.
113 ft. **Site 3 of 6 in cluster C**

Actual: EDR Hist Auto
30 ft.

Focus Map: Year: Name: Type:
4 2011 VALERO ENERGY STATION Gasoline Service Stations

C14 **CIRCLE K STORE #2741409** **RDR** **S127536828**
NE **5091 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX**
0.021 mi.
113 ft. **Site 4 of 6 in cluster C**

Actual: RDR:
30 ft.

Focus Map:
4

RDR ID:	29543
Facility ID:	62181
RN:	Not reported
CN:	Not reported
Name:	CIRCLE K STORE #2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	1/21/2021
Due Date:	1/21/2021
Tank Owner:	CIRCLE K STORES INC
Contact Person:	KEVIN PAGSOLINGAN
Report:	Suspected Release
Latest TCEQ Letter:	No System/Site Check
Date of Latest TCEQ Letter:	3/22/2021
Project Manager:	Reagan Stephens
Team:	Team 1
New LPST Number:	Not reported
Pre-Existing LPST Number:	Not reported
Comments:	Not reported
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

C15
NE
< 1/8
0.021 mi.
113 ft.

VALERO CORNER STORE 1409
5091 FM 2351 RD
FRIENDSWOOD, TX 77546

Site 5 of 6 in cluster C

PST STAGE 2 | **S122000110** | **N/A**

Actual:
30 ft.

Focus Map:
4

PST STAGE 2:

Regulated Number:	RN102369576
Region Location:	12
Has Active Violation:	NO
PST ID:	62181
Start Date:	01/09/1992
Stage 2 Type:	ASSIST SYSTEM
Stage 2 Install Date:	12/29/1995
Last Inspection Activity:	DECOMMCEI
EACT Status:	ACTIVE
ADDN ID:	62181
Last Inspection Number:	1204975
Last Inspection Status Date:	01/12/2015
Last Inspection Status:	DAPPROVED
Last Inspection Activity 2:	DECOMMCEI
Last Inspection Conducted By:	REGION 12 - HOUSTON
Facility Not Inspected:	Not reported
Facility Not Inspected Reason:	Not reported
ADDN Status:	ACTIVE
Status:	ACTIVE
Signed Date:	10/01/2018
Expired Date:	09/30/2019
Tank Status:	IN USE
Type:	RETAIL
UST Number:	3
Latitude:	0
Longitude:	0

Stage2 Detail:

RN:	RN102369576
Reg Status:	FULLY REGULATED
CN:	CN604312421
Princ Name:	BIG DIAMOND LLC
Princ Legal Name:	Big Diamond, LLC
Role:	OWNOPR
First Name:	Not reported
Middle Name:	Not reported
Last Name:	Not reported
PST UST ID:	144446
UST Tank ID:	2
Num UST Comprt:	1
Install Date:	10/01/1991
Regis Date:	01/09/1992
Capacity Qty:	12000
Substance Type:	GASOLINE

C16 **CIRCLE K STORE 2741409** **UST** **U003422169**
NE **5091 FM 2351 RD** **Financial Assurance** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.021 mi.
113 ft. **Site 6 of 6 in cluster C**

Actual:
30 ft.

Focus Map:
4

UST:

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 775462807
AI Number:	62181
Facility Type:	RETAIL
Facility Begin Date:	01/09/1992
Facility Status:	ACTIVE
Additional ID:	754743362002149
Facility Exempt Status:	N
Records Off-Site:	Yes
UST Financial Assurance Required:	No
Number Of Active UST:	3
Site Location Description:	Not reported
Site Location (Nearest City Name):	Not reported
Site Location (County Name):	HARRIS
Site Location (Tceq Region):	12
Site Location (Location Zip):	77546
Contact Name/Title:	,
Contact Organization Name:	Not reported
Contact Mailing Address1:	Not reported
Contact Mailing Address2:	Not reported
Contact Mailing City/State/Zip:	Not reported
Contact Telephone:	Not reported
Facility Contact Address Deliverable:	Not reported
Contact Fax Number:	Not reported
Contact Email Address:	Not reported
Signature Date On Earliest Reg Form:	08/17/2017
Signature Name/Title On Earliest Reg Form:	TERRY HANKINS,COMP COORD
Application Received Date On Earliest Reg Form:	08/18/2017
Signature Role On Earliest Reg Form:	LEGAL AUTH REP OWNER
Signature Company On Earliest Reg Form:	Not reported
Enforcement Action:	No
Facility Not Inspectable:	No

Operator:

Princ ID:	658325792001221
Additional ID:	754743362002149
Ai Number:	62181
Operator CN:	CN600134456
Operator Name:	CIRCLE K STORES INC
Operator Effective Begin Date:	08/16/2021
Operator Type:	CO
Operator Role:	OPRCON
Contact Name:	MINDY SZANISZLO/
Contact Organization Name:	CIRCLE K STORES INC
Contact Mailing Address (Delivery):	PO BOX 52085
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	PHOENIX AZ 85072-2085
Contact Phone Country Code:	1
Contact Phone Area Code:	602
Contact Phone Number:	7283217
Contact Phone Extension:	0
Contact Fax Country Code:	Not reported

CIRCLE K STORE 2741409 (Continued) **U003422169**

Contact Fax Area Code:	Not reported
Contact Fax Number:	Not reported
Contact Fax Extension:	Not reported
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported

Owner:

Owner CN:	CN600134456
Owner Last Name:	CIRCLE K STORES INC
Owner First Name:	Not reported
Owner Middle Name:	Not reported
Owner Type:	CO
Contact Mailing Address (Delivery):	PO BOX 52085
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City:	PHOENIX
Contact Mailing State:	AZ
Contact Mailing Zip:	85072
Contact Mailing Zip5:	2085
Contact Phone Number/Ext:	1 602 7283217/0
Contact Fax Country Code:	Not reported
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported
Princ ID:	658325792001221
Additional ID:	754743362002149
AI Number:	62181
Owner Effective Begin Date:	08/16/2021
State Tax ID:	17411495405
Contact Role:	OWNCON
Contact Name/Title:	MINDY SZANISZLO/
Contact Organization Name:	CIRCLE K STORES INC

Self Certification:

Self Cert ID:	74769
Cert ID:	396382
AI Number:	62181
Self Certification Date:	10/18/2023
Signature Name/Title:	KELLIE BODDIE ENVIRONMENTAL SPECIALIST
Signature Type Role:	OPERATOR
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	10/31/2024
Reporting Method:	E
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	N

Self Cert ID:	74769
Cert ID:	379308
AI Number:	62181
Self Certification Date:	09/29/2022

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	KELLIE BODDIE ENV SPE
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	10/31/2023
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	N

Self Cert ID:	74769
Cert ID:	360530
AI Number:	62181
Self Certification Date:	09/21/2021
Signature Name/Title:	KELLIE BODDIE ENVIRONMENTAL SPECIALIST
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2022
Reporting Method:	E
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	N

Self Cert ID:	74769
Cert ID:	342501
AI Number:	62181
Self Certification Date:	09/02/2020
Signature Name/Title:	Veronica Rivera OPERATOR
Signature Type Role:	OPERATOR
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2021
Reporting Method:	S
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	N

Self Cert ID:	74769
Cert ID:	327512
AI Number:	62181
Self Certification Date:	09/25/2019

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	Annette S Toale Environmental Manage
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2020
Reporting Method:	S
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	310916
AI Number:	62181
Self Certification Date:	10/01/2018
Signature Name/Title:	Annette S Toale Enviro Manager
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2019
Reporting Method:	S
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	292217
AI Number:	62181
Self Certification Date:	08/17/2017
Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2018
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	275856
AI Number:	62181
Self Certification Date:	08/29/2016

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2017
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	259195
AI Number:	62181
Self Certification Date:	08/24/2015
Signature Name/Title:	TERRY HANKINS COMPCOORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2016
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	242418
AI Number:	62181
Self Certification Date:	08/25/2014
Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2015
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	225342
AI Number:	62181
Self Certification Date:	08/27/2013

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	TERRY HANKINS COMPIANCE COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2014
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	74769
Cert ID:	103744
AI Number:	62181
Self Certification Date:	08/22/2012
Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2013
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103743
AI Number:	62181
Self Certification Date:	08/22/2011
Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2012
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103742
AI Number:	62181
Self Certification Date:	08/24/2010

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2011
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103741
AI Number:	62181
Self Certification Date:	08/24/2009
Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2010
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103740
AI Number:	62181
Self Certification Date:	08/29/2008
Signature Name/Title:	TERRY HANKINS COMP COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2009
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103739
AI Number:	62181
Self Certification Date:	03/20/2008

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	TERRY HANKINS O & E SPECIALIST
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2008
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103738
AI Number:	62181
Self Certification Date:	08/04/2007
Signature Name/Title:	TERRY HANKINS COMPLIANCE COORD
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2008
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103737
AI Number:	62181
Self Certification Date:	07/25/2006
Signature Name/Title:	TERRY HANKINS O & E SPECIALIST
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2007
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103736
AI Number:	62181
Self Certification Date:	07/27/2005

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	TERRY HANKINS O&E SPECIALIST
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2006
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103735
AI Number:	62181
Self Certification Date:	07/12/2004
Signature Name/Title:	TERRY HANKINS O&E SPECIALIST
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2005
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103734
AI Number:	62181
Self Certification Date:	07/28/2003
Signature Name/Title:	TERRY HANKINS O & E SPEC
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2004
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103733
AI Number:	62181
Self Certification Date:	08/14/2002

CIRCLE K STORE 2741409 (Continued) **U003422169**

Signature Name/Title:	DAVID MENDOZA O & E SPEC
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2003
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	74769
Cert ID:	103732
AI Number:	62181
Self Certification Date:	01/05/2001
Signature Name/Title:	DAVID MENDOZA O&E SPEC
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	09/30/2002
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Tank:

Install Date:	10/01/1991
Tank Registration Date:	01/09/1992
Number of Compartments:	1
Tank Capacity:	12000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	144447
Facility ID:	74769
Ai Number:	62181
Tank Id:	3
Tank Status (Current):	IN USE
Tank Status Date:	10/01/1991
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	Y
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	Y
TCPM(Cathodic Prot-FacInstallation):	Y
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	N
Tank Tested Flag:	N
Installation Signature Date:	11/05/1991

Compartment Records:

Tank ID:	3
Tank Capacity:	12000
UST Comprt ID:	106970
UST ID:	144447
AI Number:	62181
Compartment ID:	A
Substance Stored1:	DIESEL
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	N
SOPE(Spill Cont/Bucket/Sump):	N
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	N
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Install Date:	10/01/1991
Tank Registration Date:	01/09/1992
Number of Compartments:	1
Tank Capacity:	12000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	144448
Facility ID:	74769
Ai Number:	62181
Tank Id:	1
Tank Status (Current):	IN USE
Tank Status Date:	10/01/1991
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	Y
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	Y
TCPM(Cathodic Prot-FacInstallation):	Y
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	N
Tank Tested Flag:	N
Installation Signature Date:	11/05/1991

Compartment Records:

Tank ID:	1
Tank Capacity:	12000
UST Comprt ID:	106971
UST ID:	144448
AI Number:	62181
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	N
SOPE(Spill Cont/Bucket/Sump):	N
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	N
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Install Date:	10/01/1991
Tank Registration Date:	01/09/1992
Number of Compartments:	1
Tank Capacity:	12000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	144446
Facility ID:	74769
Ai Number:	62181
Tank Id:	2
Tank Status (Current):	IN USE
Tank Status Date:	10/01/1991
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	Y
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	Y
TCPM(Cathodic Prot-FacInstallation):	Y
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	N
Tank Tested Flag:	N
Installation Signature Date:	11/05/1991

Compartment Records:

Tank ID:	2
Tank Capacity:	12000
UST Comprt ID:	106969
UST ID:	144446
AI Number:	62181
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	N
SOPE(Spill Cont/Bucket/Sump):	N
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	N
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Construction Notification:

NOC ID:	35098
Facility ID:	74769
AI Number:	62181
Application Received Date:	08/06/2019
Scheduled Construction Date:	09/04/2019
UST Improvement:	Y
UST Installation:	N
UST Removal:	N
UST Repair:	N
UST Return To Service:	N
UST Replacement:	N
UST Abandonment:	N
UST Stage I:	N
AST Installation:	N
AST Stage I:	N
Historical Tracking Number:	Not reported
Waiver Flag:	Not reported
Late Filing Flag:	Y
Form Received Date:	08/06/2019
Signature Date On Form:	08/05/2019
Signature Name On Form:	CHRIS JOHNSON
Signature Company On Form:	Not reported
Signature Title On Form:	OFFICE MGR
Signature Role:	Not reported
Owner Name At Time Of Construction:	BIG DIAMOND LLC;BIG DIAMOND LLC
Owner CN At Time Of Construction:	CN604312421,CN604312421
Owner AR At Time Of Construction:	74569A,74569U
General Desc Of Prop Construct:	DISPENSER UPGRADE WITH THE ADDITION OF NEW UDC'S AND/OR TANK SUMPS AND PIPING AS REQUIRED PER REGULATIONS. UPDATED REGISTRATION UPON COMPLETION.

NOC ID:	11582
Facility ID:	74769
AI Number:	62181
Application Received Date:	06/22/2007
Scheduled Construction Date:	07/22/2007
UST Improvement:	Y
UST Installation:	N
UST Removal:	N
UST Repair:	N
UST Return To Service:	N
UST Replacement:	N
UST Abandonment:	N
UST Stage I:	N
AST Installation:	N

CIRCLE K STORE 2741409 (Continued) **U003422169**

AST Stage I:	N
Historical Tracking Number:	M70622005
Waiver Flag:	N
Late Filing Flag:	N
Form Received Date:	08/06/2019
Signature Date On Form:	08/05/2019
Signature Name On Form:	CHRIS JOHNSON
Signature Company On Form:	Not reported
Signature Title On Form:	OFFICE MGR
Signature Role:	Not reported
Owner Name At Time Of Construction:	Not reported
Owner CN At Time Of Construction:	Not reported
Owner AR At Time Of Construction:	21599
General Desc Of Prop Construct:	Not reported

Contractor, Consultant and Installer:

Cont/Cons/Installer ID:	83251
UST ID:	Not reported
NOC ID:	35098
AI Number:	62181
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	CRP001194
Company Name:	BEAR SERVICES LP
Representative Name:	VICTOR SAIENNI
Mailing Address (Delivery):	PO BOX 2296
Mailing Address (Internal Delivery):	Not reported
Mailing City:	SPRING
Mailing State:	TX
Mailing Zip:	77383
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	0
Phone Number Area Code:	281
Phone Number:	3558953
Phone Number Extension:	0
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported

Cont/Cons/Installer ID:	29787
UST ID:	144446
NOC ID:	Not reported
AI Number:	62181
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	CRP000572
Company Name:	DIAMOND SHAMROCK
Representative Name:	Not reported
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported

CIRCLE K STORE 2741409 (Continued) **U003422169**

Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported
Cont/Cons/Installer ID:	29789
UST ID:	144448
NOC ID:	Not reported
AI Number:	62181
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	CRP000572
Company Name:	DIAMOND SHAMROCK
Representative Name:	Not reported
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported
Cont/Cons/Installer ID:	29788
UST ID:	144447
NOC ID:	Not reported
AI Number:	62181
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	CRP000572
Company Name:	DIAMOND SHAMROCK
Representative Name:	Not reported
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported
Cont/Cons/Installer ID:	44951
UST ID:	144446

CIRCLE K STORE 2741409 (Continued) **U003422169**

NOC ID:	Not reported
AI Number:	62181
Type Of Contact:	INSTALLER
Contractor CRP Number Or Installer ILP Number:	Not reported
Company Name:	Not reported
Representative Name:	BURR METE ER
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported

Cont/Cons/Installer ID:	44952
UST ID:	144447
NOC ID:	Not reported
AI Number:	62181
Type Of Contact:	INSTALLER
Contractor CRP Number Or Installer ILP Number:	Not reported
Company Name:	Not reported
Representative Name:	BURR METE ER
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported

Cont/Cons/Installer ID:	44953
UST ID:	144448
NOC ID:	Not reported
AI Number:	62181
Type Of Contact:	INSTALLER
Contractor CRP Number Or Installer ILP Number:	Not reported
Company Name:	Not reported
Representative Name:	BURR METE ER
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported

CIRCLE K STORE 2741409 (Continued) **U003422169**

Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported
Cont/Cons/Installer ID:	83250
UST ID:	Not reported
NOC ID:	35098
AI Number:	62181
Type Of Contact:	INSTALLER
Contractor CRP Number Or Installer ILP Number:	ILP001077
Company Name:	SAIENNI VICTOR LOUIS
Representative Name:	Not reported
Mailing Address (Delivery):	PO BOX 2296
Mailing Address (Internal Delivery):	Not reported
Mailing City:	SPRING
Mailing State:	TX
Mailing Zip:	77383
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	1
Phone Number Area Code:	281
Phone Number:	3558953
Phone Number Extension:	0
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	VICTORS@BEARSERVICESLP.COM

Facility Billing Contacts:

Contact Organization Name:	CIRCLE K STORES INC
Contact Mailing Address (Delivery):	1120 W WARNER RD
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	TEMPE, AZ 85284 2816
Phone Number/Ext:	984 3891316/0
Contact Fax Number/Ext:	/
Contact Email Address:	kboddie@circlek.com
Contact Address Deliverable:	Y
Facility ID:	74769
Additional ID:	754743362002149
Princ ID:	658325792001221
AI Number:	62181
Facility Name:	CIRCLE K STORE 2741409
AR Number:	82920
AR UST Number Suffix:	A
AR AST Number Suffix:	U
Contact Name/Title:	KELLIE BODDIE/ENVIRONMENTAL SPECIALIST

CIRCLE K STORE 2741409 (Continued) **U003422169**

TX Financial Assurance 2:

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	293580
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	Not reported
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	GUARANTEE
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	07/13/2023
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	PARENT (GUARANTEE)
Issuer Phone:	0 0 0
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	07/13/2024
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	275469
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	Not reported
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	GUARANTEE
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	08/11/2022
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	PARENT (GUARANTEE)
Issuer Phone:	0 984 3891316
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	08/11/2023
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	257558
AI:	62181
Mechanism Type Other:	Not reported

CIRCLE K STORE 2741409 (Continued) **U003422169**

Multiple Mechanism Types:	Not reported
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	GUARANTEE
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	12/23/2020
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	PARENT (GUARANTEE)
Issuer Phone:	0 0 0
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	08/27/2022
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	221009
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	GUARANTEE
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	08/27/2019
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	PARENT (GUARANTEE)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	12/27/2020
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	204727
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/01/2018
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	NAVIGATORS INS CO

CIRCLE K STORE 2741409 (Continued) **U003422169**

Issuer Phone:	Not reported
Policy Number:	CH18ESP0BDKNONC
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/01/2019
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	185238
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	03/27/2017
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	2,000,000
Coverage Expiration Date:	03/27/2018
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	168457
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/15/2016
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	04/15/2017
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes
Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD

CIRCLE K STORE 2741409 (Continued) **U003422169**

City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	150327
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/09/2015
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	04/30/2016
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	133529
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/16/2014
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	1,000,000
Coverage Expiration Date:	04/30/2015
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	114881
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y

CIRCLE K STORE 2741409 (Continued) **U003422169**

Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/22/2013
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	Not reported
Policy Number:	Not reported
Coverage Amount:	2,000,000
Coverage Expiration Date:	04/30/2014
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	8083
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/19/2012
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 210 3452000
Policy Number:	None
Coverage Amount:	2,000,000
Coverage Expiration Date:	04/30/2013
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	61148
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/23/2010
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 210 3452000
Policy Number:	None
Coverage Amount:	10000000

CIRCLE K STORE 2741409 (Continued) **U003422169**

Coverage Expiration Date:	04/30/2011
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	61149
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/23/2010
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 210 3452000
Policy Number:	None
Coverage Amount:	10000000
Coverage Expiration Date:	04/30/2011
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	61150
AI:	62181
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	FINANCIAL TEST
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/27/2009
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	SELF(FIN TEST OR LOCAL GOV FT)
Issuer Phone:	1 713 8123041
Policy Number:	None
Coverage Amount:	10000000
Coverage Expiration Date:	04/30/2010
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes
Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769

CIRCLE K STORE 2741409 (Continued) **U003422169**

Finass ID:	61153
AI:	62181
Mechanism Type Other:	PST REMEDIATION FUND
Multiple Mechanism Types:	Y
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	OTHER
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	12/31/1992
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	61151
AI:	62181
Mechanism Type Other:	PST REMEDIATION FUND
Multiple Mechanism Types:	Y
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	OTHER
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	12/31/1992
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

Name:	CIRCLE K STORE 2741409
Address:	5091 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	74769
Finass ID:	61152
AI:	62181
Mechanism Type Other:	PST REMEDIATION FUND
Multiple Mechanism Types:	Y
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	OTHER
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y

CIRCLE K STORE 2741409 (Continued) **U003422169**

Financial Assurance Begin Date:	12/31/1992
Date Financial Assurance Form Rec:	08/18/2017
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

B17 **CORNER FOOD MART** **UST** **U001276354**
ENE **3698 E FM 528 RD** **Financial Assurance** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546** **PST STAGE 2**
0.023 mi.
121 ft. **Site 3 of 4 in cluster B**

Actual:
22 ft.

Focus Map:
4

UST:

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 775465039
AI Number:	44610
Facility Type:	RETAIL
Facility Begin Date:	04/25/2022
Facility Status:	ACTIVE
Additional ID:	295568792002087
Facility Exempt Status:	N
Records Off-Site:	Not reported
UST Financial Assurance Required:	Yes
Number Of Active UST:	3
Site Location Description:	Not reported
Site Location (Nearest City Name):	FRIENDSWOOD
Site Location (County Name):	HARRIS
Site Location (Tceq Region):	12
Site Location (Location Zip):	77546
Contact Name/Title:	AKBAR ALVIRI,OWNER
Contact Organization Name:	CORNER FOOD MART
Contact Mailing Address1:	3698 E FM 528 RD
Contact Mailing Address2:	Not reported
Contact Mailing City/State/Zip:	FRIENDSWOOD, TX 775465039
Contact Telephone:	2813327270
Facility Contact Address Deliverable:	Y
Contact Fax Number:	Not reported
Contact Email Address:	Not reported
Signature Date On Earliest Reg Form:	04/28/2020
Signature Name/Title On Earliest Reg Form:	M SADIQ DURRANI,REP
Application Received Date On Earliest Reg Form:	04/28/2020
Signature Role On Earliest Reg Form:	LEGAL AUTH REP OWNER
Signature Company On Earliest Reg Form:	Not reported
Enforcement Action:	No
Facility Not Inspectable:	No

Operator:

Princ ID:	465380162010362
Additional ID:	295568792002087
Ai Number:	44610
Operator CN:	CN603791815
Operator Name:	HNC GROUP CORPORATION
Operator Effective Begin Date:	10/09/2006

CORNER FOOD MART (Continued) **U001276354**

Operator Type:	CO
Operator Role:	OWNOPRCON
Contact Name:	AKBAR ALVIRI/OWNER
Contact Organization Name:	HNC GROUP CORPORATION
Contact Mailing Address (Delivery):	3698 E FM 528 RD
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	FRIENDSWOOD TX 77546-5039
Contact Phone Country Code:	1
Contact Phone Area Code:	281
Contact Phone Number:	3327270
Contact Phone Extension:	0
Contact Fax Country Code:	Not reported
Contact Fax Area Code:	Not reported
Contact Fax Number:	Not reported
Contact Fax Extension:	Not reported
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported

Owner:

Owner CN:	CN603791815
Owner Last Name:	HNC GROUP CORPORATION
Owner First Name:	Not reported
Owner Middle Name:	Not reported
Owner Type:	CO
Contact Mailing Address (Delivery):	3698 E FM 528 RD
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City:	FRIENDSWOOD
Contact Mailing State:	TX
Contact Mailing Zip:	77546
Contact Mailing Zip5:	5039
Contact Phone Number/Ext:	1 281 3327270/0
Contact Fax Country Code:	Not reported
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported
Princ ID:	465380162010362
Additional ID:	295568792002087
AI Number:	44610
Owner Effective Begin Date:	10/09/2006
State Tax ID:	15508691845
Contact Role:	OWNOPRCON
Contact Name/Title:	AKBAR ALVIRI/OWNER
Contact Organization Name:	HNC GROUP CORPORATION

Self Certification:

Self Cert ID:	69870
Cert ID:	369819
AI Number:	44610
Self Certification Date:	04/25/2022
Signature Name/Title:	MOHAMMAD SADIQ DURRANI REPRESENTATIVE
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y

CORNER FOOD MART (Continued) **U001276354**

Delivery Certificate Expiration Date:	05/31/2023
Reporting Method:	E
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	361418
AI Number:	44610
Self Certification Date:	09/30/2021
Signature Name/Title:	MOHAMMAD SADIQ DURRANI REPRESENTATIVE
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2022
Reporting Method:	E
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	336550
AI Number:	44610
Self Certification Date:	04/28/2020
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2021
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	320593
AI Number:	44610
Self Certification Date:	05/13/2019
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y

CORNER FOOD MART (Continued) **U001276354**

Delivery Certificate Expiration Date:	05/31/2020
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	303483
AI Number:	44610
Self Certification Date:	05/04/2018
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2019
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	287086
AI Number:	44610
Self Certification Date:	05/24/2017
Signature Name/Title:	M DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2018
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	269536
AI Number:	44610
Self Certification Date:	05/10/2016
Signature Name/Title:	M DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y

CORNER FOOD MART (Continued) **U001276354**

Delivery Certificate Expiration Date:	05/31/2017
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	253748
AI Number:	44610
Self Certification Date:	05/27/2015
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2016
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	236464
AI Number:	44610
Self Certification Date:	05/19/2014
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2015
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y
Self Cert ID:	69870
Cert ID:	219946
AI Number:	44610
Self Certification Date:	05/21/2013
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y

CORNER FOOD MART (Continued) **U001276354**

Delivery Certificate Expiration Date:	05/31/2014
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	N
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	N
Self Cert ID:	69870
Cert ID:	91502
AI Number:	44610
Self Certification Date:	05/05/2012
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2013
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	69870
Cert ID:	91501
AI Number:	44610
Self Certification Date:	04/15/2011
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2012
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	69870
Cert ID:	91500
AI Number:	44610
Self Certification Date:	04/20/2010
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y

CORNER FOOD MART (Continued) **U001276354**

Delivery Certificate Expiration Date:	05/31/2011
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	69870
Cert ID:	91499
AI Number:	44610
Self Certification Date:	03/31/2009
Signature Name/Title:	M SADIQ DURRANI REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2010
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	69870
Cert ID:	91498
AI Number:	44610
Self Certification Date:	04/01/2008
Signature Name/Title:	CHARLES NGUYEN MANAGER
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2009
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	69870
Cert ID:	91497
AI Number:	44610
Self Certification Date:	10/03/2007
Signature Name/Title:	CHARLES NGUYEN MGR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y

CORNER FOOD MART (Continued) **U001276354**

Delivery Certificate Expiration Date:	05/31/2008
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	69870
Cert ID:	91496
AI Number:	44610
Self Certification Date:	04/20/2001
Signature Name/Title:	WOSSEN ADMASU V PRES
Signature Type Role:	OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	07/31/2002
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Tank:

Install Date:	01/01/1987
Tank Registration Date:	02/27/1987
Number of Compartments:	1
Tank Capacity:	4000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	116895
Facility ID:	69870
Ai Number:	44610
Tank Id:	1
Tank Status (Current):	IN USE
Tank Status Date:	01/01/1987
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N

CORNER FOOD MART (Continued) **U001276354**

Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	Y
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	Y
Installation Signature Date:	11/19/1990

Compartment Records:

Tank ID:	1
Tank Capacity:	4000
UST Comprt ID:	89466
UST ID:	116895
AI Number:	44610
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y

CORNER FOOD MART (Continued) **U001276354**

PRDM(TriennialTightTest(Suction/GravityPiping):	Y
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	N
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	Y
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Install Date:	01/01/1987
Tank Registration Date:	02/27/1987
Number of Compartments:	1
Tank Capacity:	8000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	116896
Facility ID:	69870
Ai Number:	44610
Tank Id:	2
Tank Status (Current):	IN USE
Tank Status Date:	01/01/1987
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N

CORNER FOOD MART (Continued) **U001276354**

Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	Y
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	Y
Installation Signature Date:	11/19/1990

Compartment Records:

Tank ID:	2
Tank Capacity:	8000
UST Comprt ID:	89467
UST ID:	116896
AI Number:	44610
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	Y
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	N
SOPE(FlowRestrictorValue:	Y

CORNER FOOD MART (Continued) **U001276354**

SOPE(Alarm (Set@<=90%) W/3a Or 3b:	Y
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Install Date:	01/01/1987
Tank Registration Date:	02/27/1987
Number of Compartments:	1
Tank Capacity:	8000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	116897
Facility ID:	69870
Ai Number:	44610
Tank Id:	3
Tank Status (Current):	IN USE
Tank Status Date:	01/01/1987
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	Y
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	Y
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N

CORNER FOOD MART (Continued) **U001276354**

TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	Y
Installation Signature Date:	11/19/1990

Compartment Records:

Tank ID:	3
Tank Capacity:	8000
UST Comprt ID:	89468
UST ID:	116897
AI Number:	44610
Compartment ID:	A
Substance Stored1:	DIESEL
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	Y
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	N
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	Y
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N

CORNER FOOD MART (Continued) **U001276354**

Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Facility Billing Contacts:

Contact Organization Name:	HNC GROUP CORPORATION
Contact Mailing Address (Delivery):	3698 E FM 528 RD
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	FRIENDSWOOD, TX 77546 5039
Phone Number/Ext:	281 3327270/0
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Y
Facility ID:	69870
Additional ID:	295568792002087
Princ ID:	465380162010362
AI Number:	44610
Facility Name:	CORNER FOOD MART
AR Number:	67895
AR UST Number Suffix:	Not reported
AR AST Number Suffix:	U
Contact Name/Title:	AKBAR ALVIRI/OWNER

TX Financial Assurance 2:

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	267454
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	Not reported
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2021
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	0 469 757454
Policy Number:	04-TOP-000023045
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2022
Ins Premium Pre-Paid For Entire Yr:	Not reported
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	258415
AI:	44610

CORNER FOOD MART (Continued) **U001276354**

Mechanism Type Other:	Not reported
Multiple Mechanism Types:	Not reported
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2020
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	0 469 757454
Policy Number:	04-TOP-000013727
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2021
Ins Premium Pre-Paid For Entire Yr:	Not reported
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	231420
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2019
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04TOP000005122
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2020
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	214193
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2018
Date Financial Assurance Form Rec:	04/28/2020

CORNER FOOD MART (Continued) **U001276354**

Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04TO000109649
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2019
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	196780
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2017
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	CRUM & FORSTER SPECIALTY INS
Issuer Phone:	Not reported
Policy Number:	STP-119406
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2018
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	180059
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2016
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	CRUM & FORSTER SPECIALTY INS
Issuer Phone:	1 973 4906600
Policy Number:	STP 114448
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2017
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART

CORNER FOOD MART (Continued) **U001276354**

Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	161541
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2015
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	CRUM & FORSTER SPECIALTY INS
Issuer Phone:	1 973 4906600
Policy Number:	STP109402
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2016
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	144801
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2014
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	CRUM & FORSTER SPECIALTY INS
Issuer Phone:	1 973 4906600
Policy Number:	STP105314
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2015
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	127629
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000

CORNER FOOD MART (Continued) **U001276354**

Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2013
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	CRUM & FORSTER SPECIALTY INS
Issuer Phone:	1 713 7722828
Policy Number:	STP100123
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2014
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	108657
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2012
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	AMERICAN SAFETY INDEM CO
Issuer Phone:	1 713 7722828
Policy Number:	179E02472-12-02
Coverage Amount:	1,000,000
Coverage Expiration Date:	10/09/2013
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	6369
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2010
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	AMERICAN SAFETY INDEM CO
Issuer Phone:	1 800 5776614
Policy Number:	179E02472-10-01

CORNER FOOD MART (Continued) **U001276354**

Coverage Amount:	1000000
Coverage Expiration Date:	10/09/2012
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes
Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	52975
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2009
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	COLONY INS CO
Issuer Phone:	1 800 5446614
Policy Number:	PP207889
Coverage Amount:	1000000
Coverage Expiration Date:	10/09/2010
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes
Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	52976
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2008
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	COLONY INS CO
Issuer Phone:	1 800 5446614
Policy Number:	PP207889
Coverage Amount:	1000000
Coverage Expiration Date:	10/09/2009
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	No
Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2

CORNER FOOD MART (Continued) **U001276354**

Facility ID:	69870
Finass ID:	52977
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	10/09/2007
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	COLONY INS CO
Issuer Phone:	1 800 5446614
Policy Number:	PP207889
Coverage Amount:	1000000
Coverage Expiration Date:	10/09/2008
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	69870
Finass ID:	52978
AI:	44610
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	04/17/1994
Date Financial Assurance Form Rec:	04/28/2020
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

PST STAGE 2:

Regulated Number:	RN101807097
Region Location:	12
Has Active Violation:	NO
PST ID:	44610
Start Date:	03/18/1987
Stage 2 Type:	ASSIST SYSTEM
Stage 2 Install Date:	08/09/1998
Last Inspection Activity:	DECOMEACT
EACT Status:	ACTIVE
ADDN ID:	44610
Last Inspection Number:	1531689
Last Inspection Status Date:	12/14/2018

CORNER FOOD MART (Continued) **U001276354**

Last Inspection Status:	DAPPROVED
Last Inspection Activity 2:	DECOMEACT
Last Inspection Conducted By:	GALVESTON COUNTY LOCAL PROGRAM
Facility Not Inspected:	Not reported
Facility Not Inspected Reason:	Not reported
ADDN Status:	ACTIVE
Status:	ACTIVE
Signed Date:	05/13/2019
Expired Date:	05/31/2020
Tank Status:	IN USE
Type:	RETAIL
UST Number:	3
Latitude:	0
Longitude:	0

Stage2 Detail:

RN:	RN101807097
Reg Status:	FULLY REGULATED
CN:	CN603791815
Princ Name:	HNC GROUP CORPORATION
Princ Legal Name:	HNC Group Corporation
Role:	OWNOPR
First Name:	Not reported
Middle Name:	Not reported
Last Name:	Not reported
PST UST ID:	116895
UST Tank ID:	1
Num UST Comprt:	1
Install Date:	01/01/1987
Regis Date:	02/27/1987
Capacity Qty:	4000
Substance Type:	GASOLINE

B18 **CORNER FOOD MART** **UST FINDER** **1028762637**
ENE **3698 E FM 528 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.023 mi.
121 ft. **Site 4 of 4 in cluster B**

Actual:
22 ft.

Focus Map:
4

UST FINDER:

Object ID:	438443
Facility ID:	TX69870
Name:	CORNER FOOD MART
Address:	3698 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Address Match Type:	PointAddress
Open USTs:	3
Closed USTs:	0
TOS USTs:	0
Population 1500ft:	1101
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported

CORNER FOOD MART (Continued) **1028762637**

SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX0840002_15844
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	6
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.1691573099999
Y Coord:	29.5215733700001
Latitude:	29.52157337
Longitude:	-95.16915731

UST FINDER:

Object ID:	1895528
Facility ID:	TX69870
Tank ID:	TX116895
Tank Status:	Open
Installation Date:	1987/01/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	4000
Substances:	Not reported
Tank Wall Type:	Single

Object ID:	1895529
Facility ID:	TX69870
Tank ID:	TX116896
Tank Status:	Open
Installation Date:	1987/01/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	8000
Substances:	Not reported
Tank Wall Type:	Single

Object ID:	1895530
Facility ID:	TX69870
Tank ID:	TX116897
Tank Status:	Open
Installation Date:	1987/01/01 16:00:00+00
Removal Date:	Not reported
Tank Capacity:	8000
Substances:	Not reported
Tank Wall Type:	Single

D19 **FORMER SPEEDY FOOD MART** **UST FINDER RELEASE** **1028965847**
WSW **3702 E FM 528 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 0**
0.024 mi.
129 ft. **Site 1 of 3 in cluster D**

Actual:
23 ft.

Focus Map:
4

UST FINDER RELEASE:

Object ID:	401764
Facility ID:	Not reported
Lust ID:	TX117144
Name:	FORMER SPEEDY FOOD MART
Address:	3702 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 0
Address Match Type:	PointAddress
Reported Date:	2006/08/08 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1083
Domestic Wells within 1500ft:	0
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX0840002_15844
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	6
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.16995
Y Coord:	29.5214800000001
Latitude:	29.52148
Longitude:	-95.16995

D20 **SPEEDY FOOD MART** **LPST** **U001290942**
WSW **3702 E FM 528 RD** **UST** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546** **Financial Assurance**
0.024 mi. **GCC**
129 ft. **Site 2 of 3 in cluster D** **RDR**

Actual:
23 ft.

Focus Map:
4

LPST:

Name:	FORMER SPEEDY FOOD MART
Address:	3702 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Facility ID:	0061693
LPST Id:	117144
Facility Location:	3702 E FM 528 RD
TCEQ Region# and City:	REGION 12 - HOUSTON
Region City:	HOUSTON
Discovered Date:	08/04/2006

SPEEDY FOOD MART (Continued) **U001290942**

Entered Date:	03/12/2007
Reported Date:	08/08/2006
Closure Date:	02/15/2017
Priority:	4.2 - NO GW IMPACT NO APPARENT THREATS OR IMPACTS TO RECEPTORS
Program:	1 - RPR
CA Status:	6A - FINAL CONCURRENCE ISSUED
Priority Description:	Groundwater is affected.
Status:	**PREASSESSMENT/RELEASE DETERMINATION**
Coordinators Primary:	1/1P
Coordinators RPR:	KLM
Responsible Party Name:	Not reported
Responsible Party Contact:	MICHAEL NASSIF
Responsible Party Address:	11839 MIGHTY REDWOOD DR
Responsible Party City,St,Zip:	HOUSTON, TX 77059 5511
Responsible Party Telephone:	/-
Reported Date:	08/08/2006
Case Start Date:	02/15/2017
Reference Number:	RN102621109
Project Manager:	BRPATTER

UST:

Name:	SPEEDY FOOD MART
Address:	3702 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 775465041
AI Number:	61693
Facility Type:	RETAIL
Facility Begin Date:	11/18/1991
Facility Status:	INACTIVE
Additional ID:	657700562002268
Facility Exempt Status:	N
Records Off-Site:	No
UST Financial Assurance Required:	No
Number Of Active UST:	0
Site Location Description:	Not reported
Site Location (Nearest City Name):	Not reported
Site Location (County Name):	HARRIS
Site Location (Tceq Region):	12
Site Location (Location Zip):	77546
Contact Name/Title:	,
Contact Organization Name:	SPEEDY FOOD MART
Contact Mailing Address1:	Not reported
Contact Mailing Address2:	Not reported
Contact Mailing City/State/Zip:	Not reported
Contact Telephone:	2814826020
Facility Contact Address Deliverable:	Not reported
Contact Fax Number:	Not reported
Contact Email Address:	Not reported
Signature Date On Earliest Reg Form:	11/08/1991
Signature Name/Title On Earliest Reg Form:	KASAMALI MANPURI,SEC
Application Received Date On Earliest Reg Form:	11/14/1991
Signature Role On Earliest Reg Form:	Not reported
Signature Company On Earliest Reg Form:	Not reported
Enforcement Action:	Not reported
Facility Not Inspectable:	No

Operator:

Princ ID:	993255452002089

SPEEDY FOOD MART (Continued) **U001290942**

Additional ID:	657700562002268
Ai Number:	61693
Operator CN:	CN601026206
Operator Name:	MICHAEL NASSIF
Operator Effective Begin Date:	08/01/2006
Operator Type:	IN
Operator Role:	Not reported
Contact Name:	/
Contact Organization Name:	Not reported
Contact Mailing Address (Delivery):	Not reported
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	-
Contact Phone Country Code:	Not reported
Contact Phone Area Code:	Not reported
Contact Phone Number:	Not reported
Contact Phone Extension:	Not reported
Contact Fax Country Code:	Not reported
Contact Fax Area Code:	Not reported
Contact Fax Number:	Not reported
Contact Fax Extension:	Not reported
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported

Owner:

Owner CN:	CN601026206
Owner Last Name:	NASSIF
Owner First Name:	MICHAEL
Owner Middle Name:	Not reported
Owner Type:	IN
Contact Mailing Address (Delivery):	11839 MIGHTY REDWOOD DR
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City:	HOUSTON
Contact Mailing State:	TX
Contact Mailing Zip:	77059
Contact Mailing Zip5:	5511
Contact Phone Number/Ext:	/
Contact Fax Country Code:	Not reported
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported
Princ ID:	993255452002089
Additional ID:	657700562002268
AI Number:	61693
Owner Effective Begin Date:	08/01/2006
State Tax ID:	Not reported
Contact Role:	OWNCON
Contact Name/Title:	MICHAEL NASSIF/
Contact Organization Name:	NASSIF MICHAEL

Self Certification:

Self Cert ID:	91778
Cert ID:	148210
AI Number:	61693
Self Certification Date:	07/09/2005
Signature Name/Title:	HIREN PATEL REP
Signature Type Role:	LEGAL AUTH REP OWNER

SPEEDY FOOD MART (Continued) **U001290942**

Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2006
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported
Self Cert ID:	91778
Cert ID:	148209
AI Number:	61693
Self Certification Date:	12/04/2001
Signature Name/Title:	KASAMALI MANPURI PRES
Signature Type Role:	OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	10/31/2002
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Tank:

Install Date:	07/01/1991
Tank Registration Date:	11/14/1991
Number of Compartments:	1
Tank Capacity:	8000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	143868
Facility ID:	91778
Ai Number:	61693
Tank Id:	2
Tank Status (Current):	REMOVED FROM GROUND
Tank Status Date:	07/05/2006
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N

SPEEDY FOOD MART (Continued) **U001290942**

Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	Y
Installation Signature Date:	10/14/1991

Compartment Records:

Tank ID:	2
Tank Capacity:	8000
UST Comprt ID:	139555
UST ID:	143868
AI Number:	61693
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N

SPEEDY FOOD MART (Continued) **U001290942**

PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	N
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	01/01/1995

Install Date:	07/01/1991
Tank Registration Date:	11/14/1991
Number of Compartments:	1
Tank Capacity:	8000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	143869
Facility ID:	91778
Ai Number:	61693
Tank Id:	1
Tank Status (Current):	REMOVED FROM GROUND
Tank Status Date:	07/05/2006
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y

SPEEDY FOOD MART (Continued) **U001290942**

Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	Y
Installation Signature Date:	10/14/1991

Compartment Records:

Tank ID:	1
Tank Capacity:	8000
UST Comprt ID:	139556
UST ID:	143869
AI Number:	61693
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	Y

SPEEDY FOOD MART (Continued) **U001290942**

PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	N
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	01/01/1995

Install Date:	07/01/1991
Tank Registration Date:	11/14/1991
Number of Compartments:	1
Tank Capacity:	8000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	143867
Facility ID:	91778
Ai Number:	61693
Tank Id:	3
Tank Status (Current):	REMOVED FROM GROUND
Tank Status Date:	07/05/2006
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N

SPEEDY FOOD MART (Continued) **U001290942**

TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	Y
Installation Signature Date:	10/14/1991

Compartment Records:

Tank ID:	3
Tank Capacity:	8000
UST Comprt ID:	139554
UST ID:	143867
AI Number:	61693
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	N
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y

SPEEDY FOOD MART (Continued) **U001290942**

Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	01/01/1995

Construction Notification:

NOC ID:	14969
Facility ID:	91778
AI Number:	61693
Application Received Date:	06/23/2006
Scheduled Construction Date:	07/05/2006
UST Improvement:	N
UST Installation:	N
UST Removal:	Y
UST Repair:	N
UST Return To Service:	N
UST Replacement:	N
UST Abandonment:	N
UST Stage I:	N
AST Installation:	N
AST Stage I:	N
Historical Tracking Number:	M60623004
Waiver Flag:	N
Late Filing Flag:	Y
Form Received Date:	Not reported
Signature Date On Form:	Not reported
Signature Name On Form:	Not reported
Signature Company On Form:	Not reported
Signature Title On Form:	Not reported
Signature Role:	Not reported
Owner Name At Time Of Construction:	Not reported
Owner CN At Time Of Construction:	Not reported
Owner AR At Time Of Construction:	35762

General Desc Of Prop Construct: Not reported

Contractor, Consultant and Installer:

Cont/Cons/Installer ID:	16053
UST ID:	Not reported
NOC ID:	14969
AI Number:	61693
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	CRP001398
Company Name:	Not reported
Representative Name:	Not reported
Mailing Address (Delivery):	Not reported
Mailing Address (Internal Delivery):	Not reported
Mailing City:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	1

SPEEDY FOOD MART (Continued) **U001290942**

Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	Not reported
Fax Number Area Code:	Not reported
Fax Number:	Not reported
Email Address:	Not reported

Facility Billing Contacts:

Contact Organization Name:	NASSIF MICHAEL
Contact Mailing Address (Delivery):	11839 MIGHTY REDWOOD DR
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	HOUSTON, TX 77059 5511
Phone Number/Ext:	/
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Y
Facility ID:	91778
Additional ID:	657700562002268
Princ ID:	993255452002089
AI Number:	61693
Facility Name:	SPEEDY FOOD MART
AR Number:	Not reported
AR UST Number Suffix:	Not reported
AR AST Number Suffix:	Not reported
Contact Name/Title:	MICHAEL NASSIF/

TX Financial Assurance 2:

Name:	SPEEDY FOOD MART
Address:	3702 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	91778
Finass ID:	74723
AI:	61693
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	01/01/1901
Date Financial Assurance Form Rec:	Not reported
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

GCC:

Name:	GHANSHYAM INC
Address:	3702 E FM 528 RD

SPEEDY FOOD MART (Continued) **U001290942**

City,State,Zip: FRIENDSWOOD, TX
Division: RMD/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1A -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: MICHAEL NASSIF
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: GHANSHYAM INC
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: RMD/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

SPEEDY FOOD MART (Continued) **U001290942**

Name: FORMER SPEEDY FOOD MART
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 8/8/2006
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: FORMER SPEEDY FOOD MART
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: GHANSHYAM INC
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: RMD/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported

SPEEDY FOOD MART (Continued) **U001290942**

Location: Not reported
Data Quality 2: Not reported

Name: GHANSHYAM INC
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: RMD/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1A -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: FORMER SPEEDY FOOD MART
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 3/12/2007
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: 1A -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

Name: FORMER SPEEDY FOOD MART
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Division: REM/PST
New Cases: Not reported
File Number: 117144
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 8/8/2006
Enforcement Status - Level Of Agency Response: 1B -
Enforcement Status - Site Activity Status: -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported

SPEEDY FOOD MART (Continued) **U001290942**

Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

RDR:
RDR ID: 15751
Facility ID: 61693
RN: Not reported
CN: Not reported
Name: FORMER SPEEDY FOOD MART
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX
Date Report Received: 12/19/2006
Due Date: 2/17/2007
Tank Owner: SPEEDY STOP FOOD STORE
Contact Person: MR PATEL
Report: RDR
Latest TCEQ Letter: New LPST
Date of Latest TCEQ Letter: 3/12/2007
Project Manager: PST Privitization Contract
Team: #N/A
New LPST Number: 117144
Pre-Existing LPST Number: Not reported
Comments: DOES THIS NEED AN LPST#?;LADSCREEN SENT 3/15/07
Review Coordinator: PPC
Date Release Reported: Not reported
Suspected: Not reported
Confirmed: Not reported
NOLPST Letter Date: Not reported
Date Report Returned: Not reported
Region: Not reported
DKC RDR (misfiled): Not reported

D21 **SPEEDY FOOD MART** **UST FINDER** **1028780572**
WSW **3702 E FM 528 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.024 mi.
129 ft. **Site 3 of 3 in cluster D**

Actual:
23 ft.

Focus Map:
4

UST FINDER:
Object ID: 438442
Facility ID: TX91778
Name: SPEEDY FOOD MART
Address: 3702 E FM 528 RD
City,State,Zip: FRIENDSWOOD, TX 77546
Address Match Type: PointAddress
Open USTs: 0
Closed USTs: 3
TOS USTs: 0
Population 1500ft: 1082
Private Wells 1500ft: 0
Within 100yr Floodplain: No
Land Use: Developed, High Intensity
Within SPA: No
SPA PWS Facility ID: Not reported
SPA Water Type: Not reported

SPEEDY FOOD MART (Continued) **1028780572**

SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX0840002_15844
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	6
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.1699541999999
Y Coord:	29.5214824
Latitude:	29.5214824
Longitude:	-95.1699542

UST FINDER:

Object ID:	1764013
Facility ID:	TX91778
Tank ID:	TX143868
Tank Status:	Closed
Installation Date:	1991/07/01 15:59:59+00
Removal Date:	2006/07/05 15:59:59+00
Tank Capacity:	8000
Substances:	Not reported
Tank Wall Type:	Single

Object ID:	1764014
Facility ID:	TX91778
Tank ID:	TX143867
Tank Status:	Closed
Installation Date:	1991/07/01 15:59:59+00
Removal Date:	2006/07/05 15:59:59+00
Tank Capacity:	8000
Substances:	Not reported
Tank Wall Type:	Single

Object ID:	1764015
Facility ID:	TX91778
Tank ID:	TX143869
Tank Status:	Closed
Installation Date:	1991/07/01 15:59:59+00
Removal Date:	2006/07/05 15:59:59+00
Tank Capacity:	8000
Substances:	Not reported
Tank Wall Type:	Single

A22 **SAMS MART 5** **UST FINDER** **1028754731**
SW **5103 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.025 mi.
134 ft. **Site 8 of 11 in cluster A**

Actual:
30 ft.

Focus Map:
4

UST FINDER:

Object ID:	438899
Facility ID:	TX61239
Name:	SAMS MART 5
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Address Match Type:	PointAddress
Open USTs:	3
Closed USTs:	0
TOS USTs:	0
Population 1500ft:	1062
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Facility Status:	Open UST(s)
Date of Last Inspection:	Not reported
EPA Region:	6
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.19369108
Y Coord:	29.5452949300001
Latitude:	29.54529493
Longitude:	-95.19369108

UST FINDER:

Object ID:	1888554
Facility ID:	TX61239
Tank ID:	TX105330
Tank Status:	Open
Installation Date:	1990/01/01 15:59:59+00
Removal Date:	Not reported
Tank Capacity:	10000
Substances:	Not reported
Tank Wall Type:	Single

Object ID:	1888555
Facility ID:	TX61239
Tank ID:	TX105331
Tank Status:	Open
Installation Date:	1990/01/01 15:59:59+00
Removal Date:	Not reported
Tank Capacity:	10000
Substances:	Not reported
Tank Wall Type:	Single

SAMS MART 5 (Continued) **1028754731**

Object ID:	1888556
Facility ID:	TX61239
Tank ID:	TX105332
Tank Status:	Open
Installation Date:	1990/01/01 15:59:59+00
Removal Date:	Not reported
Tank Capacity:	10000
Substances:	Not reported
Tank Wall Type:	Single

A23 **SMART STOP FOOD MART** **LPST U001272358**
SW **5103 FM 2351 RD** **UST N/A**
< 1/8 **FRIENDSWOOD, TX 77546** **Financial Assurance**
0.025 mi. **GCC**
134 ft. **Site 9 of 11 in cluster A** **PST STAGE 2**

Actual:
30 ft.

Focus Map:
4

LPST:

Name:	SMART STOP 6
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Facility ID:	Not reported
LPST Id:	120078
Facility Location:	Not reported
TCEQ Region# and City:	REGION 12 - HOUSTON
Region City:	Not reported
Discovered Date:	08/16/2016
Entered Date:	11/21/2016
Reported Date:	09/22/2016
Closure Date:	06/28/2017
Priority:	4.1 - GW IMPACTED NO APPARENT THREATS OR IMPACTS TO RECEPTORS
Program:	1 - RPR
CA Status:	6P - FINAL PENDING WELL PLUG
Priority Description:	Not reported
Status:	**Not reported**
Coordinators Primary:	Not reported
Coordinators RPR:	Not reported
Responsible Party Name:	Not reported
Responsible Party Contact:	Not reported
Responsible Party Address:	Not reported
Responsible Party City,St,Zip:	Not reported
Responsible Party Telephone:	Not reported
Reported Date:	09/22/2016
Case Start Date:	06/28/2017
Reference Number:	RN102282977
Project Manager:	KFROSS

UST:

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 775462809
AI Number:	39821
Facility Type:	RETAIL
Facility Begin Date:	01/15/1987
Facility Status:	ACTIVE
Additional ID:	949246192002139
Facility Exempt Status:	N

SMART STOP FOOD MART (Continued) **U001272358**

Records Off-Site:	No
UST Financial Assurance Required:	No
Number Of Active UST:	3
Site Location Description:	Not reported
Site Location (Nearest City Name):	Not reported
Site Location (County Name):	HARRIS
Site Location (Tceq Region):	12
Site Location (Location Zip):	77546
Contact Name/Title:	MUHAMMAD SAJID KHAN,
Contact Organization Name:	SMART STOP FOOD MART
Contact Mailing Address1:	Not reported
Contact Mailing Address2:	Not reported
Contact Mailing City/State/Zip:	Not reported
Contact Telephone:	8323983612
Facility Contact Address Deliverable:	Not reported
Contact Fax Number:	Not reported
Contact Email Address:	Not reported
Signature Date On Earliest Reg Form:	07/31/2020
Signature Name/Title On Earliest Reg Form:	ALI KARIM,REP
Application Received Date On Earliest Reg Form:	07/31/2020
Signature Role On Earliest Reg Form:	LEGAL AUTH REP OWNER
Signature Company On Earliest Reg Form:	Not reported
Enforcement Action:	No
Facility Not Inspectable:	No

Operator:

Princ ID:	884578322021344
Additional ID:	949246192002139
Ai Number:	39821
Operator CN:	CN605963685
Operator Name:	SWEENY KINGS LLC
Operator Effective Begin Date:	11/30/2021
Operator Type:	CO
Operator Role:	OWNOPRCON
Contact Name:	MUHAMMAD SAJID KHAN/
Contact Organization Name:	SWEENY KINGS LLC
Contact Mailing Address (Delivery):	5103 FM 2351 RD
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	FRIENDSWOOD TX 77546-2809
Contact Phone Country Code:	1
Contact Phone Area Code:	832
Contact Phone Number:	3983612
Contact Phone Extension:	0
Contact Fax Country Code:	Not reported
Contact Fax Area Code:	Not reported
Contact Fax Number:	Not reported
Contact Fax Extension:	Not reported
Contact Email Address:	sajid_kkj@yahoo.com
Contact Address Deliverable:	Not reported

Owner:

Owner CN:	CN605963685
Owner Last Name:	SWEENY KINGS LLC
Owner First Name:	Not reported
Owner Middle Name:	Not reported
Owner Type:	CO
Contact Mailing Address (Delivery):	5103 FM 2351 RD

SMART STOP FOOD MART (Continued) **U001272358**

Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City:	FRIENDSWOOD
Contact Mailing State:	TX
Contact Mailing Zip:	77546
Contact Mailing Zip5:	2809
Contact Phone Number/Ext:	1 832 3983612/0
Contact Fax Country Code:	Not reported
Contact Fax Number/Ext:	/
Contact Email Address:	sajid_kkj@yahoo.com
Contact Address Deliverable:	Not reported
Princ ID:	884578322021344
Additional ID:	949246192002139
AI Number:	39821
Owner Effective Begin Date:	11/30/2021
State Tax ID:	32073734009
Contact Role:	OWNOPRCON
Contact Name/Title:	MUHAMMAD SAJID KHAN/
Contact Organization Name:	SWEENY KINGS LLC

Self Certification:

Self Cert ID:	61239
Cert ID:	384861
AI Number:	39821
Self Certification Date:	02/23/2023
Signature Name/Title:	AHMED MADHA ADMINISTRATOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	02/29/2024
Reporting Method:	E
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	363171
AI Number:	39821
Self Certification Date:	12/03/2021
Signature Name/Title:	AHMED MADHA REPRESENTATIVE
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	02/28/2023
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	355313
AI Number:	39821
Self Certification Date:	06/09/2021
Signature Name/Title:	IMRAN MANJIYANI PRES
Signature Type Role:	OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	07/31/2022
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	341262
AI Number:	39821
Self Certification Date:	07/31/2020
Signature Name/Title:	ALI KARIM REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	08/31/2021
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	324306
AI Number:	39821
Self Certification Date:	08/08/2019
Signature Name/Title:	SOMI MAREDIA REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	08/31/2020
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	317727
AI Number:	39821
Self Certification Date:	03/01/2019
Signature Name/Title:	SOMI MAREDIA REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	08/31/2019
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	312732
AI Number:	39821
Self Certification Date:	12/10/2018
Signature Name/Title:	SOMI MAREDIA REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	01/31/2020
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	305850
AI Number:	39821
Self Certification Date:	06/26/2018
Signature Name/Title:	ALI MOMIN REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	01/31/2019
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	304690
AI Number:	39821
Self Certification Date:	05/30/2018
Signature Name/Title:	SOMI MAREDIA REP
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2019
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	285408
AI Number:	39821
Self Certification Date:	04/04/2017
Signature Name/Title:	NIZAM HEMANI PRES
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2018
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	268601
AI Number:	39821
Self Certification Date:	04/02/2016
Signature Name/Title:	NIZAM HERMANI OWNER
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2017
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	252172
AI Number:	39821
Self Certification Date:	03/25/2015
Signature Name/Title:	NIZAM HEMANI PRES
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2016
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	235487
AI Number:	39821
Self Certification Date:	04/02/2014
Signature Name/Title:	NIZAM HEMANI PRES
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2015
Reporting Method:	P
Tank Corrosion Protection Compliance:	Y
Piping Corrosion Protection Compliance:	Y
Compartment Release Detection Compliance:	Y
Piping Release Detection Compliance:	Y
Spill Prevention/Overfill Compliance:	Y

Self Cert ID:	61239
Cert ID:	68096
AI Number:	39821
Self Certification Date:	04/04/2013
Signature Name/Title:	NIZAM HEMANI PRESIDENT
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2014
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	68095
AI Number:	39821
Self Certification Date:	03/21/2012
Signature Name/Title:	BOBBY HERMAN SUPR
Signature Type Role:	OPERATOR
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2013
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68094
AI Number:	39821
Self Certification Date:	03/30/2011
Signature Name/Title:	BOBBY HEMANI SUPERVISOR
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2012
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68093
AI Number:	39821
Self Certification Date:	04/06/2010
Signature Name/Title:	BOBBY HEMANI SUPVR
Signature Type Role:	LEGAL AUTH REP OPERATOR
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2011
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	68092
AI Number:	39821
Self Certification Date:	03/24/2009
Signature Name/Title:	BADRUDDIN HEMANI SUPERVISOR
Signature Type Role:	LEGAL AUTH REP OPERATOR
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2010
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68091
AI Number:	39821
Self Certification Date:	03/26/2008
Signature Name/Title:	BOBBY HERMANI SUPV
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2009
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68090
AI Number:	39821
Self Certification Date:	03/22/2007
Signature Name/Title:	BOBBY HEMANI SUPERVISOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2008
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	68089
AI Number:	39821
Self Certification Date:	03/21/2006
Signature Name/Title:	BOBBY HEMANI SUPERVISOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2007
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68088
AI Number:	39821
Self Certification Date:	04/18/2005
Signature Name/Title:	BADRUDDIN HEMANI SUPERVISOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2006
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68087
AI Number:	39821
Self Certification Date:	03/26/2004
Signature Name/Title:	BADRUDDIN HEMANI
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2005
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

Self Cert ID:	61239
Cert ID:	68086
AI Number:	39821
Self Certification Date:	03/26/2003
Signature Name/Title:	BADRUDDIN HEMANI SUPERVISOR
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2004
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68085
AI Number:	39821
Self Certification Date:	04/22/2002
Signature Name/Title:	NIZAM HEMANI PRES
Signature Type Role:	OWNER
Filing Status:	RENEWAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2003
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Self Cert ID:	61239
Cert ID:	68084
AI Number:	39821
Self Certification Date:	01/18/2001
Signature Name/Title:	BOBBY HEMANI SUPV
Signature Type Role:	LEGAL AUTH REP OWNER
Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	05/31/2002
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

Tank:

Install Date:	01/01/1990
Tank Registration Date:	05/08/1986
Number of Compartments:	1
Tank Capacity:	10000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	105330
Facility ID:	61239
Ai Number:	39821
Tank Id:	1
Tank Status (Current):	IN USE
Tank Status Date:	01/01/1990
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	Y
Tank Tested Flag:	N
Installation Signature Date:	Not reported

Compartment Records:

Tank ID:	1
Tank Capacity:	10000
UST Comprt ID:	57293
UST ID:	105330
AI Number:	39821
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	Y
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	Y
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	Not reported
Stage 1 Installation Date:	Not reported

Install Date:	01/01/1990
Tank Registration Date:	05/08/1986
Number of Compartments:	1
Tank Capacity:	10000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P

SMART STOP FOOD MART (Continued) **U001272358**

UST ID:	105331
Facility ID:	61239
Ai Number:	39821
Tank Id:	3
Tank Status (Current):	IN USE
Tank Status Date:	01/01/1990
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	Y
Tank Tested Flag:	N
Installation Signature Date:	Not reported

Compartment Records:

Tank ID:	3

SMART STOP FOOD MART (Continued) **U001272358**

Tank Capacity:	10000
UST Comprt ID:	57294
UST ID:	105331
AI Number:	39821
Compartment ID:	A
Substance Stored1:	DIESEL
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	Y
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	Y
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	Not reported
Stage 1 Installation Date:	Not reported

Install Date:	01/01/1990
Tank Registration Date:	05/08/1986
Number of Compartments:	1
Tank Capacity:	10000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	105332
Facility ID:	61239
Ai Number:	39821
Tank Id:	2
Tank Status (Current):	IN USE
Tank Status Date:	01/01/1990
Empty:	N
Tank Regulatory Status:	FULLY REGULATED

SMART STOP FOOD MART (Continued) **U001272358**

Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	N
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	N
Tank Material(Frp(Fiberglass-Reinforced Plastic):	Y
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	N
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	Y
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	N
PCPMethod (FRP Tank Or Piping(Noncorrodible):	Y
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	Y
Technical Compliance Flag:	Y
Tank Tested Flag:	N
Installation Signature Date:	Not reported

Compartment Records:

Tank ID:	2
Tank Capacity:	10000
UST Comprt ID:	57295
UST ID:	105332
AI Number:	39821
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	Y
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	N
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	Y
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	Y
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	Y
PRDM(Sir(StatInv Recon)/Inv Control)):	N
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	N
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	Y
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	Y
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	Not reported
Stage 1 Installation Date:	Not reported

Construction Notification:

NOC ID:	35408
Facility ID:	61239
AI Number:	39821
Application Received Date:	09/24/2019
Scheduled Construction Date:	10/24/2019
UST Improvement:	Y
UST Installation:	N
UST Removal:	N
UST Repair:	N
UST Return To Service:	N
UST Replacement:	N
UST Abandonment:	N
UST Stage I:	N
AST Installation:	N
AST Stage I:	N
Historical Tracking Number:	Not reported
Waiver Flag:	Y
Late Filing Flag:	N
Form Received Date:	09/24/2019
Signature Date On Form:	09/24/2019
Signature Name On Form:	MANUEAL IAVIRA
Signature Company On Form:	Not reported

SMART STOP FOOD MART (Continued) **U001272358**

Signature Title On Form:	Not reported
Signature Role:	Not reported
Owner Name At Time Of Construction:	ROCKLANE PARTNERS LLC
Owner CN At Time Of Construction:	CN605633569
Owner AR At Time Of Construction:	80538
General Desc Of Prop Construct:	UST SYSTEMS WILL BE UPGRADING LINES AND SETTING (3) NEW DISPENSER. PLEASE SEND ACKNOWLEDGEMENT TO MANUELTAVIRA@YAHOO.COM

Contractor, Consultant and Installer:

Cont/Cons/Installer ID:	83921
UST ID:	Not reported
NOC ID:	35408
AI Number:	39821
Type Of Contact:	CONTRACTOR
Contractor CRP Number Or Installer ILP Number:	Not reported
Company Name:	UST SYSTEMS
Representative Name:	MANUEL LAVIRA
Mailing Address (Delivery):	4313 DELHI ST
Mailing Address (Internal Delivery):	Not reported
Mailing City:	HOUSTON
Mailing State:	TX
Mailing Zip:	77022
Mailing Foreign Postal Code:	Not reported
Mailing County Code:	Not reported
Phone Number Country Code:	Not reported
Phone Number Area Code:	Not reported
Phone Number:	Not reported
Phone Number Extension:	Not reported
Fax Number Country Code:	1
Fax Number Area Code:	713
Fax Number:	6993750
Email Address:	Not reported

Facility Billing Contacts:

Contact Organization Name:	SWEENY KINGS LLC
Contact Mailing Address (Delivery):	5103 FM 2351 RD
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	FRIENDSWOOD, TX 77546 2809
Phone Number/Ext:	832 3983612/0
Contact Fax Number/Ext:	/
Contact Email Address:	sajid_kkj@yahoo.com
Contact Address Deliverable:	Y
Facility ID:	61239
Additional ID:	949246192002139
Princ ID:	884578322021344
AI Number:	39821
Facility Name:	SMART STOP FOOD MART
AR Number:	83202
AR UST Number Suffix:	Not reported
AR AST Number Suffix:	U
Contact Name/Title:	MUHAMMAD SAJID KHAN/

TX Financial Assurance 2:

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD

SMART STOP FOOD MART (Continued) **U001272358**

City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	281996
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	Not reported
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	12/01/2022
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	0 800 2643175
Policy Number:	04-TOP-000034228
Coverage Amount:	1,000,000
Coverage Expiration Date:	12/01/2023
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	260436
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	12/01/2021
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04-TOP-000027522
Coverage Amount:	1,000,000
Coverage Expiration Date:	12/01/2022
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	252062
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/08/2021
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04TOP000022631
Coverage Amount:	1,000,000
Coverage Expiration Date:	06/08/2022
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	235929
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	01/24/2020
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04-TOP-000007469
Coverage Amount:	1,000,000
Coverage Expiration Date:	01/24/2021
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	211383
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	01/24/2019
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	Not reported
Policy Number:	04-TOP-000002101
Coverage Amount:	1,000,000

SMART STOP FOOD MART (Continued) **U001272358**

Coverage Expiration Date:	01/24/2020
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	217983
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	01/24/2019
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	Not reported
Policy Number:	04-TOP-000002101
Coverage Amount:	1,000,000
Coverage Expiration Date:	01/24/2020
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	199158
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/11/2018
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04TO000108254
Coverage Amount:	1,000,000
Coverage Expiration Date:	06/11/2019
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239

SMART STOP FOOD MART (Continued) **U001272358**

Finass ID:	206210
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	1,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/11/2018
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	Not reported
Policy Number:	04-TO-000108254
Coverage Amount:	1,000,000
Coverage Expiration Date:	06/11/2019
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	198048
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2018
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361336
Policy Number:	9951491
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/22/2019
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	178143
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y

SMART STOP FOOD MART (Continued) **U001272358**

Financial Assurance Begin Date:	05/22/2016
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361336
Policy Number:	9951491
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/22/2017
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	160345
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2015
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361336
Policy Number:	9951491
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/22/2016
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	143150
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2014
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361336
Policy Number:	9951491
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/22/2015
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

SMART STOP FOOD MART (Continued) **U001272358**

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	126607
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	2,000,000
Meets Financial Assurance Req Flag:	Y
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2013
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361336
Policy Number:	9951491
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/22/2014
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	5085
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2012
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361338
Policy Number:	9951491
Coverage Amount:	1,000,000
Coverage Expiration Date:	05/22/2013
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	45004
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N

SMART STOP FOOD MART (Continued) **U001272358**

Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2011
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361338
Policy Number:	9951491
Coverage Amount:	1000000
Coverage Expiration Date:	05/22/2012
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	No

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	45005
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2011
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361338
Policy Number:	9951491
Coverage Amount:	1000000
Coverage Expiration Date:	05/22/2012
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	Yes

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	45006
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2009
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	TANK OWNERS MEMBERS INS CO
Issuer Phone:	1 800 3361338

SMART STOP FOOD MART (Continued) **U001272358**

Policy Number:	9951491
Coverage Amount:	1000000
Coverage Expiration Date:	05/22/2010
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	45007
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	05/22/2007
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	MID-CONTINENT INS CO
Issuer Phone:	1 800 7224994
Policy Number:	04TO00065699
Coverage Amount:	1000000
Coverage Expiration Date:	05/22/2008
Ins Premium Pre-Paid For Entire Yr:	Yes
Proof of Financial Assurance:	No

Name:	SMART STOP FOOD MART
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	61239
Finass ID:	45008
AI:	39821
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y
Financial Assurance Begin Date:	06/30/1993
Date Financial Assurance Form Rec:	07/31/2020
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

GCC:

Name:	SMART STOP 6
Address:	5103 FM 2351 RD

SMART STOP FOOD MART (Continued) **U001272358**

City,State,Zip: FRIENDSWOOD, TX
Division: REM/PST
New Cases: *
File Number: 120078
Contamination Description: UNKNOWN
Date Of Earliest Known Contamination Confirmation: 9/22/2016
Enforcement Status - Level Of Agency Response: 2 - Staff Action
Enforcement Status - Site Activity Status: 6 -
Data Quality 1: E,Q
Section 5236: Not reported
Type: GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency: Not reported
Section: Not reported
Year Deleted: Not reported
Location: Not reported
Data Quality 2: Not reported

PST STAGE 2:
Regulated Number: RN102282977
Region Location: 12
Has Active Violation: NO
PST ID: 39821
Start Date: 01/15/1987
Stage 2 Type: ASSIST SYSTEM
Stage 2 Install Date: Not reported
Last Inspection Activity: Not reported
EACT Status: ACTIVE
ADDN ID: 39821
Last Inspection Number: Not reported
Last Inspection Status Date: Not reported
Last Inspection Status: Not reported
Last Inspection Activity 2: Not reported
Last Inspection Conducted By: Not reported
Facility Not Inspected: Not reported
Facility Not Inspected Reason: Not reported
ADDN Status: ACTIVE
Status: ACTIVE
Signed Date: 03/01/2019
Expired Date: 01/31/2020
Tank Status: IN USE
Type: RETAIL
UST Number: 3
Latitude: 0
Longitude: 0

Stage2 Detail:
RN: RN102282977
Reg Status: FULLY REGULATED
CN: CN604248286
Princ Name: CAPITAL BANK
Princ Legal Name: CAPITAL BANK
Role: OWN
First Name: Not reported
Middle Name: Not reported
Last Name: Not reported
PST UST ID: 105330

SMART STOP FOOD MART (Continued) **U001272358**

UST Tank ID:	1
Num UST Comprt:	1
Install Date:	01/01/1990
Regis Date:	05/08/1986
Capacity Qty:	10000
Substance Type:	GASOLINE

A24 **SMART STOP 6** **UST FINDER RELEASE** **1029108405**
SW **5103 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 0**
0.025 mi.
134 ft. **Site 10 of 11 in cluster A**

Actual:
30 ft.

Focus Map:
4

UST FINDER RELEASE:

Object ID:	401645
Facility ID:	Not reported
Lust ID:	TX120078
Name:	SMART STOP 6
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX 0
Address Match Type:	PointAddress
Reported Date:	2016/09/22 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1061
Domestic Wells within 1500ft:	0
Land Use:	Developed, Medium Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	No
WHPA PWS Facility ID:	Not reported
WHPA Water Type:	Not reported
WHPA Facility Type:	Not reported
WHPA HUC12:	Not reported
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	6
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.1936899999999
Y Coord:	29.5453000000001
Latitude:	29.5453
Longitude:	-95.19369

A25 **SMART STOP 5103** **RDR** **S127532305**
SW **5103 FM 2351 RD** **N/A**
< 1/8 **FRIENDSWOOD, TX**
0.025 mi.
134 ft. **Site 11 of 11 in cluster A**

Actual: RDR:
30 ft.

Focus Map:
4

RDR ID:	24026
Facility ID:	39821
RN:	Not reported
CN:	Not reported
Name:	SMART STOP 5103
Address:	5103 FM 2351 RD
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	9/22/2016
Due Date:	11/21/2016
Tank Owner:	CAPITAL BANK
Contact Person:	MARY TEUTSCH
Report:	PHI
Latest TCEQ Letter:	New LPST
Date of Latest TCEQ Letter:	11/21/2016
Project Manager:	Kim Fross
Team:	Team 3
New LPST Number:	120078
Pre-Existing LPST Number:	Not reported
Comments:	Not reported
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

E26 **AIRCRAFT BRAKE SVC** **Ind. Haz Waste** **S102748525**
SW **16427 TIBET RD** **CENTRAL REGISTRY** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.096 mi.
507 ft. **Site 1 of 2 in cluster E**

Actual: Ind. Haz Waste:
30 ft.

Focus Map:
4

Name:	AIRCRAFT BRAKE SERVICE
Address:	16427 TIBET RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Permit Number:	Not reported
Registration Number:	61651
Registration Initial Notification Date:	09/30/1985
Registration Last Amendment Date:	08/23/2001
EPA Identification:	Not reported
Primary NAICS Code:	Not reported
Status Change Date:	19850930
Land Type:	Not reported
Description of Facility Site Location:	16427 Tibet Road, Friendswood, TX
Site Primary Standard Industrial Code:	Not reported
Registration is Generator of Waste:	1
TNRCC Region Number:	12
Registration is Receivers of Waste:	1
Registration is Transporter of Waste:	1
Registration is Transfer Facility:	1

AIRCRAFT BRAKE SVC (Continued) **S102748525**

Facility is STEERS Reporter:	1
Reqired to Submit Annual Waste Summary:	1
Facility Involved In Recycling:	1
Revcr Has Monthly Reporting Requirement:	0
Mexican Facility:	Not reported
Type of Generator HW:	CESQG
Type of Generator:	NON INDUS
Company Name:	AIRCRAFT BRAKE SERVICE
Contact Name:	D R DRISKELL
Contact Telephone Number:	Not reported
Mailing Address:	16427 TIBET RD
Mailing Address2:	Not reported
Mailing City,State,Zip:	FRIENDSWOOD, TX 775463337
Mailing County:	UNITED STATES
Facility Country:	UNITED STATES
TNRCC Facility ID:	19995
Site Owner Tax ID:	0
Site Location Latitude:	-00.000
Site Location Longitude:	-000.000
Last Update to NOR Data:	20100604
Ind. Waste Permit Number:	Not reported
Mun Waste Permit Number:	Not reported
Non Notifier:	1
MSW:	Not reported
Medical Waste:	Not reported
Other:	Not reported
Sludge:	Not reported
Used Oil:	Not reported
Used Tires:	Not reported
Permit Status:	Not reported
Receiver Type:	Not reported
Transporter for Hire:	0
Transport Own Waste:	0

Ind. Haz Waste:

Operator Name:	AIRCRAFT BRAKE SVC
Operator Address:	Not reported
Operator Address 2:	Not reported
Operator Address 3:	Not reported
Operator City,State,Zip:	Not reported
Operator Country:	Not reported
Operator Telephone:	Not reported
Operator Fax Number:	Not reported
Operator Email:	Not reported
Operator Business Type:	Unknown
Operator Tax ID:	Not reported
Operator Bankruptcy Code:	Not reported

Ind. Haz Waste:

Owner Name:	AIRCRAFT BRAKE SERVICE
Owner Mailing Address:	Not reported
Owner Mailing Address 2:	Not reported
Owner Mailing Address 3:	Not reported
Owner Mailing City,State,Zip:	Not reported
Owner Country:	Not reported
Owner Telephone:	Not reported
Owner Fax:	Not reported

AIRCRAFT BRAKE SVC (Continued) **S102748525**

Owner Email Address: Not reported
Owner Business Type: Unknown
Owner Tax ID: Not reported
Owner Bankruptcy Code: Not reported

Owner Name: AIRCRAFT BRAKE SVC
Owner Mailing Address: Not reported
Owner Mailing Address 2: Not reported
Owner Mailing Address 3: Not reported
Owner Mailing City,State,Zip: Not reported
Owner Country: Not reported
Owner Telephone: Not reported
Owner Fax: Not reported
Owner Email Address: Not reported
Owner Business Type: Unknown
Owner Tax ID: Not reported
Owner Bankruptcy Code: Not reported

Ind. Haz Waste:
Contact Name: D DRISKELL
Contact Title: ENV MGR
Contact Role: PRICONT
Contact Address: 16427 TIBET RD
Contact Address 2: Not reported
Contact Address 3: Not reported
Contact City,State,Zip: FRIENDSWOOD, TX 77546
Contact Phone: Not reported
Contact Fax: Not reported
Contact Email: Not reported

CENTRAL REGISTRY:
Regulated Entity Number: RN100637297
Name: AIRCRAFT BRAKE SVC
Address: 16427 TIBET RD
Address 2: Not reported
City,State,Zip: FRIENDSWOOD, TX 77546-3337
Status: ACTIVE
Status Date: ##########
Customer Number: CN600347876
Customer Name: AIRCRAFT BRAKE SVC
Customer Legal Name: Aircraft Brake Svc
Customer Ownership Type: ORGANIZATION
Affiliation Begin Date: ##########
Affiliation End Date: 12/31/3000
Customer Status: ACTIVE
Primary NAICS Industry Type Code: Not reported
Primary NAICS Industry Type Description: Not reported
Physical Location Description: 16427 Tibet Road, Friendswood, TX

Regulated Entity Number: RN100637297
Name: AIRCRAFT BRAKE SVC
Address: 16427 TIBET RD
Address 2: Not reported
City,State,Zip: FRIENDSWOOD, TX 77546-3337
Status: ACTIVE

AIRCRAFT BRAKE SVC (Continued) **S102748525**

Status Date:	##########
Customer Number:	CN603909755
Customer Name:	AIRCRAFT BRAKE SERVICE
Customer Legal Name:	AIRCRAFT BRAKE SERVICE
Customer Ownership Type:	ORGANIZATION
Affiliation Begin Date:	8/23/2001
Affiliation End Date:	12/31/3000
Customer Status:	ACTIVE
Primary NAICS Industry Type Code:	Not reported
Primary NAICS Industry Type Description:	Not reported
Physical Location Description:	16427 Tibet Road, Friendswood, TX

E27 **SAMINA BUSINESS INC** **EDR Hist Auto** **1022201288**
SW **16418 TIBET RD** **N/A**
< 1/8 **FRIENDSWOOD, TX 77546**
0.121 mi.
638 ft. **Site 2 of 2 in cluster E**

Actual: EDR Hist Auto
30 ft.

Focus Map:
4

Year:	Name:	Type:
2009	SAMINA BUSINESS INC	Gasoline Service Stations, NEC
2010	SAMINA BUSINESS INC	Gasoline Service Stations, NEC

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28 **DORSETTS TRUCK AND AUTO TIRE** **Ind. Haz Waste** **S105531850**
ENE **3508 E FM 528 RD** **N/A**
1/8-1/4 **FRIENDSWOOD, TX 77546**
0.126 mi.
666 ft.

Actual: Ind. Haz Waste:
20 ft.

Focus Map:
5

Name:	DORSETTS TRUCK AND AUTO TIRE
Address:	3508 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Permit Number:	Not reported
Registration Number:	61668
Registration Initial Notification Date:	09/30/1985
Registration Last Amendment Date:	08/23/2001
EPA Identification:	Not reported
Primary NAICS Code:	Not reported
Status Change Date:	19850930
Land Type:	Not reported
Description of Facility Site Location:	3508 E FM 528 Road, Friendswood, TX
Site Primary Standard Industrial Code:	Not reported
Registration is Generator of Waste:	1
TNRCC Region Number:	12
Registration is Receivers of Waste:	1
Registration is Transporter of Waste:	1
Registration is Transfer Facility:	1
Facility is STEERS Reporter:	1
Reqired to Submit Annual Waste Summary:	1
Facility Involved In Recycling:	1
Revcr Has Monthly Reporting Requirement:	0
Mexican Facility:	Not reported
Type of Generator HW:	CESQG
Type of Generator:	NON INDUS

DORSETTS TRUCK AND AUTO TIRE (Continued) **S105531850**

Company Name:	DORSETTS TRUCK AND AUTO TIRE
Contact Name:	A W PEACE
Contact Telephone Number:	Not reported
Mailing Address:	3508 E FM 528 RD
Mailing Address2:	Not reported
Mailing City,State,Zip:	FRIENDSWOOD, TX 775465005
Mailing County:	UNITED STATES
Facility Country:	UNITED STATES
TNRCC Facility ID:	20012
Site Owner Tax ID:	0
Site Location Latitude:	-00.000
Site Location Longitude:	-000.000
Last Update to NOR Data:	20030922
Ind. Waste Permit Number:	Not reported
Mun Waste Permit Number:	Not reported
Non Notifier:	1
MSW:	Not reported
Medical Waste:	Not reported
Other:	Not reported
Sludge:	Not reported
Used Oil:	Not reported
Used Tires:	Not reported
Permit Status:	Not reported
Receiver Type:	Not reported
Transporter for Hire:	0
Transport Own Waste:	0

Ind. Haz Waste:

Operator Name:	DORSETTS TRUCK AND AUTO TIRE
Operator Address:	3508 E FM528 RD
Operator Address 2:	Not reported
Operator Address 3:	Not reported
Operator City,State,Zip:	FRIENDSWOOD, TX 77546
Operator Country:	UNITED STA
Operator Telephone:	Not reported
Operator Fax Number:	Not reported
Operator Email:	Not reported
Operator Business Type:	Unknown
Operator Tax ID:	Not reported
Operator Bankruptcy Code:	Not reported

Ind. Haz Waste:

Owner Name:	DORSETTS TRUCK AND AUTO TIRE
Owner Mailing Address:	3508 E FM528 RD
Owner Mailing Address 2:	Not reported
Owner Mailing Address 3:	Not reported
Owner Mailing City,State,Zip:	FRIENDSWOOD, TX 77546
Owner Country:	UNITED STA
Owner Telephone:	Not reported
Owner Fax:	Not reported
Owner Email Address:	Not reported
Owner Business Type:	Unknown
Owner Tax ID:	Not reported
Owner Bankruptcy Code:	Not reported

Ind. Haz Waste:

Contact Name:	Not reported

DORSETTS TRUCK AND AUTO TIRE (Continued) **S105531850**

Contact Title:	Not reported
Contact Role:	OPRCON
Contact Address:	3508 E FM528 RD
Contact Address 2:	Not reported
Contact Address 3:	Not reported
Contact City,State,Zip:	FRIENDSWOOD, TX 77546
Contact Phone:	Not reported
Contact Fax:	Not reported
Contact Email:	Not reported
Contact Name:	Not reported
Contact Title:	Not reported
Contact Role:	OWNCON
Contact Address:	3508 E FM528 RD
Contact Address 2:	Not reported
Contact Address 3:	Not reported
Contact City,State,Zip:	FRIENDSWOOD, TX 77546
Contact Phone:	Not reported
Contact Fax:	Not reported
Contact Email:	Not reported
Contact Name:	A PEACE
Contact Title:	ENV MGR
Contact Role:	PRICONT
Contact Address:	3508 E FM528 RD
Contact Address 2:	Not reported
Contact Address 3:	Not reported
Contact City,State,Zip:	FRIENDSWOOD, TX 77546
Contact Phone:	Not reported
Contact Fax:	Not reported
Contact Email:	Not reported

F29 **SOUTHERN STATE BANK PROPERTY** **LPST** **S116702414**
East **3502 E FM 528 RD** **N/A**
1/8-1/4 **FRIENDSWOOD, TX 77546**
0.204 mi.
1078 ft. **Site 1 of 2 in cluster F**

Actual:
19 ft.

Focus Map:
5

LPST:

Name:	SOUTHERN STATE BANK PROPERTY
Address:	3502 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Facility ID:	Not reported
LPST Id:	093439
Facility Location:	3502 FM 528
TCEQ Region# and City:	REGION 12 - HOUSTON
Region City:	HOUSTON
Discovered Date:	07/25/1989
Entered Date:	08/18/1989
Reported Date:	07/25/1989
Closure Date:	09/27/1989
Priority:	4A - SOIL CONTAMINATION ONLY REQUIRES FULL SITE ASSESSMENT RAP
Program:	1 - RPR
CA Status:	6A - FINAL CONCURRENCE ISSUED
Priority Description:	SOIL CONTAMINATION ONLY, REQUIRES FULL SITE ASSESSMENT & RAP
Status:	**FINAL CONCURRENCE ISSUED, CASE CLOSED**
Coordinators Primary:	1/2

SOUTHERN STATE BANK PROPERTY (Continued) **S116702414**

Coordinators RPR:	RPR
Responsible Party Name:	Not reported
Responsible Party Contact:	JERRY QUARLES
Responsible Party Address:	PO BOX 567
Responsible Party City,St,Zip:	SOUTH HOUSTON, TX 77587
Responsible Party Telephone:	713/946-5000
Reported Date:	07/25/1989
Case Start Date:	09/27/1989
Reference Number:	RN106975238
Project Manager:	HWELCH

F30 **SOUTHERN STATE BANK PROPERTY** **UST FINDER RELEASE** **1029109535**
East **3502 E FM 528 RD** **N/A**
1/8-1/4 **FRIENDSWOOD, TX 0**
0.204 mi.
1078 ft. **Site 2 of 2 in cluster F**

Actual:
19 ft.

Focus Map:
5

UST FINDER RELEASE:

Object ID:	401778
Facility ID:	Not reported
Lust ID:	TX93439
Name:	SOUTHERN STATE BANK PROPERTY
Address:	3502 E FM 528 RD
City,State,Zip:	FRIENDSWOOD, TX 0
Address Match Type:	PointAddress
Reported Date:	1989/07/25 16:00:00+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1031
Domestic Wells within 1500ft:	1
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX1010678_19044
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	6
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.16615
Y Coord:	29.52189
Latitude:	29.5218899999999
Longitude:	-95.16615

G31 **DIAMOND SHAMROCK CORNER STORE 2** **UST FINDER RELEASE** **1028948950**
SW **3860 FRIENDSWOOD LINK RD** **N/A**
1/8-1/4 **FRIENDSWOOD, TX 0**
0.206 mi.
1086 ft. **Site 1 of 4 in cluster G**

Actual: **29 ft.**

Focus Map: **4**

UST FINDER RELEASE:

Object ID:	401714
Facility ID:	Not reported
Lust ID:	TX91203
Name:	DIAMOND SHAMROCK CORNER STORE 2
Address:	3860 FRIENDSWOOD LINK RD
City,State,Zip:	FRIENDSWOOD, TX 0
Address Match Type:	PointAddress
Reported Date:	1986/12/16 16:00:00+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1531
Domestic Wells within 1500ft:	0
Land Use:	Developed, Low Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX0840002_15844
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	6
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.18027
Y Coord:	29.5287900000001
Latitude:	29.52879
Longitude:	-95.1802699999999

G32 **DIAMOND SHAMROCK 2515** **LPST** **U003040582**
SW **3860 FRIENDSWOOD LINK RD** **UST** **N/A**
1/8-1/4 **FRIENDSWOOD, TX 77546** **Financial Assurance**
0.206 mi.
1086 ft. **Site 2 of 4 in cluster G**

Actual: **29 ft.**

Focus Map: **4**

LPST:

Name:	DIAMOND SHAMROCK CORNER STORE 2
Address:	3860 FRIENDSWOOD LINK RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Facility ID:	0035241
LPST Id:	091203
Facility Location:	3860 FRIENDSWOOD LINK RD
TCEQ Region# and City:	REGION 12 - HOUSTON
Region City:	HOUSTON
Discovered Date:	12/16/1986

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Entered Date:	01/15/1987
Reported Date:	12/16/1986
Closure Date:	04/11/1991
Priority:	2A - GROUNDWATER OTHER THAN 1B SITE CHARACTERIZATION INCOMPLETE
Program:	1 - RPR
CA Status:	6A - FINAL CONCURRENCE ISSUED
Priority Description:	GROUNDWATER OTHER THAN 1B, SITE CHARACTERIZATION INCOMPLETE
Status:	**FINAL CONCURRENCE ISSUED, CASE CLOSED**
Coordinators Primary:	1
Coordinators RPR:	RONNIE EASON
Responsible Party Name:	Not reported
Responsible Party Contact:	KEN HILLIARD
Responsible Party Address:	PO BOX 4415
Responsible Party City,St,Zip:	DALLAS, TX 75221
Responsible Party Telephone:	214/841-6592
Reported Date:	12/16/1986
Case Start Date:	04/11/1991
Reference Number:	RN101788008
Project Manager:	REASON

UST:

Name:	DIAMOND SHAMROCK 2515
Address:	3860 FRIENDSWOOD LINK RD
City,State,Zip:	FRIENDSWOOD, TX 775464155
AI Number:	35241
Facility Type:	RETAIL
Facility Begin Date:	12/11/1986
Facility Status:	INACTIVE
Additional ID:	94315462002087
Facility Exempt Status:	N
Records Off-Site:	Yes
UST Financial Assurance Required:	No
Number Of Active UST:	0
Site Location Description:	Not reported
Site Location (Nearest City Name):	Not reported
Site Location (County Name):	HARRIS
Site Location (Tceq Region):	12
Site Location (Location Zip):	77546
Contact Name/Title:	TERRY HANKINS,
Contact Organization Name:	DIAMOND SHAMROCK 2515
Contact Mailing Address1:	Not reported
Contact Mailing Address2:	Not reported
Contact Mailing City/State/Zip:	Not reported
Contact Telephone:	7138123041
Facility Contact Address Deliverable:	Not reported
Contact Fax Number:	Not reported
Contact Email Address:	Not reported
Signature Date On Earliest Reg Form:	05/02/1986
Signature Name/Title On Earliest Reg Form:	JERRY L SESSIONS,DIV MGR
Application Received Date On Earliest Reg Form:	05/02/1986
Signature Role On Earliest Reg Form:	Not reported
Signature Company On Earliest Reg Form:	Not reported
Enforcement Action:	Not reported
Facility Not Inspectable:	No

Operator:

Princ ID:	765580132003199

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Additional ID:	94315462002087
Ai Number:	35241
Operator CN:	CN602277386
Operator Name:	CST SERVICES LLC
Operator Effective Begin Date:	05/01/2003
Operator Type:	CO
Operator Role:	OPRCON
Contact Name:	KENT HAMEL/COORD
Contact Organization Name:	DIAMOND SHAMROCK REFINING AND MARKETING COMPANY
Contact Mailing Address (Delivery):	PO BOX 696000
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	SAN ANTONIO TX 78269-6000
Contact Phone Country Code:	1
Contact Phone Area Code:	210
Contact Phone Number:	3454670
Contact Phone Extension:	0
Contact Fax Country Code:	Not reported
Contact Fax Area Code:	Not reported
Contact Fax Number:	Not reported
Contact Fax Extension:	Not reported
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported

Owner:

Owner CN:	CN602277386
Owner Last Name:	CST SERVICES LLC
Owner First Name:	Not reported
Owner Middle Name:	Not reported
Owner Type:	CO
Contact Mailing Address (Delivery):	PO BOX 696000
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City:	SAN ANTONIO
Contact Mailing State:	TX
Contact Mailing Zip:	78269
Contact Mailing Zip5:	6000
Contact Phone Number/Ext:	1 210 3454670/0
Contact Fax Country Code:	Not reported
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Not reported
Princ ID:	765580132003199
Additional ID:	94315462002087
AI Number:	35241
Owner Effective Begin Date:	05/01/2003
State Tax ID:	17425053794
Contact Role:	OWNCON
Contact Name/Title:	KENT HAMEL/COORDINATOR
Contact Organization Name:	DIAMOND SHAMROCK REFINING AND MARKETING COMPANY

Self Certification:

Self Cert ID:	60749
Cert ID:	63875
AI Number:	35241
Self Certification Date:	01/18/2001
Signature Name/Title:	PETER OTTO PRESIDENT
Signature Type Role:	LEGAL AUTH REP OWNER

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Filing Status:	INITIAL
Registration Self Certification Flag:	Y
Facility Fees Self Certification Flag:	Y
Financial Assurance Self Certification Flag:	Y
Technical Standards Self Certification Flag:	Y
Delivery Certificate Expiration Date:	08/31/2002
Reporting Method:	Not reported
Tank Corrosion Protection Compliance:	Not reported
Piping Corrosion Protection Compliance:	Not reported
Compartment Release Detection Compliance:	Not reported
Piping Release Detection Compliance:	Not reported
Spill Prevention/Overfill Compliance:	Not reported

Tank:

Install Date:	01/01/1985
Tank Registration Date:	05/02/1986
Number of Compartments:	1
Tank Capacity:	10000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	93218
Facility ID:	60749
Ai Number:	35241
Tank Id:	2
Tank Status (Current):	REMOVED FROM GROUND
Tank Status Date:	01/13/2003
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	Y
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	Y
PCPMethod (FRP Tank Or Piping(Noncorrodible):	N
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	N
Installation Signature Date:	Not reported

Compartment Records:

Tank ID:	2
Tank Capacity:	10000
UST Comprt ID:	64107
UST ID:	93218
AI Number:	35241
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	N
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	N
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported
Install Date:	01/01/1985
Tank Registration Date:	05/02/1986
Number of Compartments:	1
Tank Capacity:	10000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	93219
Facility ID:	60749
Ai Number:	35241
Tank Id:	1
Tank Status (Current):	REMOVED FROM GROUND
Tank Status Date:	01/13/2003
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	Y
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	Y
PCPMethod (FRP Tank Or Piping(Noncorrodible):	N
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N
Technical Compliance Flag:	N
Tank Tested Flag:	N
Installation Signature Date:	Not reported

Compartment Records:

Tank ID:	1
Tank Capacity:	10000
UST Comprt ID:	64108
UST ID:	93219
AI Number:	35241
Compartment ID:	A
Substance Stored1:	GASOLINE
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	N
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	N
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported
Install Date:	01/01/1985
Tank Registration Date:	05/02/1986

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Number of Compartments:	1
Tank Capacity:	10000
Tank Singlewall:	Y
Tank Doublewall:	N
Pipe Type:	P
UST ID:	93220
Facility ID:	60749
Ai Number:	35241
Tank Id:	3
Tank Status (Current):	REMOVED FROM GROUND
Tank Status Date:	01/13/2003
Empty:	N
Tank Regulatory Status:	FULLY REGULATED
Tank Int Prot (Internal Tank Lining Date):	Not reported
Piping Design (Single Wall):	Y
Piping Design (Double Wall):	N
Tank Ext Cont(Fac-Built Nonmetallic Jacket):	N
Tank Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Tank Ext Cont(Tank Vault/Rigid Trench Liner):	N
Piping Ext Cont(Fac-Built Nonmetallic Jacket):	N
Piping Ext Cont(Syn Tank-Pit/Piping-Trench Liner):	N
Piping Ext Cont(Tank Vault/Rigid Trench Liner):	N
Tank Material (Steel):	Y
Tank Material(Frp(Fiberglass-Reinforced Plastic):	N
Tank Mat(Composite (Steel W/Ext Frp Cladding)):	N
Tank Mat(Concrete):	N
Tank Mat(Jacketed (Steel W/Ext Nonmetallic Jck)):	N
Tank Mat(Coated(Steel W/ExtPolyurethane Cladding)):	N
Piping Material (Steel):	N
Piping Mat(Frp(Fiberglass Reinforced Plastic):	Y
Piping Mat(Concrete):	N
Piping Mat(Jacketed(Steel W/Ext Nonmetallic Jacket)):	N
Piping Mat(Nonmetallic Flex Piping):	N
PipingConnect/Valves(Shear/Impact Valves(Under Disp)):	N
Piping Connect/Valves(Steel Swing-Joints(End Of Piping)):	N
Piping Connect/Valves (Flex Connectors(Ends Of Piping)):	N
Tank Corr Prot Meth(TCPM)(Cathodic-Field Installation):	Y
TCPM (ExtDielectricCoat/Laminate/Tape/Wrap):	N
TCPM(Cathodic Prot-FacInstallation):	N
TCPM(Composite Tank(Steel W/Frp Ext Laminate):	N
TCPMeth(Coated Tank(Steel W/ExtPolyurethaneLaminate):	N
TCPM(FRP Tank Or Piping(Noncorrodible)):	N
TCPM(Ext Nonmetallic Jacket):	N
TCPMeth(Unnecessary Per Corrosion Prot Spec):	N
Piping Corr Prot Meth(Dielectric Coat/Laminate/Tape/Wrap):	N
Piping Corr Prot Method(PCPM) (Cathodic Factory Install):	N
PCPM(Cathodic Prot-Field Install):	Y
PCPMethod (FRP Tank Or Piping(Noncorrodible):	N
PCPM(Nonmetallic FlexPiping (Noncorrodible)):	N
PCPMeth(Isolated Open Area/2nd Containment):	N
PCPM (Dual Protected):	N
PCPM(Unnec Per Corrosion Prot Specialist):	N
Tank Corr Prot Compliance Flag:	Y
Piping Corr Prot Compliance Flag:	Y
Tank Corrosion Prot Variance:	N
Piping Corrosion Prot Variance:	N
Temp Out Of Service Compliance:	N

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Technical Compliance Flag:	N
Tank Tested Flag:	N
Installation Signature Date:	Not reported

Compartment Records:

Tank ID:	3
Tank Capacity:	10000
UST Comprt ID:	64109
UST ID:	93220
AI Number:	35241
Compartment ID:	A
Substance Stored1:	DIESEL
Substance Stored2:	Not reported
Substance Stored3:	Not reported
CompartmentReleaseDetectionMethod(Vapor):	N
CRDM(GW Monitoring):	N
CRDM(Monitoring Of Secondary Cont Barrier):	N
CRDM(Auto Tank Gauge Test/Inv Control):	N
CRDM(Interstitial Monitoring SecWall/Jacket):	N
CRDM(Wkly Manual Gauging(Tanks<=1000 G):	N
CRDM(Mthly Tank Gauging(Emer Gen Tanks):	N
CRDM(Sir (Stat Inv Reconciliation)/Inv Control):	Y
PipingReleaseDetectionMethod(PRDM)(Vapor):	N
PRDM(Groundwater Monitoring):	N
PRDM(Monitoring Sec Containment Barrier):	N
PRDM(InterstitialMonitoring w/in SecWall/Jacket):	N
PRDM(Mthly Piping Tightness Test)@.2Gph:	N
PRDM(AnnualPipingTightTest/ElecMon@.1Gph:	N
PRDM(TriennialTightTest(Suction/GravityPiping):	N
PRDM AutoLineLeakDet(3.0 Gph PressPiping):	N
PRDM(Sir(StatInv Recon)/Inv Control)):	Y
PRDM(Exempt System Suction:	N
Spill Overfill Prevention Equip(SOPE):	Y
SOPE(Spill Cont/Bucket/Sump):	Y
SOPE(DelShut-Off Valve)):	Y
SOPE(FlowRestrictorValue:	Y
SOPE(Alarm (Set@<=90%) W/3a Or 3b:	N
SOPE(N/A Deliveries To Tank<=25G):	N
Compartment Release Det Compliance Flag:	Y
Piping Release Detection Compliance Flag):	N
Spill/OverfillPreventionCompliance Flag:	Y
Compartment Release Detection Variance:	N
Piping Release Detection Variance:	N
Spill And Overfill Prevention Variance:	N
Stage I Vapor Recovery:	TWO POINT SYSTEM
Stage 1 Installation Date:	Not reported

Construction Notification:

NOC ID:	6334
Facility ID:	60749
AI Number:	35241
Application Received Date:	09/30/2002
Scheduled Construction Date:	10/30/2002
UST Improvement:	N
UST Installation:	N
UST Removal:	Y

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

UST Repair:	N
UST Return To Service:	N
UST Replacement:	N
UST Abandonment:	N
UST Stage I:	N
AST Installation:	N
AST Stage I:	N
Historical Tracking Number:	M20930012
Waiver Flag:	N
Late Filing Flag:	N
Form Received Date:	Not reported
Signature Date On Form:	Not reported
Signature Name On Form:	Not reported
Signature Company On Form:	Not reported
Signature Title On Form:	Not reported
Signature Role:	Not reported
Owner Name At Time Of Construction:	Not reported
Owner CN At Time Of Construction:	Not reported
Owner AR At Time Of Construction:	21599
General Desc Of Prop Construct:	Not reported

Facility Billing Contacts:

Contact Organization Name:	DIAMOND SHAMROCK REFINING AND MARKETING COMPANY
Contact Mailing Address (Delivery):	PO BOX 696000
Contact Mailing Address (Internal Delivery):	Not reported
Contact Mailing City/State/Zip:	SAN ANTONIO, TX 78269 6000
Phone Number/Ext:	/
Contact Fax Number/Ext:	/
Contact Email Address:	Not reported
Contact Address Deliverable:	Y
Facility ID:	60749
Additional ID:	94315462002087
Princ ID:	765580132003199
AI Number:	35241
Facility Name:	DIAMOND SHAMROCK 2515
AR Number:	Not reported
AR UST Number Suffix:	Not reported
AR AST Number Suffix:	Not reported
Contact Name/Title:	/

TX Financial Assurance 2:

Name:	DIAMOND SHAMROCK 2515
Address:	3860 FRIENDSWOOD LINK RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Region:	2
Facility ID:	60749
Finass ID:	40383
AI:	35241
Mechanism Type Other:	Not reported
Multiple Mechanism Types:	N
Coverage Amt per Annual Aggregate:	Not reported
Meets Financial Assurance Req Flag:	Not reported
Financial Responsibility Type:	INSURANCE OR RISK RETENTION
Corrective Action MET Flag:	Y
3rd Party MET Flag:	Y

DIAMOND SHAMROCK 2515 (Continued) **U003040582**

Financial Assurance Begin Date:	06/30/1993
Date Financial Assurance Form Rec:	Not reported
Issuer Name:	Not reported
Issuer Phone:	Not reported
Policy Number:	Unknown
Coverage Amount:	0
Coverage Expiration Date:	01/01/1901
Ins Premium Pre-Paid For Entire Yr:	No
Proof of Financial Assurance:	No

G33 **DIAMOND SHAMROCK 2515** **UST FINDER** **1028754244**
SW **3860 FRIENDSWOOD LINK RD** **N/A**
1/8-1/4 **FRIENDSWOOD, TX 77546**
0.206 mi.
1086 ft. **Site 3 of 4 in cluster G**

Actual:
29 ft.

Focus Map:
4

UST FINDER:

Object ID:	438593
Facility ID:	TX60749
Name:	DIAMOND SHAMROCK 2515
Address:	3860 FRIENDSWOOD LINK RD
City,State,Zip:	FRIENDSWOOD, TX 77546
Address Match Type:	PointAddress
Open USTs:	0
Closed USTs:	3
TOS USTs:	0
Population 1500ft:	1532
Private Wells 1500ft:	0
Within 100yr Floodplain:	No
Land Use:	Developed, Low Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX0840002_15844
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Facility Status:	Closed UST(s)
Date of Last Inspection:	Not reported
EPA Region:	6
Tribe:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.1802723599999
Y Coord:	29.52878538
Latitude:	29.52878538
Longitude:	-95.18027236

UST FINDER:

Object ID:	1853008
Facility ID:	TX60749
Tank ID:	TX93218
Tank Status:	Closed
Installation Date:	1985/01/01 16:00:00+00
Removal Date:	2003/01/13 15:59:59+00
Tank Capacity:	10000

DIAMOND SHAMROCK 2515 (Continued) **1028754244**

Substances:	Not reported
Tank Wall Type:	Single
Object ID:	1853009
Facility ID:	TX60749
Tank ID:	TX93219
Tank Status:	Closed
Installation Date:	1985/01/01 16:00:00+00
Removal Date:	2003/01/13 15:59:59+00
Tank Capacity:	10000
Substances:	Not reported
Tank Wall Type:	Single
Object ID:	1853010
Facility ID:	TX60749
Tank ID:	TX93220
Tank Status:	Closed
Installation Date:	1985/01/01 16:00:00+00
Removal Date:	2003/01/13 15:59:59+00
Tank Capacity:	10000
Substances:	Not reported
Tank Wall Type:	Single

G34 **FORMER STOP N GO 2515** **RDR** **S127531028**
SW **3860 FRIENDSWOOD LINK RD** **N/A**
1/8-1/4 **FRIENDSWOOD, TX**
0.206 mi.
1086 ft. **Site 4 of 4 in cluster G**

Actual:
29 ft.

Focus Map:
4

RDR:

RDR ID:	12927
Facility ID:	35241
RN:	Not reported
CN:	Not reported
Name:	FORMER STOP N GO 2515
Address:	3860 FRIENDSWOOD LINK RD
City,State,Zip:	FRIENDSWOOD, TX
Date Report Received:	10/22/2003
Due Date:	12/21/2003
Tank Owner:	DIAMOND SHAMROCK
Contact Person:	TIM GEORGE
Report:	RDR
Latest TCEQ Letter:	No Leaker
Date of Latest TCEQ Letter:	4/13/2004
Project Manager:	Susan Williams
Team:	#N/A
New LPST Number:	Not reported
Pre-Existing LPST Number:	91203
Comments:	Not reported
Review Coordinator:	SNW
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	4/13/2004
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

H35 **WEBSTER EXXON 60458** **UST FINDER RELEASE** **1029129479**
ENE **2932 W BAY AREA BLVD** **N/A**
1/4-1/2 **WEBSTER, TX 0**
0.461 mi.
2436 ft. **Site 1 of 4 in cluster H**

Actual: **24 ft.**
Focus Map: 5

UST FINDER RELEASE:

Object ID:	401801
Facility ID:	Not reported
Lust ID:	TX117418
Name:	WEBSTER EXXON 60458
Address:	2932 W BAY AREA BLVD
City,State,Zip:	WEBSTER, TX 0
Address Match Type:	PointAddress
Reported Date:	2007/07/30 15:59:59+00
Status:	No Further Action
Substance:	Not reported
Population within 1500ft:	1379
Domestic Wells within 1500ft:	3
Land Use:	Developed, High Intensity
Within SPA:	No
SPA PWS Facility ID:	Not reported
SPA Water Type:	Not reported
SPA Facility Type:	Not reported
SPA HUC12:	Not reported
Within WHPA:	Yes
WHPA PWS Facility ID:	TX1010678_19044
WHPA Water Type:	GW - Ground water
WHPA Facility Type:	WL - Well
WHPA HUC12:	120402040100
Within 100yr Floodplain:	No
Tribe:	Not reported
EPA Region:	6
NFA Letter 1:	Not reported
NFA Letter 2:	Not reported
NFA Letter 3:	Not reported
NFA Letter 4:	Not reported
Closed With Residual Contaminate:	Not reported
Coordinate Source:	Geocode
X Coord:	-95.162
Y Coord:	29.52277
Latitude:	29.52277
Longitude:	-95.162

H36 **WEBSTER EXXON 60458** **LPST** **S108860069**
ENE **2932 W BAY AREA BLVD** **GCC** **N/A**
1/4-1/2 **WEBSTER, TX 77598**
0.461 mi.
2436 ft. **Site 2 of 4 in cluster H**

Actual: **24 ft.**
Focus Map: 5

LPST:

Name:	WEBSTER EXXON 60458
Address:	2932 W BAY AREA BLVD
City,State,Zip:	WEBSTER, TX 77598
Facility ID:	0026151
LPST Id:	117418
Facility Location:	2932 W BAY AREA
TCEQ Region# and City:	REGION 12 - HOUSTON
Region City:	HOUSTON
Discovered Date:	07/30/2007

WEBSTER EXXON 60458 (Continued) **S108860069**

Entered Date:	09/17/2007
Reported Date:	07/30/2007
Closure Date:	05/29/2009
Priority:	4.1 - GW IMPACTED NO APPARENT THREATS OR IMPACTS TO RECEPTORS
Program:	1 - RPR
CA Status:	6A - FINAL CONCURRENCE ISSUED
Priority Description:	Groundwater is affected.
Status:	**FINAL CONCURRENCE ISSUED, CASE CLOSED**
Coordinators Primary:	1
Coordinators RPR:	FPC
Responsible Party Name:	Not reported
Responsible Party Contact:	DALE L GOMM
Responsible Party Address:	16945 NORTHCHASE DR RM 537
Responsible Party City,St,Zip:	HOUSTON, TX 77060
Responsible Party Telephone:	713/819-6879
Reported Date:	07/30/2007
Case Start Date:	05/29/2009
Reference Number:	RN101619773
Project Manager:	FCLAYWOR

GCC:

Name:	EXXONMOBIL
Address:	2932 W BAY AREA
City,State,Zip:	WEBSTER, TX
Division:	RMD/PST
New Cases:	Not reported
File Number:	117418
Contamination Description:	UNKNOWN
Date Of Earliest Known Contamination Confirmation:	9/17/2007
Enforcement Status - Level Of Agency Response:	6 -
Enforcement Status - Site Activity Status:	6 -
Data Quality 1:	E,Q
Section 5236:	Not reported
Type:	GROUNDWATER CONTAMINATION CASE DESCRIPTION BY COUNTY TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency:	Not reported
Section:	Not reported
Year Deleted:	Not reported
Location:	Not reported
Data Quality 2:	Not reported

Name:	EXXONMOBIL
Address:	2932 W BAY AREA
City,State,Zip:	WEBSTER, TX
Division:	RMD/PST
New Cases:	Not reported
File Number:	117418
Contamination Description:	UNKNOWN
Date Of Earliest Known Contamination Confirmation:	9/17/2007
Enforcement Status - Level Of Agency Response:	1A -
Enforcement Status - Site Activity Status:	1A -
Data Quality 1:	E,Q
Section 5236:	Not reported
Type:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Agency:	Not reported
Section:	Not reported
Year Deleted:	Not reported

WEBSTER EXXON 60458 (Continued) **S108860069**

Location: Not reported
Data Quality 2: Not reported

H37 **EXXON** **RDR** **S127528383**
ENE **2932 W BAY AREA BLVD** **N/A**
1/4-1/2 **WEBSTER, TX**
0.461 mi.
2436 ft. **Site 3 of 4 in cluster H**

Actual: **24 ft.**

Focus Map: **5**

RDR:

RDR ID:	3049
Facility ID:	26151
RN:	Not reported
CN:	Not reported
Name:	EXXON
Address:	2932 W BAY AREA BLVD
City,State,Zip:	WEBSTER, TX
Date Report Received:	1/1/1901
Due Date:	3/2/1901
Tank Owner:	EXXON
Contact Person:	TOM VALERY
Report:	RDR
Latest TCEQ Letter:	No Leaker
Date of Latest TCEQ Letter:	7/16/1996
Project Manager:	Not reported
Team:	Not reported
New LPST Number:	Not reported
Pre-Existing LPST Number:	Not reported
Comments:	SENT TO STATE LIBRARY BOX 3
Review Coordinator:	Not reported
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	7/16/1996
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

H38 **EXXON 60458** **RDR** **S127528382**
ENE **2932 W BAY AREA BLVD** **N/A**
1/4-1/2 **WEBSTER, TX**
0.461 mi.
2436 ft. **Site 4 of 4 in cluster H**

Actual: **24 ft.**

Focus Map: **5**

RDR:

RDR ID:	16517
Facility ID:	26151
RN:	Not reported
CN:	Not reported
Name:	EXXON 60458
Address:	2932 W BAY AREA BLVD
City,State,Zip:	WEBSTER, TX
Date Report Received:	9/13/2007
Due Date:	11/12/2007
Tank Owner:	EXXONMOBIL CORP
Contact Person:	DALE GOMM

EXXON 60458 (Continued) **S127528382**

Report:	RDR
Latest TCEQ Letter:	Not reported
Date of Latest TCEQ Letter:	Not reported
Project Manager:	Not reported
Team:	Not reported
New LPST Number:	Not reported
Pre-Existing LPST Number:	Not reported
Comments:	DOES THIS NEED AN LPST #?
Review Coordinator:	WS
Date Release Reported:	Not reported
Suspected:	Not reported
Confirmed:	Not reported
NOLPST Letter Date:	Not reported
Date Report Returned:	Not reported
Region:	Not reported
DKC RDR (misfiled):	Not reported

Count: 145 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CITY OF HOUSTON	1027678071	PRESERVE AT FRIENDSWOOD WWTP	0.5 MI NW OF INTX OF EL DORADO BLVD & GULF FWY	77546	FINDS, ECHO
FRIENDSHIP	1026002322	CHICK-FIL-A - FRIENDSWOOD TX 4297	SEQ OF S. FRIENDSWOOD DR. AND FM 528	77546	FINDS
FRIENDSHIP	1025928905	CHICK-FIL-A - FRIENDSWOOD TX 4297	SEQ OF S. FRIENDSWOOD DR. AND FM 528	77546	ECHO
FRIENDSHIP	S126960955	CHICK-FIL-A - FRIENDSWOOD TX 4297	SEQ OF S. FRIENDSWOOD DR. AND FM 528	77546	COMP HIST, CENTRAL REGISTRY
FRIENDSWOOD	S126806252	WEST RANCH ESTATES SECTION TWO PAVING	APPROXIMATELY 2 MILES FROM INTERSECTION OF FM 518 AND FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S128249956	FRIENDSWOOD TRAIL BLVD EXT	FRIENDSWOOD TRAILS FROM FM 528 RD WESTWARD TO CHIGGER CREEK	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126714078	DR HORTON FRIENDSWOOD LAKES GARDEN PATIO HOMES SECTION 1	ON INTER FRIENDSWOOD LAKES DR & FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126898566	CREEKWOOD ESTATES	TAKE I-45 SOUTHBOUND, EXIT FM 528, TURN RIGHT. GO TO BRIAR CREEK DR., TURN RIGHT. GO TO GREENBRIAR AVE & TURN LEFT. GO TO WILDERNESS TRAIL, TURN LEFT AND THEN TURN RIGHT ON TO PINECREST COURT	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126750730	CLEARWATER UTILITIES WEST RANCH ESTATES SECTION 1	ON APPROX 2 MI FROM INT OF 528 AND 518 OFF I-45 S TO FM 528 RIGHT AT FM 528, LEFT AT FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126901578	STERLING CREEK SUBDIVISION	APPROXIMATELY 0.42 MI SE OF THE INTERSECTION OF FM 528 & FRIENDSWOOD LAKES BLVD; SW OF FRIENDSWOOD LAKES BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126811735	WEST RANCH DETENTION BASIN F2A PHASE ONE	FM 518 AND FM 528 APPROX 2 MILES FROM INTERSECTION	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126728003	LINDSEY CONSTRUCTION 33 ACRE DETENTION POND FOR GALVESTON CITY DD	ON 1250 FT NW OF FM 528 & FRIENDSWOOD LAKES	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126766853	DOUBLE OAK CONSTRUCTION WEST RANCH DETENTION BASIN F5A PHASE II	ON 2 MILES SE FROM INTX OF FM 518 AND FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126696645	HUNTERS CREEK	1000 FEET S OF FM 528 ON 1600 BLOCK FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126759897	ANGEL BROTHERS ENTERPRISES FRIENDSWOOD LAKES SECTION 4	ON FM 528 W OF I-45 PAST FM 518 HALF MI ALONG L WHITAKER ST L TO SITE	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126834231	DOMINION AT FRIENDSWOOD LAKES HOMEBUILDIN	IN SW QUADRANT OF FM 528 AND FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126948158	FM 518 SITE	1.5 MI SE OF INTERSECTION OF FM 518 AND FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126736464	HURTADO CONSTRUCTION FRIENDSWOOD OAKS SECTION 2	ON BAY AREA BLVD 1.2 MI S OF FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126750600	AUTUMN CREEK DEVELOPMENT WEST RANCH MITIGATION CHIGGER CREEK TRIBUTARIES 2 & 3	ON 2 MI FROM INTEX OF FM 528 AND FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126757636	HOU CSJ 0912-73-125	FM 518 FROM EAST OF COWART CREEK TO LANDING DITCH AND FM 528 FROM NORTH OF DICKINSON BAYOU TO FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126804162	FRIENDSWOOD LAKES SECTION 4	I 45 SOUTH EXIT FM 528 GO WEST APPROXIMATELY 5 MILES TURN SOUTH ON FRIENDSWOOD LAKES BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126923281	FRIENDSWOOD TRAILS PHASE I	FM 528 AT COUNTRY CLUB DRIVE	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126723735	CROSTEX CONSTRUCTION LAKES OF FALCON RIDG SECTION TWO	ON HWY FM 518 & WEST OAK DR APPROX A QUARTER MILE S OF FM 518 & FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126792546	GARDENS AT FRIENDSWOOD LAKES	APPROX 1400 BLOCK OF FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126900268	2013 STREET BOND PROJECTS ROUND 1 - TOWNES RD	BEGINS NEAR TOWNES RD & LUCIAN LANE AND CONTINUES SE APPROX 0.19 MI ENDING NEAR INTERSECTION OF TOWNES RD & CROFTER GLEN DR.	77546	CENTRAL REGISTRY

Count: 145 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FRIENDSWOOD	S126941529	STERLING CREEK 3 PHASE 2	FM 528 TO FRIENDSWOOD LAKES BLVD. TURN EAST TO END	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126954737	LEXUS OF CLEAR LAKE DETACHED SHOP PHASE 1	APPROX. 0.30 MILES NORTHWEST OF THE INTERSECTION AT EL DORADO BLVD AND GULF FREEWAY	77546	CENTRAL REGISTRY
FRIENDSWOOD	S127055449	STERLING CREEK 5 & 6	FM 528 TO FRIENDSWOOD LAKE BLVD TURN EAST TO AVERY LN	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126812186	FRIENDSWOOD OAKS	ON THE E OF BAY AREA BLVD S OF FM 528 AND N OF FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126785692	WEST RANCH STONECREEK 2 & CREEKSIDE 2	1.3 MILES SOUTHEAST OF THE INTERSECTION OF FM 528 AND FM 518 SOUTH FRIENDSWOOD DRIVE.	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126870919	CREEKWOOD ESTATES	TAKE I-45 SOUTHBOUND, EXIT FM 528, TURN RIGHT. GO TO BRIAR CREEK DR., TURN RIGHT. GO TO GREENBRIAR AVE., TURN LEFT. GO APROXIMATELY 1/2 MILE TO WILDERNESS TRAIL, TURN LEFT AND THEN TURN RIGHT INTO SUB	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126880893	STERLING CREEK SECTION 2	FM 528 TO FRIENDSWOOD LAKES BLVD, TURN EAST TO END	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126912860	STERLING CREEK SECTION 3	FM 528 TO FRIENDSWOOD LAKES BLVD. TURN EAST TO END	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126823987	HERITAGE PARK DETENTION POND MODIFICATIONS & REGIONAL PARK FACILITY	APPROXIMATELY 1000 FEET TO THE SOUTHWEST FROM THE INTERSECTION OF FRIENDSWOOD LINK RD AND FIFE LN	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126696783	INTERMEDIATE SCHOOL NO 9 CLEAR CREEK ISD	ON BEAMER RD & EL DORADO BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126897893	METRO EL DORADO PARK AND RIDE	NORTHEAST CORNER OF EL DORADO BLVD AND GLENWEST DRIVE	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126769967	DURWOOD GREENE CONSTRUCTION STONECREEK WEST RANCH SECTION 2	ON APPX 2 MI FROM INTX OF FM 528 & FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126806254	CREEKSIDE AT WEST RANCH SECTION THREE PAVING	APPROXIMATELY 2 MILES FROM INTERSECTION OF FM 518 AND FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126819981	WEST RANCH DETENTION BASIN F2B	FM 518 AND FM 528, APPROX 2 MILES FROM THE INTERSECTION	77546	CENTRAL REGISTRY
FRIENDSWOOD	S128998637	WHISPERING PIINES	THE PROJECT STARTS AT THE INTERSECTION OF FRIENDSWOOD LINK RD. AND CLEAR CREEK	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126697557	FRIENDSWOOD LAKES SECTION 2	ON EAST OF FM 528 SOUTH OF SANDY LAKES DR	77546	CENTRAL REGISTRY
FRIENDSWOOD	S123943606	S E HASTINGS COMPRESSOR SITE	FROM FRIENDSWOOD FROM IH 35 TAKE FM 528 TO FRIENDSWOOD LOOK FOR LARGE RADIO ANTENNA ON THE LEFT SITE IS TO THE LEFT OF THE ANTENNA	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126750700	AUTUMN CREEK DEVELOPMENT WEST RANCH DETENTION BASIN F5A PHASE 1	ON I45 S TO FM 518 RIGHT 518 THEN LEFT 2 MI FROM INTEX OF FM 528 AND FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126804214	HUNTERS CREEK ESTATES	APPROX. .25 MILE EAST OF THE INTERSECTION OF FM 528 & FM 518.	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126691281	LAKES OF FALCON RIDGE	I 45 N LEFT ON FM 518 & FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126734761	DOUBLE OAK CONSTRUCTION WEST RANCH PHASE MASS GRADING FOR DETENTION LAKE	ON 1 MI SE OF INTX OF FM 528 & FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126952544	CLEAR CREEK COMMUNITY CHURCH OFFSITE UTILITY	LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF FM 528 AND TOWNES ROAD.	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126750144	REDDICO CONSTRUCTION	ON IH 45 S TO FM 428 TURN R FM 528 TO FM 518 TURN LEFT FM 518 SITE APPROX 2 MI FROM INTEX OF FM 528 AND FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126803573	CREEKSIDE AT WEST RANCH SEC THREE- PHASE 2	APPROX. 2 MILES FROM TEH INTERSECTION OF FM 518 & FM 528	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126765941	DAVID WIGHT CONSTRUCTION CRAWFORD BUSINES PARK	ON INTEX OF FM 528 AND WINDING WAY	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126697626	HUNTERS CREEK	1000 FEET S OF FM 528 ON 1600 BLOCK FM 518	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126823802	STERLING RIDGE ESTATES	LOCATED ONE HALF MILE NORTH OF FM 528 ON MOORE ROAD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126906646	BAYBROOK MALL POWER CENTER-PAD SITES-BUILDINGS A & B	0.37 MILES SOUTH OF EL DORADO BOULEVARD ON THE WEST SIDE OF GULF FREEWAY	77546	CENTRAL REGISTRY
FRIENDSWOOD	S128256281	IVY POINT FRIENDSWOOD	2920 W. EL DORADO BLVD	77546	CENTRAL REGISTRY

Count: 145 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FRIENDSWOOD	S126921479	SPEEDY EXPRESS 36	2811 EL DORADO BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S127059116	ALLORA FRIENDSWOOD	2911 EL DORADO BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126809310	KROGER SW-744	3135 FM 528 RD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S123877237	FLORES ELADIO	CR 125 BETWEEN FM 2351 & CR 130	77546	CENTRAL REGISTRY
FRIENDSWOOD	S124258760	WEBSTER OIL SALES FACILITY	FROM THE INTERSECTION OF BELTWAY 8 AND IH-45 TRAVEL SOUTHWEST FOR 4.0 MI ON IH-45 EXIT TO FM 2351 AND WEST ON FM 2351 TAKE THE FIRST RIGHT ON AN UNNAMED ROAD TO ENTER THE WEBSTER FIELD TAKE A LEFT BEF	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126878115	UTILITY EXTENSIONS ALONG REX ROAD	PROJECT IS LOCATED SOUTH OF FM 2351 AND WEST OF BEAMER ROAD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126938837	RECONSTR BLACKHAWK BLVD PH II PACKAGE A	BLACKHAWK BOULEVARD FROM APPROXIMATELY 50 FEET NORTH OF CEDAR GULLY TO FRIENDSWOOD LINK ROAD, AND FROM APPROXIMATELY 280 FEET NORTH OF EDENVALE STREET TO APPROXIMATELY 50 FEET NORTH OF CEDAR GULLY	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126795428	EL DORADO BLVD FROM BEAMER ROAD TO BLACKHAWK BLVD APIN 0410100002	EL DORADO BLVD. FROM BEAMER ROAD TO BLACKHAWK BLVD.	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126812091	THE LAKE AT SAN JOAQUIN	LOCATED THREE MILES WEST OF FM 2351 ACCESSIBLE OFF FM 2351	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126686006	HERITAGE PARK	I 75 N EXIT LEFT ON FM 2351 TO BEAMER RD PROPERTY ON SOUTH OF BEAMER RD & FM 2351 INTERSECTION	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126943812	SOUTH BELT SW DET EXCAVATION PH2 DUMP SITE	ON THE WESTERN CORNER OF THE INTERSECTION OF BEAMER RD. AND FM 2351	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126819237	NORTHFIELD ESTATES	LOCATED ON MELODY LANE ONE MILE NORTH OF FM 2351	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126870581	PAVING IMPROVEMENTS ON FRIENDSWOOD LINK ROAD	FRIENDSWOOD LINK RD. FROM FM518 TO BLACKHAWK BLVD.	77546	CENTRAL REGISTRY
FRIENDSWOOD	S123941973	FLORES ELADIO	FM 2351 .5 MI N ON CR 125	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126920707	2013 STREET BOND PROJECTS ROUND 1 - WOODLAWN DR	BEGINNING AT THE INTERSECTION OF FM 2351 AND WOODLAWN DRIVE, CONTINUING APPROXIMATELY 0.25 MILES SOUTH EAST, AND ENDING AT THE INTERSECTION OF WOODLAWN DRIVE AND W SHADOWBEND AVENUE	77546	CENTRAL REGISTRY
FRIENDSWOOD	S123918620	FRIENDSWOOD FD STE 1	1 MI E OF INTERS I45 & FM 2351	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126887828	HOU CSJ 0912-71-894	BEAMER ROAD BETWEEN FM 2351 AND BAY AREA BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126796353	EL DORADO BOULEVARD FROM BEAMER ROAD TO BLACKWATER BOULEVARD	EL DORADO BLVD FROM BEAMER RD TO BLACKHAWK BLVD	77546	CENTRAL REGISTRY
FRIENDSWOOD	S123943533	FRIENDSWOOD SALTWATER SYS	1 MI N OF I-45 BETWEEN DIXIE RD & FM 2351	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126824242	MELODY LANE	FROM FM 2351 TO LEROY	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126839251	FRIENDSWOOD PAVING IMPROVEMENTS	BLACKHAWK BLVD, OAK VISTA DR, & WANDERING TRAIL	77546	CENTRAL REGISTRY
FRIENDSWOOD	S126766263	DAVID WIGHT CONSTRUCTION 40 ACRE DETENTION FACILITY	ON FM 2351 S FROM FM 518 APPROX 1.7 MI TO BAKER RD L AT BAKER	77546	CENTRAL REGISTRY
FRIENDSWOOD	2007848398		FM 2351		ERNS
FRIENDSWOOD	8853531		DITCH ALONG FM 2351 1/4 MILE WEST OF BEAMER RD FRIENDSWOOD F		ERNS
FRIENDSWOOD	A100122651	FM 528 SANDPIT	FM 528		AST
FRIENDSWOOD	1011323164	DURWOOD GREENE CONSTRUCTION STONECREEK WEST RANCH SECTION 2	ON APPX 2 MI FROM INTX OF FM 528 & FM 518	77546	FINDS
FRIENDSWOOD	1024449614	STERLING CREEK 3 PHASE 2	FM 528 TO FRIENDSWOOD LAKES BLVD. TURN EAST TO END	77546	FINDS, ECHO
FRIENDSWOOD	1024438517	FRIENDSWOOD TRAILS PHASE I	FM 528 AT COUNTRY CLUB DRIVE	77546	FINDS, ECHO

Count: 145 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FRIENDSWOOD	1026792522	ALLORA FRIENDSWOOD	2911 W EL DORADO BLVD	77546	FINDS
FRIENDSWOOD	1027122359	IVY POINT FRIENDSWOOD	2920 W EL DORADO BLVD	77546	FINDS
FRIENDSWOOD	1027017088	FRIENDSWOOD TRAIL BLVD EXT	FRIENDSWOOD TRAILS FROM FM 528 RD WESTWARD TO CHIG	77546	FINDS
FRIENDSWOOD	1024186358	HERITAGE PARK	I 75 N EXIT LEFT ON FM 2351 TO BEAMER RD PROPERTY	77546	FINDS
FRIENDSWOOD	1024202498	HOU CSJ 0912-71-894	BEAMER ROAD BETWEEN FM 2351 AND BAY AREA BLVD	77546	FINDS
FRIENDSWOOD	1024175254	FRIENDSWOOD SALTWATER SYS	1 MI N OF I-45 BETWEEN DIXIE RD & FM 2351	77546	FINDS
FRIENDSWOOD	1024439306	RECONSTR BLACKHAWK BLVD PH II PACKAGE A	BLACKHAWK BOULEVARD FROM APPROXIMATELY 50 FEET NOR	77546	FINDS, ECHO
FRIENDSWOOD	1026741807	ALLORA FRIENDSWOOD	2911 W EL DORADO BLVD	77546	ECHO
FRIENDSWOOD	1026661369	STERLING CREEK 5 & 6	FM 528 TO FRIENDSWOOD LAKE BLVD TURN EAST TO AVERY	77546	ECHO
FRIENDSWOOD	1026941021	IVY POINT FRIENDSWOOD	2920 W EL DORADO BLVD	77546	ECHO
FRIENDSWOOD	1026895301	FRIENDSWOOD TRAIL BLVD EXT	FRIENDSWOOD TRAILS FROM FM 528 RD WESTWARD TO CHIG	77546	ECHO
FRIENDSWOOD	S121359816	CALVARY CHURCH	3700 FM 528	77546	ASBESTOS
FRIENDSWOOD	S131644456	EL DORADO BLVD WESTBOUND STRUCTURE NUMBI 102-0500-03-144	EL DORADO AT IH 45	77546	ASBESTOS
FRIENDSWOOD	S107637910	CITY OF FRIENDSWOOD	WELL 2-809 MERRIWOOD KEY MAP 656H WELL 3-605 STONELEDGE DR. KEY MAP 616X WELL 4 - 500 CASTLE HARBOR WEST KEY MAP 656P WELL 5 - 1100 COLT TRAIL KEY MAP 855A WELL 6 - 5006 PENNYSTONE WAY KEY MAP 617W WE	77546	ENF, COMP HIST
FRIENDSWOOD	S113912329	FRIENDSWOOD METER STATION 22	FM 2351 AND I-45 IN		GCC
FRIENDSWOOD	S131534035	PRESERVE AT FRIENDSWOOD WWTP	0.5 MI NW OF INTX OF EL DORADO BLVD & GULF FWY	77546	NPDES
FRIENDSWOOD	S126960954	CHICK-FIL-A - FRIENDSWOOD TX 4297	SEQ OF S. FRIENDSWOOD DR. AND FM 528	77546	COMP HIST, CENTRAL REGISTRY
FRIENDSWOOD	S126966514	STERLING CREEK 4	FM 528 TO FRIENDSWOOD LAKES BLVD. TURN EAST TO AVERY LN.	77546	COMP HIST, CENTRAL REGISTRY
FRIENDSWOOD	S126962272	FRIENDSWOOD TRAILS	APPROX. 350 FEET SOUTHWEST OF THE INTERSECTION OF FM 528 & SUN MEADOW BLVD.	77546	COMP HIST, CENTRAL REGISTRY
GALVESTON	S126765590	WEST RANCH DETENTION BASIN F5A PHASE II	ON 2 MILES S OF INTX FM 518 AND FM 528 ON SE SIDE	77546	CENTRAL REGISTRY
HARRIS COUNTY	S130225688	LOCATED WITHIN THE 1000 BLOCK OF EL DORADO	LOCATED WITHIN THE 1000 BLOCK OF EL DORADO HOUSTON, TEXAS		OCPCASES
HARRIS COUNTY	S130221913	RYANS EXPRESS CL1	531 EL DORADO BLVD, WEBSTER, TX		OCPCASES
HARRIS COUNTY	S130227413	EXXON MOBIL	3110 FM 2351 FRIENDSWOOD TEXAS 77456		OCPCASES
HARRIS COUNTY	S119136698	2920654 CANADA, INC.	5785 RUE PARE, MONT-ROYAL, QUEBEC, H4P 1S1, CANADA		ASBESTOS
HARRIS COUNTY	S125821159	HARRIS COUNTY WCID 161	EL DORADO BLVD		ENF
HARRIS COUNTY	S107654172	ONEILL CONCRETE	BACK OF PROPERTY AT 4411 FM 2351		ENF, OCPCASES
HARRIS COUNTY	S110148945	FRIENDSWOOD METER STATION 22	FM 2351 AND I-45 IN FRIENDSWOOD		GCC
HOUSTON	S126859791	HOU CSJ 0051-02-091	SH 3 FROM CLEAR LAKE CITY BLVD (FM 2351) TO GALVESTON C/L	77598	CENTRAL REGISTRY
HOUSTON	S126912724	BAY AREA BOULEVARD FM 528 TO PILGRIMS POINT DR	ALONG WEST BAY AREA BLVD BEGINNING NEAR FM 528 ENDING NEAR PILGRIMS POINT DRIVE	77598	CENTRAL REGISTRY
HOUSTON	1024198877	HOU CSJ 0051-02-091	SH 3 FROM CLEAR LAKE CITY BLVD (FM 2351) TO GALVES	77598	FINDS
HOUSTON	S131644455	EL DORADO BLVD EASTBOUND STRUCTURE NUMBE 102-0500-03-371	EL DORADO AT IH 45	77598	ASBESTOS
LEAGUE CITY	S126746595	ANGEL BROTHERS ENTERPRISES AUTUMN LAKES SEC 2	ON W B AREA BLVD S OF FM 528	77598	CENTRAL REGISTRY
PEARLAND	S126784352	RIVERSTONE RANCH SUBDIVISION	BLACKHAWK RD TO RIVERSTONE RANCH, FOLLOW SOUTH AND WEST ALONG RIVERSTONE RANCH TO THE DEAD END	77598	CENTRAL REGISTRY
PEARLAND	S126788187	RIVERSTONE RANCH DR	BLACKHAWK RD TO RIVERSTONE RANCH DR TO DEAD END	77598	CENTRAL REGISTRY
WEBSTER	S126677893	HERITAGE PARK SECTION 29	ON W OF IH 45 AND N OF FM 528	77598	CENTRAL REGISTRY
WEBSTER	S126856274	CHICK-FIL-A - WEBSTER I-45 & EL DORADO TX 3274	I-45 AND EL DORADO BOULEVARD	77598	CENTRAL REGISTRY
WEBSTER	S126854761	EASTFIELD DR RETAIL RD & SOUTH VILLAGE DR	LOCATED NEAR EL DORADO AND IH 45 INTERSECTION	77598	CENTRAL REGISTRY

Count: 145 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
WEBSTER	S126932156	OUTLOTS 4 9 & 10 FILL PROJECT	LOCATED .33 MILES WEST OF THE SWC OF GULF FREEWAY AND FM 528 ROAD	77598	CENTRAL REGISTRY
WEBSTER	S126856913	CHICK-FIL-A WEBSTER TX 3274	I-45 AND EL DORADO BLVD	77598	CENTRAL REGISTRY
WEBSTER	S126766845	WHITE SPUNNER CONSTRUCTION THE HOME DEPO WEBSTER RELO	ON E EL DORADO BLVD	77598	CENTRAL REGISTRY
WEBSTER	S126894026	MAINSTREET - WEBSTER TRANSITIONAL CARE FACILITY	THE SITE IS LOCATED ON THE SOUTHWEST SIDE OF HIGHWAY 3 GALVESTON RD APPROXIMATELY 0.45 MILES SOUTHEAST OF EL DORADO BLVD	77598	CENTRAL REGISTRY
WEBSTER	S126848100	HOU CSJ 0500-03-042	IH 45 FROM S OF EL DORADO TO S OF MEDICAL CENTER DR AND S OF FM 2351 TO S OF EL DORADO	77598	CENTRAL REGISTRY
WEBSTER	S126878104	ST LAWRENCE LIFT STATION FORCE MAIN REHABILITATION	PROJECT IS LOCATED ALONG THE SOUTHWESTERN BORDER OF HARRIS COUNTY MUD NO 55 BETWEEN SHADY OAKS LANE AND FM 528	77598	CENTRAL REGISTRY
WEBSTER	S126814008	JAMES CONEY ISLAND RESTAURANT	SOUTH CORNER OF THE INTERSECTION OF IH 45 SOUTH GULF FREEWAY AND FM 528	77598	CENTRAL REGISTRY
WEBSTER	S128263033	EASTFIELD DRIVE NORTH	SOUTHEAST OF INTERSECTION BETWEEN I45 SOUTH AND EL DORADO BLVD.	77598	CENTRAL REGISTRY
WEBSTER	S126930970	CITY OF WEBSTER GENESIS BOULEVARD PHASE 2 AND JASMINE AVENUE	APPROXIMATELY 0.50 MI NORTHWEST OF THE INTERSECTION AT I-45 AND FM 528	77598	CENTRAL REGISTRY
WEBSTER	S123940660	EL DORADO BLVD PLANT	501.5 EL DORADO BLVD	77598	CENTRAL REGISTRY
WEBSTER	S126923020	GENESIS BOULEVARD PHASE I	APPROXIMATELY 0.19 MI NORTHWEST OF THE INTERSECTION AT I-45 AND FM 528	77598	CENTRAL REGISTRY
WEBSTER	S126722438	PACE SERVICES THE LAKES OF BAYBROOK PARCEI A SECTIONS 5 & 6	ON E OF IH45 BTWN EL DORADO BLVD & BAY AREA BLVD	77598	CENTRAL REGISTRY
WEBSTER	S127059403	EASTFIELD DR	EAST SIDE OF 45 BETWEEN EL DORADO BLVD & BAY AREA BLVD	77598	CENTRAL REGISTRY
WEBSTER	S126855065	BAYBROOK SEC 3 & 7 PUBLIC INFRASTRUCTURE & ROADWAYS	THE PROJECT IS LOCATED NEAR 19000 BLOCK OF GULF FREEWAY WEBSTER TX IT IS LOCATED NEAR THE EL DORADO AND IH45 INTERSECTION	77598	CENTRAL REGISTRY
WEBSTER	S126793131	THE HOME DEPOT WEBSTER RELO 567	S ON I-45 EXIT EL DORADO BLVD GO E SITE ON LF EL DORADO BLVD & I-45	77598	CENTRAL REGISTRY
WEBSTER	S126720751	APPALOOSA LAND WEBSTER	BAY AREA BLVD & FM 528	77598	CENTRAL REGISTRY
WEBSTER	S126952345	P954 ALGOA TO FRIENDSWOOD PROJECT	PROJECT EXTENDS FOR 8.2 MILES FROM WEST OF THE INTERSECTION OF OLD DICKINSON ROAD AND FM 517 TO 0.4 MILE SOUTHEAST OF THE INTERSECTION OF I-45 AND FM 528.	77598	CENTRAL REGISTRY
WEBSTER	S126736029	TXDOT HUO CSJ 0500-03-475	ON IH 45 AT FM 528 AND NASA RD 1	77598	CENTRAL REGISTRY
WEBSTER	S126681515	ONSITE CLEANERS	3140 FM 528 RD	77598	CENTRAL REGISTRY
WEBSTER	S126572551	CHEVRON 164701	3136 FM 528 RD	77598	CENTRAL REGISTRY
WEBSTER	1024196895	HOU CSJ 0500-03-042	IH 45 FROM S OF EL DORADO TO S OF MEDICAL CENTER D	77598	FINDS
WEBSTER	1026770441	EASTFIELD DR	EAST SIDE OF 45 BETWEEN EL DORADO BLVD & BAY AREA	77598	FINDS
WEBSTER	1026735349	EASTFIELD DR	EAST SIDE OF 45 BETWEEN EL DORADO BLVD & BAY AREA	77598	ECHO
WEBSTER	S131649298	IH 45 OVER FM 2351	IH 45 OVER FM 2351	77598	ASBESTOS
WEBSTER	S119140048	BRIDGE ON IH-45 OVER FM 2351	IH-45 OVER FM 2351	77598	ASBESTOS
WEBSTER	S108526962	ONSITE CLEANERS	3140 FM 528 RD	77598	DRYCLEANERS, ENF

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 02/29/2024
Date Data Arrived at EDR: 03/01/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 02/29/2024
Date Data Arrived at EDR: 03/01/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Lists of Federal Delisted NPL sites

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 02/29/2024
Date Data Arrived at EDR: 03/01/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Quarterly

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/20/2023
Date Data Arrived at EDR: 12/20/2023
Date Made Active in Reports: 01/24/2024
Number of Days to Update: 35

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 03/26/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/29/2024
Date Data Arrived at EDR: 02/01/2024
Date Made Active in Reports: 02/22/2024
Number of Days to Update: 21

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 04/22/2024
Data Release Frequency: Quarterly

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 01/29/2024
Date Data Arrived at EDR: 02/01/2024
Date Made Active in Reports: 02/22/2024
Number of Days to Update: 21

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 06/17/2024
Data Release Frequency: Quarterly

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/04/2023
Date Data Arrived at EDR: 12/06/2023
Date Made Active in Reports: 12/12/2023
Number of Days to Update: 6

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

Lists of Federal RCRA TSD facilities

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/04/2023
Date Data Arrived at EDR: 12/06/2023
Date Made Active in Reports: 12/12/2023
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

Lists of Federal RCRA generators

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/04/2023
Date Data Arrived at EDR: 12/06/2023
Date Made Active in Reports: 12/12/2023
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/04/2023
Date Data Arrived at EDR: 12/06/2023
Date Made Active in Reports: 12/12/2023
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/04/2023
Date Data Arrived at EDR: 12/06/2023
Date Made Active in Reports: 12/12/2023
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 02/14/2024
Date Data Arrived at EDR: 02/16/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 48

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/02/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/13/2024
Date Data Arrived at EDR: 02/21/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 43

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/21/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/13/2024
Date Data Arrived at EDR: 02/21/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 43

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/21/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/12/2023
Date Data Arrived at EDR: 12/13/2023
Date Made Active in Reports: 02/28/2024
Number of Days to Update: 77

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

Lists of state- and tribal (Superfund) equivalent sites

SHWS: State Superfund Registry

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 12/29/2023
Number of Days to Update: 1

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5680
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Semi-Annually

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF: Permitted Solid Waste Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 01/16/2024
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 04/08/2024
Number of Days to Update: 82

Source: Texas Commission on Environmental Quality
Telephone: 512-239-6706
Last EDR Contact: 01/12/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Quarterly

H-GAC CLI: Houston-Galveston Closed Landfill Inventory

Closed Landfill Inventory for the Houston-Galveston Area Council Region. In 1993, the Texas Legislature passed House Bill (HB) 2537, which required Councils of Governments (COGs) to develop an inventory of closed municipal solid waste landfills for their regional solid waste management plans.

Date of Government Version: 12/21/2023
Date Data Arrived at EDR: 12/21/2023
Date Made Active in Reports: 03/15/2024
Number of Days to Update: 85

Source: Houston-Galveston Area Council
Telephone: 832-681-2518
Last EDR Contact: 03/27/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

DEBRIS: Approved Debris Management Sites Locations

A listing of temporary debris management sites and MSW landfills for debris resulting from Hurricane Harvey.

Date of Government Version: 03/27/2018
Date Data Arrived at EDR: 04/04/2018
Date Made Active in Reports: 06/08/2018
Number of Days to Update: 65

Source: Texas Commission on Environmental Quality
Telephone: 512-239-6840
Last EDR Contact: 03/01/2024
Next Scheduled EDR Contact: 06/17/2024
Data Release Frequency: Varies

CLI: Closed Landfill Inventory
Closed and abandoned landfills (permitted as well as unauthorized) across the state of Texas. For current information regarding any of the sites included in this database, contact the appropriate Council of Governments agency.

Date of Government Version: 08/30/1999
Date Data Arrived at EDR: 09/28/2000
Date Made Active in Reports: 10/30/2000
Number of Days to Update: 32
Source: Texas Commission on Environmental Quality
Telephone: N/A
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: No Update Planned

WASTE MGMT: Commercial Hazardous & Solid Waste Management Facilities
This list contains commercial recycling facilities and facilities permitted or authorized (interim status) by the Texas Natural Resource Conservation Commission.

Date of Government Version: 10/14/2022
Date Data Arrived at EDR: 06/30/2023
Date Made Active in Reports: 09/22/2023
Number of Days to Update: 84
Source: Texas Commission on Environmental Quality
Telephone: 512-239-2920
Last EDR Contact: 03/28/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

Lists of state and tribal leaking storage tanks

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 10/04/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/25/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

LPST: Leaking Petroleum Storage Tank Database
An inventory of reported leaking petroleum storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 09/25/2023
Date Data Arrived at EDR: 09/28/2023
Date Made Active in Reports: 12/20/2023
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2200
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

RDR: Release Determination Report Listing
An owner-operator permanently removing an underground storage tank system from service must determine whether a release of a stored regulated substance has occurred. Assemble and submit documentation of tank removal and release determination?including the details of all excavation, removal, and sampling activities?to the TCEQ using the PST Program?s Release Determination Report form (TCEQ-00621).

Date of Government Version: 01/08/2024
Date Data Arrived at EDR: 01/10/2024
Date Made Active in Reports: 01/29/2024
Number of Days to Update: 19

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2081
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Varies

Lists of state and tribal registered storage tanks

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 11/16/2023
Date Data Arrived at EDR: 11/16/2023
Date Made Active in Reports: 02/13/2024
Number of Days to Update: 89

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

UST: Petroleum Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 12/07/2023
Date Data Arrived at EDR: 12/14/2023
Date Made Active in Reports: 03/06/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2160
Last EDR Contact: 03/20/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

AST: Petroleum Storage Tank Database

Registered Aboveground Storage Tanks.

Date of Government Version: 12/07/2023
Date Data Arrived at EDR: 12/14/2023
Date Made Active in Reports: 03/06/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2160
Last EDR Contact: 03/20/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 10/17/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 56

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

TANKS: Petroleum Storage Tanks Listing

A list of facilities included on the Petroleum Storage Tank database that have no association as either underground or aboveground tanks.

Date of Government Version: 12/07/2023
Date Data Arrived at EDR: 12/14/2023
Date Made Active in Reports: 03/06/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-0985
Last EDR Contact: 03/20/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

State and tribal institutional control / engineering control registries

AUL: Sites with Controls

Activity and use limitations include both engineering controls and institutional controls.

Date of Government Version: 12/12/2023
Date Data Arrived at EDR: 01/11/2024
Date Made Active in Reports: 04/01/2024
Number of Days to Update: 81

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5891
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

Lists of state and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 07/08/2021
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VCP RRC: Voluntary Cleanup Program Sites

The Voluntary Cleanup Program (RRC-VCP) provides an incentive to remediate Oil & Gas related pollution by participants as long as they did not cause or contribute to the contamination. Applicants to the program receive a release of liability to the state in exchange for a successful cleanup.

Date of Government Version: 10/01/2023
Date Data Arrived at EDR: 01/11/2024
Date Made Active in Reports: 04/01/2024
Number of Days to Update: 81

Source: Railroad Commission of Texas
Telephone: 512-463-6969
Last EDR Contact: 01/11/2024
Next Scheduled EDR Contact: 04/22/2024
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Varies

VCP TCEQ: Voluntary Cleanup Program Database

The Texas Voluntary Cleanup Program was established to provide administrative, technical, and legal incentives to encourage the cleanup of contaminated sites in Texas.

Date of Government Version: 12/12/2023
Date Data Arrived at EDR: 01/16/2024
Date Made Active in Reports: 04/08/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5891
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Quarterly

Lists of state and tribal brownfield sites

BROWNFIELDS: Brownfields Site Assessments

Brownfield site assessments that are being cleaned under EPA grant monies.

Date of Government Version: 12/01/2023
Date Data Arrived at EDR: 01/03/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 84

Source: TCEQ
Telephone: 512-239-5872
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 08/15/2023
Date Data Arrived at EDR: 08/30/2023
Date Made Active in Reports: 12/01/2023
Number of Days to Update: 93

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/12/2024
Next Scheduled EDR Contact: 06/24/2024
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

NCTCOG LI: North Central Landfill Inventory

North Central Texas Council of Governments landfill database.

Date of Government Version: 12/21/2023
Date Data Arrived at EDR: 12/21/2023
Date Made Active in Reports: 03/15/2024
Number of Days to Update: 85

Source: North Central Texas Council of Governments
Telephone: 817-695-9223
Last EDR Contact: 03/27/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

CAPCOG LI: Capitol Area Landfill Inventory

Permitted and unpermitted landfills for the CAPCOG region. Serving Bastrop, Blanco, Burnet, Caldwell, Fayette, Hays, Lee, Llano, Travis, and Williamson Counties.

Date of Government Version: 11/11/2022
Date Data Arrived at EDR: 05/23/2023
Date Made Active in Reports: 06/05/2023
Number of Days to Update: 13

Source: Capital Area Council of Governments
Telephone: 512-916-6000
Last EDR Contact: 03/28/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

SWRCY: Recycling Facility Listing

A listing of recycling facilities in the state.

Date of Government Version: 11/07/2023
Date Data Arrived at EDR: 11/09/2023
Date Made Active in Reports: 01/30/2024
Number of Days to Update: 82

Source: TCEQ
Telephone: 512-239-6700
Last EDR Contact: 02/05/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Varies

HIST LF: Historical Information About Municipal Solid Waste Facilities

An historical information listing old, closed unnumbered MSW landfills that were operated before permits were required, as well as unauthorized landfills and miscellaneous illegal dumps and disposal sites.

Date of Government Version: 02/01/2022
Date Data Arrived at EDR: 09/28/2022
Date Made Active in Reports: 05/24/2023
Number of Days to Update: 238

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2335
Last EDR Contact: 01/16/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: No Update Planned

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 01/26/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/11/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176
Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 12/31/2023
Date Data Arrived at EDR: 02/21/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 43
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/21/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Site Locations Listing
A listing of former clandestine drug site locations

Date of Government Version: 09/07/2021
Date Data Arrived at EDR: 12/09/2021
Date Made Active in Reports: 03/01/2022
Number of Days to Update: 82
Source: Department of Public Safety
Telephone: 512-424-2144
Last EDR Contact: 01/22/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Varies

PRIORITY CLEANERS: Dry Cleaner Remediation Program Prioritization List
A listing of dry cleaner related contaminated sites.

Date of Government Version: 09/01/2023
Date Data Arrived at EDR: 11/27/2023
Date Made Active in Reports: 02/21/2024
Number of Days to Update: 86
Source: Texas Commisision on Environmenatl Quality
Telephone: 512-239-5658
Last EDR Contact: 03/01/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Varies

DEL SHWS: Deleted Superfund Registry Sites
Sites have been deleted from the state Superfund registry in accordance with the Act, 361.189

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 12/29/2023
Number of Days to Update: 1
Source: Texas Commission on Environmental Quality
Telephone: 512-239-0666
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 12/31/2023
Date Data Arrived at EDR: 02/21/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 43
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/21/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Quarterly

CENTRAL REGISTRY: The Central Registry
The Central Registry, a common record area of the TCEQ, maintains information about TCEQ customers and regulated activities, such as company names, addresses, and telephone numbers. This information is commonly referred to as "core data". The Central Registry provides the regulated community with a central access point within the agency to check core data and make changes when necessary.

Date of Government Version: 09/30/2022
Date Data Arrived at EDR: 10/04/2022
Date Made Active in Reports: 12/27/2022
Number of Days to Update: 84
Source: Texas Commission on Environmental Quality
Telephone: 512-239-5175
Last EDR Contact: 03/28/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

Local Lists of Registered Storage Tanks

NON REGIST PST: Petroleum Storage Tank Non Registered
A listing of non-registered petroleum storage tank site locations.

Date of Government Version: 12/11/2023
Date Data Arrived at EDR: 12/11/2023
Date Made Active in Reports: 03/06/2024
Number of Days to Update: 86
Source: Texas Commission on Environmental Quality
Telephone: 512-239-2081
Last EDR Contact: 01/29/2024
Next Scheduled EDR Contact: 05/13/2024
Data Release Frequency: Quarterly

Local Land Records

HIST LIENS: Environmental Liens Listing
This listing contains information fields that are no longer tracked in the LIENS database.

Date of Government Version: 03/23/2007
Date Data Arrived at EDR: 03/23/2007
Date Made Active in Reports: 05/02/2007
Number of Days to Update: 40

Source: Texas Commission on Environmental Qualilty
Telephone: 512-239-2209
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

LIENS: Environmental Liens Listing

The listing covers TCEQ liens placed against either State Superfund sites or Federal Superfund sites to recover cost incurred by TCEQ.

Date of Government Version: 12/20/2023
Date Data Arrived at EDR: 01/10/2024
Date Made Active in Reports: 03/29/2024
Number of Days to Update: 79

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2209
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/29/2024
Date Data Arrived at EDR: 03/01/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/12/2023
Date Data Arrived at EDR: 12/13/2023
Date Made Active in Reports: 02/28/2024
Number of Days to Update: 77

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/20/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

SPILLS: Spills Database

Spills reported to the Emergency Response Division.

Date of Government Version: 01/09/2024
Date Data Arrived at EDR: 01/11/2024
Date Made Active in Reports: 03/29/2024
Number of Days to Update: 78

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5100
Last EDR Contact: 01/11/2024
Next Scheduled EDR Contact: 04/22/2024
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 10/23/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/07/2013
Number of Days to Update: 63

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SPILLS 80: SPILLS80 data from FirstSearch

Spills 80 includes those spill and release records available from FirstSearch databases prior to 1990. Typically, they may include chemical, oil and/or hazardous substance spills recorded before 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 80.

Date of Government Version: 05/15/2005
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/07/2013
Number of Days to Update: 63

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/04/2023
Date Data Arrived at EDR: 12/06/2023
Date Made Active in Reports: 12/12/2023
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 214-665-6444
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/30/2024
Date Data Arrived at EDR: 02/13/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 51

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 02/13/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 06/07/2021
Date Data Arrived at EDR: 07/13/2021
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 239

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/10/2024
Next Scheduled EDR Contact: 04/22/2024
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/04/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 07/30/2021
Date Data Arrived at EDR: 02/03/2023
Date Made Active in Reports: 02/10/2023
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/06/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 12/11/2023
Date Data Arrived at EDR: 12/13/2023
Date Made Active in Reports: 02/28/2024
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 03/13/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA Watch List

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 01/29/2024
Next Scheduled EDR Contact: 05/13/2024
Data Release Frequency: No Update Planned

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/02/2024
Next Scheduled EDR Contact: 05/13/2024
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 06/14/2022
Date Made Active in Reports: 03/24/2023
Number of Days to Update: 283

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/14/2024
Next Scheduled EDR Contact: 06/24/2024
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2022
Date Data Arrived at EDR: 11/13/2023
Date Made Active in Reports: 02/07/2024
Number of Days to Update: 86

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/15/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 01/16/2024
Date Data Arrived at EDR: 01/17/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 70

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/17/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/29/2024
Date Data Arrived at EDR: 03/01/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 26

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 02/01/2024
Date Data Arrived at EDR: 02/08/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 56

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/12/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 09/19/2023
Date Data Arrived at EDR: 10/03/2023
Date Made Active in Reports: 10/19/2023
Number of Days to Update: 16

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 05/13/2024
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 03/20/2023
Date Data Arrived at EDR: 04/04/2023
Date Made Active in Reports: 06/09/2023
Number of Days to Update: 66

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/04/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 03/28/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/02/2024
Date Data Arrived at EDR: 01/16/2024
Date Made Active in Reports: 03/13/2024
Number of Days to Update: 57

Source: Nuclear Regulatory Commission
Telephone: 301-415-0717
Last EDR Contact: 01/11/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2022
Date Data Arrived at EDR: 11/27/2023
Date Made Active in Reports: 02/22/2024
Number of Days to Update: 87
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 02/23/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 02/23/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 02/02/2024
Next Scheduled EDR Contact: 05/13/2024
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 01/05/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2023
Date Data Arrived at EDR: 01/11/2024
Date Made Active in Reports: 01/16/2024
Number of Days to Update: 5

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 03/28/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2021
Date Data Arrived at EDR: 03/09/2023
Date Made Active in Reports: 03/20/2023
Number of Days to Update: 11

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/19/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 04/04/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 03/03/2023
Date Data Arrived at EDR: 03/03/2023
Date Made Active in Reports: 06/09/2023
Number of Days to Update: 98

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 01/29/2024
Next Scheduled EDR Contact: 05/13/2024
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/15/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 02/29/2024
Date Data Arrived at EDR: 03/01/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/02/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 01/02/2024
Date Data Arrived at EDR: 01/03/2024
Date Made Active in Reports: 01/04/2024
Number of Days to Update: 1

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 04/04/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Quarterly

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/05/2024
Date Data Arrived at EDR: 02/21/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 43

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 02/21/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 01/07/2022
Date Data Arrived at EDR: 02/24/2023
Date Made Active in Reports: 05/17/2023
Number of Days to Update: 82

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/22/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/22/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

MINES MRDS: Mineral Resources Data System

Mineral Resources Data System

Date of Government Version: 08/23/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 02/28/2023
Number of Days to Update: 98

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 02/22/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 11/28/2023
Date Data Arrived at EDR: 11/29/2023
Date Made Active in Reports: 12/11/2023
Number of Days to Update: 12

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 03/15/2024
Next Scheduled EDR Contact: 06/17/2024
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 11/03/2023
Date Data Arrived at EDR: 11/08/2023
Date Made Active in Reports: 11/20/2023
Number of Days to Update: 12

Source: EPA
Telephone: (214) 665-2200
Last EDR Contact: 02/27/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/06/2021
Date Data Arrived at EDR: 05/21/2021
Date Made Active in Reports: 08/11/2021
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 02/20/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 12/17/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 04/04/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/06/2023
Date Data Arrived at EDR: 09/13/2023
Date Made Active in Reports: 12/11/2023
Number of Days to Update: 89

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 04/08/2024
Next Scheduled EDR Contact: 07/22/2024
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/12/2024
Date Data Arrived at EDR: 02/13/2024
Date Made Active in Reports: 04/04/2024
Number of Days to Update: 51

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 02/13/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Quarterly

PFAS NPL: Superfund Sites with PFAS Detections Information

EPA's Office of Land and Emergency Management and EPA Regional Offices maintain data describing what is known about site investigations, contamination, and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) where PFAS is present in the environment.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 703-603-8895
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS FEDERAL SITES: Federal Sites PFAS Information

Several federal entities, such as the federal Superfund program, Department of Defense, National Aeronautics and Space Administration, Department of Transportation, and Department of Energy provided information for sites with known or suspected detections at federal facilities.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS TRIS: List of PFAS Added to the TRI

Section 7321 of the National Defense Authorization Act for Fiscal Year 2020 (NDAA) immediately added certain per- and polyfluoroalkyl substances (PFAS) to the list of chemicals covered by the Toxics Release Inventory (TRI) under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and provided a framework for additional PFAS to be added to TRI on an annual basis.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 01/04/2024
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-566-0250
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS TSCA: PFAS Manufacture and Imports Information

EPA issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) and requires chemical manufacturers and facilities that manufacture or import chemical substances to report data to EPA. EPA publishes non-confidential business information (non-CBI) and includes descriptive information about each site, corporate parent, production volume, other manufacturing information, and processing and use information.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 01/04/2024
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS RCRA MANIFEST: PFAS Transfers Identified In the RCRA Database Listing

To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: PFAS, PFOA, PFOS, PERFL, AFFF, GENX, GEN-X (plus the VT waste codes). These keywords were searched for in the following text fields: Manifest handling instructions (MANIFEST_HANDLING_INSTR), Non-hazardous waste description (NON_HAZ_WASTE_DESCRIPTION), DOT printed information (DOT_PRINTED_INFORMATION), Waste line handling instructions (WASTE_LINE_HANDLING_INSTR), Waste residue comments (WASTE_RESIDUE_COMMENTS).

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 01/04/2024
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS ATSDR: PFAS Contamination Site Location Listing

PFAS contamination site locations from the Department of Health & Human Services, Center for Disease Control & Prevention. ATSDR is involved at a number of PFAS-related sites, either directly or through assisting state and federal partners. As of now, most sites are related to drinking water contamination connected with PFAS production facilities or fire training areas where aqueous film-forming firefighting foam (AFFF) was regularly used.

Date of Government Version: 06/24/2020
Date Data Arrived at EDR: 03/17/2021
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 601

Source: Department of Health & Human Services
Telephone: 202-741-5770
Last EDR Contact: 01/22/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Varies

PFAS WQP: Ambient Environmental Sampling for PFAS

The Water Quality Portal (WQP) is a part of a modernized repository storing ambient sampling data for all environmental media and tissue samples. A wide range of federal, state, tribal and local governments, academic and non-governmental organizations and individuals submit project details and sampling results to this public repository. The information is commonly used for research and assessments of environmental quality.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS NPDES: Clean Water Act Discharge Monitoring Information

Any discharger of pollutants to waters of the United States from a point source must have a National Pollutant Discharge Elimination System (NPDES) permit. The process for obtaining limits involves the regulated entity (permittee) disclosing releases in a NPDES permit application and the permitting authority (typically the state but sometimes EPA) deciding whether to require monitoring or monitoring with limits. Caveats and Limitations: Less than half of states have required PFAS monitoring for at least one of their permittees and fewer states have established PFAS effluent limits for permittees. New rulemakings have been initiated that may increase the number of facilities monitoring for PFAS in the future.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS ECHO: Facilities in Industries that May Be Handling PFAS Listing

Regulators and the public have expressed interest in knowing which regulated entities may be using PFAS. EPA has developed a dataset from various sources that show which industries may be handling PFAS. Approximately 120,000 facilities subject to federal environmental programs have operated or currently operate in industry sectors with processes that may involve handling and/or release of PFAS.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS ECHO FIRE TRAINING: Facilities in Industries that May Be Handling PFAS Listing

A list of fire training sites was added to the Industry Sectors dataset using a keyword search on the permitted facilitys name to identify sites where fire-fighting foam may have been used in training exercises. Additionally, you may view an example spreadsheet of the subset of fire training facility data, as well as the keywords used in selecting or deselecting a facility for the subset. as well as the keywords used in selecting or deselecting a facility for the subset. These keywords were tested to maximize accuracy in selecting facilities that may use fire-fighting foam in training exercises, however, due to the lack of a required reporting field in the data systems for designating fire training sites, this methodology may not identify all fire training sites or may potentially misidentify them.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PFAS PART 139 AIRPORT: All Certified Part 139 Airports PFAS Information Listing

Since July 1, 2006, all certified part 139 airports are required to have fire-fighting foam onsite that meet military specifications (MIL-F-24385) (14 CFR 139.317). To date, these military specification fire-fighting foams are fluorinated and have been historically used for training and extinguishing. The 2018 FAA Reauthorization Act has a provision stating that no later than October 2021, FAA shall not require the use of fluorinated AFFF. This provision does not prohibit the use of fluorinated AFFF at Part 139 civilian airports; it only prohibits FAA from mandating its use. The Federal Aviation Administration?s document AC 150/5210-6D - Aircraft Fire Extinguishing Agents provides guidance on Aircraft Fire Extinguishing Agents, which includes Aqueous Film Forming Foam (AFFF).

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

AQUEOUS FOAM NRC: Aqueous Foam Related Incidents Listing

The National Response Center (NRC) serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. The spreadsheets posted to the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency. Response center calls from 1990 to the most recent complete calendar year where there was indication of Aqueous Film Forming Foam (AFFF) usage are included in this dataset. NRC calls may reference AFFF usage in the ?Material Involved? or ?Incident Description? fields.

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 12/28/2023
Date Made Active in Reports: 03/04/2024
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 202-267-2675
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

PCS: Permit Compliance System

PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 12/16/2016
Date Data Arrived at EDR: 01/06/2017
Date Made Active in Reports: 03/10/2017
Number of Days to Update: 63

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 03/29/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: No Update Planned

PCS ENF: Enforcement data

No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 03/29/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

BIOSOLIDS: ICIS-NPDES Biosolids Facility Data

The data reflects compliance information about facilities in the biosolids program.

Date of Government Version: 12/31/2023
Date Data Arrived at EDR: 01/03/2024
Date Made Active in Reports: 01/16/2024
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 202-564-4700
Last EDR Contact: 01/03/2024
Next Scheduled EDR Contact: 04/29/2024
Data Release Frequency: Varies

PFAS: PFAS Contamination Site Location Listing

PFOS and PFOA stand for perfluorooctane sulfonate and perfluorooctanoic acid, respectively. Both are fluorinated organic chemicals, part of a larger family of compounds referred to as perfluoroalkyl substances (PFASs).

Date of Government Version: 11/22/2023
Date Data Arrived at EDR: 12/04/2023
Date Made Active in Reports: 02/26/2024
Number of Days to Update: 84

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2341
Last EDR Contact: 02/26/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Varies

AQUEOUS FOAM: AFFF Sites Listing

A list of Aqueous Film Forming Foam (AFFF) sites.

Date of Government Version: 03/06/2023
Date Data Arrived at EDR: 03/15/2023
Date Made Active in Reports: 06/05/2023
Number of Days to Update: 82

Source: Texas Commission on Environmental Quality
Telephone: 512-239-1913
Last EDR Contact: 02/26/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Current Emission Inventory Data

The database lists by company, along with their actual emissions, the TNRCC air accounts that emit EPA criteria pollutants.

Date of Government Version: 12/06/2023
Date Data Arrived at EDR: 01/04/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: N/A
Last EDR Contact: 02/26/2024
Next Scheduled EDR Contact: 06/17/2024
Data Release Frequency: Semi-Annually

APAR: Affected Property Assessment Report Site Listing

Listing of Sites That Have Received an APAR (Affected Property Assessment Report)

Date of Government Version: 12/28/2023
Date Data Arrived at EDR: 01/11/2024
Date Made Active in Reports: 04/01/2024
Number of Days to Update: 81

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5872
Last EDR Contact: 03/29/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Varies

ASBESTOS: Asbestos Notification Listing

A listing of asbestos notification site locations.

Date of Government Version: 02/23/2024
Date Data Arrived at EDR: 02/27/2024
Date Made Active in Reports: 03/12/2024
Number of Days to Update: 14

Source: Department of State Health Services
Telephone: 512-834-6787
Last EDR Contact: 02/12/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Sites

A listing of facilities that use surface impoundments or landfills to dispose of coal ash.

Date of Government Version: 01/24/2024
Date Data Arrived at EDR: 01/26/2024
Date Made Active in Reports: 01/29/2024
Number of Days to Update: 3

Source: Texas Commission on Environmental Quality
Telephone: 512-239-6624
Last EDR Contact: 01/22/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Varies

DRYCLEANERS: Drycleaner Registration Database Listing

A listing of drycleaning facilities.

Date of Government Version: 11/07/2023
Date Data Arrived at EDR: 11/20/2023
Date Made Active in Reports: 02/15/2024
Number of Days to Update: 87

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2160
Last EDR Contact: 02/22/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

ED AQUIF: Edwards Aquifer Permits

A listing of permits in the Edwards Aquifer Protection Program database. The information provided is for the counties located in the Austin Region (Hays, Travis, and Williamson counties).

Date of Government Version: 12/22/2023
Date Data Arrived at EDR: 01/03/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 84

Source: Texas Commission on Environmental Quality, Austin Region
Telephone: 512-339-2929
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Varies

ENFORCEMENT: Notice of Violations Listing

A listing of permit violations.

Date of Government Version: 11/21/2023
Date Data Arrived at EDR: 12/21/2023
Date Made Active in Reports: 03/15/2024
Number of Days to Update: 85

Source: Texas Commission on Environmental Quality
Telephone: 512-239-6012
Last EDR Contact: 03/27/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Semi-Annually

Financial Assurance 1: Financial Assurance Information Listing
Financial assurance information.

Date of Government Version: 03/18/2024
Date Data Arrived at EDR: 03/21/2024
Date Made Active in Reports: 04/05/2024
Number of Days to Update: 15

Source: Texas Commission on Environmental Quality
Telephone: 512-239-6239
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing
Financial Assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay

Date of Government Version: 12/07/2023
Date Data Arrived at EDR: 12/14/2023
Date Made Active in Reports: 03/06/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-0986
Last EDR Contact: 03/20/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Quarterly

GCC: Groundwater Contamination Cases
Texas Water Code, Section 26.406 requires the annual report to describe the current status of groundwater monitoring activities conducted or required by each agency at regulated facilities or associated with regulated activities. The report is required to contain a description of each case of groundwater contamination documented during the previous calendar year. Also to be included, is a description of each case of contamination documented during previous periods for which voluntary clean up action was incomplete at the time the preceding report was issued. The report is also required to indicate the status of enforcement action for each listed case.

Date of Government Version: 12/31/2022
Date Data Arrived at EDR: 08/31/2023
Date Made Active in Reports: 11/15/2023
Number of Days to Update: 76

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5690
Last EDR Contact: 02/22/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Annually

IOP: Innocent Owner/Operator Program
Contains information on all sites that are in the IOP. An IOP is an innocent owner or operator whose property is contaminated as a result of a release or migration of contaminants from a source or sources not located on the property, and they did not cause or contribute to the source or sources of contamination.

Date of Government Version: 12/20/2023
Date Data Arrived at EDR: 01/03/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 84

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5894
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Quarterly

LEAD: Lead Inspection Listing
Lead inspection sites

Date of Government Version: 11/22/2023
Date Data Arrived at EDR: 11/30/2023
Date Made Active in Reports: 02/21/2024
Number of Days to Update: 83

Source: Department of State Health Services
Telephone: 512-834-6600
Last EDR Contact: 03/11/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Varies

Ind. Haz Waste: Industrial & Hazardous Waste Database
Summary reports reported by waste handlers, generators and shippers in Texas.

Date of Government Version: 11/08/2023
Date Data Arrived at EDR: 11/15/2023
Date Made Active in Reports: 02/12/2024
Number of Days to Update: 89

Source: Texas Commission on Environmental Quality
Telephone: 512-239-0985
Last EDR Contact: 01/26/2024
Next Scheduled EDR Contact: 04/22/2024
Data Release Frequency: Annually

MSD: Municipal Settings Designations Database

An MSD is an official state designation given to property within a municipality or its extraterritorial jurisdiction that certifies that designated groundwater at the property is not use as potable water, and is prohibited from future use as potatable water because that groundwater is contaminated in excess of the applicable potable-water protective concentration level.

Date of Government Version: 10/24/2023
Date Data Arrived at EDR: 10/27/2023
Date Made Active in Reports: 01/19/2024
Number of Days to Update: 84

Source: Texas Commission on Environmental Quality
Telephone: 512-239-4982
Last EDR Contact: 01/22/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Varies

NPDES: NPDES Facility List

Permitted wastewater outfalls.

Date of Government Version: 11/06/2023
Date Data Arrived at EDR: 11/08/2023
Date Made Active in Reports: 01/30/2024
Number of Days to Update: 83

Source: Texas Commission on Environmental Quality
Telephone: 512-239-4591
Last EDR Contact: 02/07/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Varies

RWS: Radioactive Waste Sites

Sites in the State of Texas that have been designated as Radioactive Waste sites.

Date of Government Version: 07/24/2006
Date Data Arrived at EDR: 12/14/2006
Date Made Active in Reports: 01/23/2007
Number of Days to Update: 40

Source: Texas Commission on Environmental Quality
Telephone: 512-239-0859
Last EDR Contact: 02/05/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Semi-Annually

TIER 2: Tier 2 Chemical Inventory Reports

A listing of facilities which store or manufacture hazardous materials and submit a chemical inventory report.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 06/07/2013
Date Made Active in Reports: 07/22/2013
Number of Days to Update: 45

Source: Department of State Health Services
Telephone: 512-834-6603
Last EDR Contact: 02/12/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Annually

UIC: Underground Injection Wells Database Listing

Class V injection wells regulated by the TCEQ. Class V wells are used to inject non-hazardous fluids underground. Most Class V wells are used to dispose of wastes into or above underground sources of drinking water and can pose a threat to ground water quality, if not managed properly.

Date of Government Version: 10/20/2023
Date Data Arrived at EDR: 10/24/2023
Date Made Active in Reports: 01/19/2024
Number of Days to Update: 87

Source: Texas Commission on Environmental Quality
Telephone: 512-239-6627
Last EDR Contact: 04/05/2024
Next Scheduled EDR Contact: 07/22/2024
Data Release Frequency: Varies

IHW CORR ACTION: Industrial and Hazardous Waste Corrective Action Information

Industrial hazardous waste facilities with corrective actions.

Date of Government Version: 12/20/2023
Date Data Arrived at EDR: 01/03/2024
Date Made Active in Reports: 03/27/2024
Number of Days to Update: 84

Source: Texas Commission on Environmental Quality
Telephone: 512-239-5872
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

PST STAGE 2: PST Stage 2

State II Vapor Recovery. Decommissioning of Stage II Rule - Gasoline dispensing facilities (GDFs) may begin the process of removing Stage II equipment on May 16, 2014 providing that all other requirements for decommissioning have been met, including appropriate notification.

Date of Government Version: 07/17/2019
Date Data Arrived at EDR: 07/18/2019
Date Made Active in Reports: 09/24/2019
Number of Days to Update: 68

Source: Texas Commission on Environmental Quality
Telephone: 512-239-2160
Last EDR Contact: 03/18/2024
Next Scheduled EDR Contact: 07/01/2024
Data Release Frequency: Varies

COMP HIST: Compliance History Listing

A listing of compliance histories of regulated entities

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 02/14/2023
Number of Days to Update: 84

Source: Txas Commission on Environmental Quality
Telephone: 512-239-3282
Last EDR Contact: 02/22/2024
Next Scheduled EDR Contact: 06/03/2024
Data Release Frequency: Varies

RRC OCP: Operator Cleanup Program Listing

The Operator Cleanup Program (OCP) under the Site Remediation Section is tasked with oversight of complex pollution cleanups performed by the oil and gas industry.

Date of Government Version: 12/27/2023
Date Data Arrived at EDR: 12/27/2023
Date Made Active in Reports: 03/19/2024
Number of Days to Update: 83

Source: Railroad Commission of Texas
Telephone: 512-475-3089
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

LAND PERMIT: Land Application Permit Listing

Texas Land Application Permits from the Texas Commission on Environmental Quality for any domestic facility that disposes of treated effluent by land application such as subsurface land application, surface irrigation, drainfields, evaporation.

Date of Government Version: 12/11/2023
Date Data Arrived at EDR: 12/20/2023
Date Made Active in Reports: 03/15/2024
Number of Days to Update: 86

Source: Texas Commission on Environmental Quality
Telephone: 512-239-4671
Last EDR Contact: 03/11/2024
Next Scheduled EDR Contact: 06/24/2024
Data Release Frequency: Varies

PETRO STOR CAVERNS: Listing of Permitted Storage Caverns

Salt caverns for petroleum storage information, from the Railroad Commission of Texas. Salt caverns, constructed in naturally occurring salt domes or salt beds, are used as storage for hydrocarbons including crude oil and natural gases.

Date of Government Version: 01/02/2024
Date Data Arrived at EDR: 01/10/2024
Date Made Active in Reports: 03/29/2024
Number of Days to Update: 79

Source: Railroad Commission of Texas
Telephone: 512-463-6900
Last EDR Contact: 03/25/2024
Next Scheduled EDR Contact: 07/08/2024
Data Release Frequency: Varies

COMPLAINTS: Complaints Information Listing

Complaints received by the TCEQ are assigned an Incident Number. The information alleged by the complainant is documented and associated to that unique number and then further investigated. An Incident Number may be listed more than once if there are multiple Customer Names, Released Materials, Media, and/or Effects.

Date of Government Version: 11/27/2023
Date Data Arrived at EDR: 11/27/2023
Date Made Active in Reports: 12/08/2023
Number of Days to Update: 11

Source: Texas Commission on Environmental Quality
Telephone: 512-239-0179
Last EDR Contact: 02/28/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Quarterly

UST FINDER RELEASE: UST Finder Releases Database

US EPA's UST Finder data is a national composite of leaking underground storage tanks. This data contains information about, and locations of, leaking underground storage tanks. Data was collected from state sources and standardized into a national profile by EPA's Office of Underground Storage Tanks, Office of Research and Development, and the Association of State and Territorial Solid Waste Management Officials.

Date of Government Version: 06/08/2023
Date Data Arrived at EDR: 10/31/2023
Date Made Active in Reports: 01/18/2024
Number of Days to Update: 79

Source: Environmental Protecton Agency
Telephone: 202-564-0394
Last EDR Contact: 02/09/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Semi-Annually

UST FINDER: UST Finder Database

EPA developed UST Finder, a web map application containing a comprehensive, state-sourced national map of underground storage tank (UST) and leaking UST (LUST) data. It provides the attributes and locations of active and closed USTs, UST facilities, and LUST sites from states and from Tribal lands and US territories . UST Finder contains information about proximity of UST facilities and LUST sites to: surface and groundwater public drinking water protection areas; estimated number of private domestic wells and number of people living nearby; and flooding and wildfires.

Date of Government Version: 06/08/2023
Date Data Arrived at EDR: 10/04/2023
Date Made Active in Reports: 01/18/2024
Number of Days to Update: 106

Source: Environmental Protection Agency
Telephone: 202-564-0394
Last EDR Contact: 02/09/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Texas Commission of Environmental Quality in Texas formerly known as Texas Natural Resources Conservation Commission which changed in 2002.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/26/2013
Number of Days to Update: 178

Source: Texas Commission on Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Texas Commission of Environmental Quality in Texas formerly known as Texas Natural Resources Conservation Commission which changed in 2002.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Texas Commission on Environmental Quality
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

TRAVIS COUNTY:

HIST UST AUSTIN: Historic Tank Records

A listing of historic records from the City of Austin.

Date of Government Version: 11/26/2023
Date Data Arrived at EDR: 11/27/2023
Date Made Active in Reports: 02/21/2024
Number of Days to Update: 86

Source: Department of Planning & Development Review
Telephone: 512-974-2715
Last EDR Contact: 02/28/2024
Next Scheduled EDR Contact: 06/10/2024
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 11/06/2023
Date Data Arrived at EDR: 11/07/2023
Date Made Active in Reports: 01/31/2024
Number of Days to Update: 85

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/06/2024
Next Scheduled EDR Contact: 05/20/2024
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 03/29/2024
Next Scheduled EDR Contact: 07/15/2024
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 11/30/2023
Date Made Active in Reports: 12/01/2023
Number of Days to Update: 1

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 01/26/2024
Next Scheduled EDR Contact: 05/06/2024
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/08/2024
Next Scheduled EDR Contact: 07/22/2024
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/18/2022
Number of Days to Update: 80

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/12/2024
Next Scheduled EDR Contact: 05/27/2024
Data Release Frequency: Annually

VT MANIFEST: Hazardous Waste Manifest Data

Hazardous waste manifest information.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/09/2020
Number of Days to Update: 72

Source: Department of Environmental Conservation
Telephone: 802-241-3443
Last EDR Contact: 01/05/2024
Next Scheduled EDR Contact: 04/22/2024
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/01/2024
Next Scheduled EDR Contact: 06/17/2024
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Facility List
Source: Department of Protective & Regulatory Services
Telephone: 512-438-3269

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005, 2010 and 2015 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Texas General Land Office
Telephone: 512-463-0745

STREET AND ADDRESS INFORMATION

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ATTACHMENT C - PHOTOGRAPHIC LOG

Representative Photo Log

Blackhawk Boulevard Reconstruction – Friendswood, Harris County, Texas

May 6, 2024

Photo 1 – Representative photo of Blackhawk Boulevard near the intersection of Blackhawk Boulevard and FM 528. Photo taken to the north.

Photo 2 – Photo of facilities at Randolph Park / Frankie Carter Randolph site, located at 5100 FM 2351. Site is north of the Project Corridor. Photo taken to the east.

Photo 3 – Photo of Circle K 2741409 / Valero Energy Station and Corner Store, located at 5091 FM 2351. Photo taken to the south.

Photo 4 – Photo of Smart Stop Food Mart, located at 5103 FM 2351, and the previous Star Cleaners, located at 5105 FM 2351 and currently operating as Habaneros Tex Mex Restaurant. Photo taken to the east.

Photo 5 – Photo of the previous Speedy Food Mart, located at 3702 FM 528. The location is now a parking lot for a church. Photo taken to the south.

Photo 6 – Photo of the strip mall where the Corner Food Mart, 3698 FM 528, and 1.49 Jet Cleaners, 3670 FM 528, were previously located. The 1.49 Jet Cleaners site currently operates as a Texas Optical Center. The Corner Food Mart location is now a closed Food Mart Beer and Wine convenience store. The Shell gas station UST has been removed and the site is under construction.

Photo 7 – Photo of Blackhawk Boulevard at the intersection with FM 528. Photo taken to the west.

Photo 8 – Photo of Blackhawk Boulevard near the intersection with Bentwood Lane and FM 2351. Photo taken to the north.

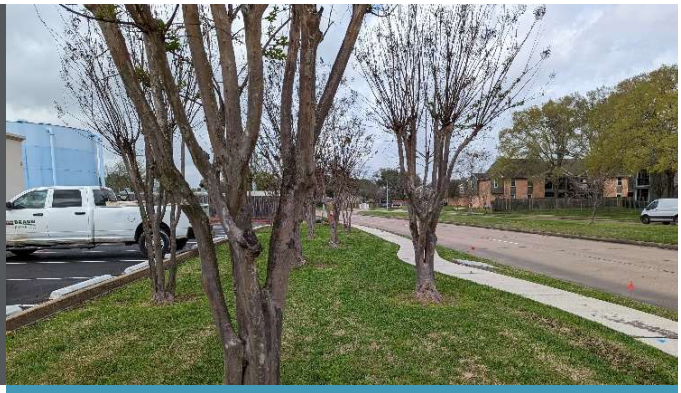
Photo 9 – Photo of Blackhawk Boulevard near the intersection with Pennystone Way (Package B). Photo taken to the west.

Photo 10 – Photo of Blackhawk Boulevard near the intersection with Geneva Drive (Package B). Photo taken to the southeast.

Photo 11 – Active road construction along Blackhawk Boulevard was observed in the Package B area. Construction best management practices (BMPs) installed wattles near stormwater drains within the Package B area. Photo taken to the west.

APPENDIX C

ENVIRONMENTAL SITE ASSESSMENT-2 REPORT



Phase II Environmental Site Assessment

Blackhawk Boulevard Reconstruction

Phase II Package B and C

Harris County, Texas

March 28, 2023

Phase II Environmental Site Assessment

Blackhawk Boulevard Reconstruction
Phase II Package B and C

Friendswood, Harris County, Texas
HDR Project # 10357152

Prepared for:

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Appendices

Appendix A – Figures
Appendix B – Representative Photos
Appendix C – Boring Logs
Appendix D – Laboratory Results

Glossary of Acronyms

Bgs ..... Below ground surface
CENTRAL REGISTRY ..... Central Registry database to identify regulated activities
COC ..... Chemical of Concern
EDR HIST AUTO ..... Environmental Data Resources Historical Gas Stations/establishments
EDR HIST CLEANER ..... Environmental Data Resources Historical Cleaners
ESA ..... Environmental Site Assessment
FINANCIAL ASSURANCE ..... Financial Assurance Information Listing
FINDS ..... Facility Index System
FM ..... Farm to Market
GCC ..... Groundwater Contamination Cases
HDR ..... HDR Engineering, Inc.
LPST ..... Leaking Petroleum Storage Tank
MDL ..... Method Detection Limit
PCLs ..... Protective Concentration Levels
PAH ..... Polycyclic Aromatic Hydrocarbon
PCBs ..... Polychlorinated Biphenyls
PST STAGE 2 ..... Petroleum Storage Tank Stage II Vapor Recovery
RCRA ..... Resource Conservation and Recovery Act
RDR ..... Release Determination Report for the Petroleum Storage Tank Program
REC ..... Recognized Environmental Condition
ROW ..... Right of Way
RL ..... Reporting Limits
SVOC ..... Semi-Volatile Organic Compound
TCEQ ..... Texas Commission on Environmental Quality
TIER 2 ..... Facilities storing or manufacturing hazardous materials
TPH ..... Total Petroleum Hydrocarbon
TRRP ..... Texas Risk Reduction Program
UST ..... Underground Storage Tank
VCP ..... Voluntary Cleanup Program
VOC ..... Volatile Organic Compound

1.0 Background and Site History

On behalf of the City of Friendswood (the City), HDR Engineering, Inc. (HDR) conducted a Phase II Environmental Site Assessment (Phase II ESA) for the Blackhawk Boulevard Reconstruction Project (Project), located in Friendswood, Harris County, Texas (**Appendix A – Figure 1**). At the request of the City, the site investigations were completed at two (2) locations across five (5) sites to assess soil conditions by obtaining samples for analytical testing to determine material characteristics and baseline conditions. The Phase II ESA has been prepared for the City.

The property, referenced herein as the "Project Corridor", consists of a 0.79-mile, non-contiguous section of Blackhawk Boulevard including a four-lane divided street with raised, vegetated medians, and concrete middle turning lanes at regular intervals. The Project Corridor begins and ends at two major roadway intersections, farm-to-market (FM) 2351 and FM 528, respectively, and is intersected frequently by minor residential streets. The properties adjacent to the Project Corridor are residential homes constructed in the 1970s, commercial strip malls, and fuel stations.

Groundwater flow direction from the sites generally follows natural patterns towards Clear Creek and the gradient is expected to be flat. The areas surrounding the Project Corridor consist of multi-family and single-family residential housing, schools, parks, and drainage ditches.

According to the 2017, 2019 and recent January 2023 Phase I ESAs, the Project was largely undeveloped property until Blackhawk Boulevard was constructed. Commercial properties including dry cleaners and gas stations, and the surrounding residential neighborhoods were built in the 1970s (HDR, 2023). The site reconnaissance identified Recognized Environmental Conditions (RECs) documented below in **Table 1**, that may adversely affect the demolition and reconstruction of the proposed Project.

Table 1: Corridor Sites Determined to Contain RECs

Property Name	Location	RECs	Regulatory Database(s)
Randolph Park / Frankie Carter Randolph	5100 FM 2351	Active LPST cleanup, groundwater impacted, and pending Final Site Closure Report, due to the TCEQ on December 20, 2022.	TIER 2, RDR, FINDS, LPST, UST, FINANCIAL ASSURANCE, CENTRAL REGISTRY
1.49 Jet Cleaners	3670 FM 528	Active GCC and associated VCP for remediation of TPH, SVOCS, chlorinated solvents, and metals.	EDR HIST CLEANER, VCP, GCC
Circle K 2741409 / Valero Energy Station and Corner Store	5091 FM 2351	High capacity of gasoline and diesel, and proximity of the three active USTs to the Project Corridor.	RDR, EDR HIST AUTO, PST STAGE 2
Corner Food Mart	3698 FM 528	High capacity of gasoline and diesel, and proximity of the	UST, FINANCIAL ASSURANCE, PST STAGE 2

Property Name	Location	RECs	Regulatory Database(s)
		three active USTs to the Project Corridor.	
Speedy Food Mart	3702 FM 528	Site history of a LPST and completed cleanup with final concurrence issued on February 15, 2017. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.	RDR, LPST, UST, FINANCIAL ASSURANCE, GCC
Smart Stop Food Mart 5103	5103 FM 2351	Site history of an LPST and completed cleanup with final concurrence issued on June 28, 2017. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.	RDR, LPST, UST, FINANCIAL ASSURANCE, GCC, PST STAGE 2

LPST = Leaking Petroleum Storage Tank
TCEQ = Texas Commission on Environmental Quality
TIER 2 = Facilities storing or manufacturing hazardous materials
RDR = Release Determination Report for the Petroleum Storage Tank Program
FINDS = Facility Index System
UST = Underground Storage Tank
FINANCIAL ASSURANCE = Financial Assurance Information Listing
CENTRAL REGISTRY = Central Registry database to identify regulated activities
EDR HIST CLEANER = Environmental Data Resources Historical Cleaners
VCP = Voluntary Cleanup Program
GCC = Groundwater Contamination Cases
EDR HIST AUTO = Environmental Data Resources Historical Gas Stations/establishments
PST STAGE 2 = Petroleum Storage Tank Stage II Vapor Recovery
SVOC = Semi-Volatile Organic Compound
TPH = Total Petroleum Hydrocarbons

2.0 Purpose and Scope of Work

The purpose of this Phase II ESA was to assess soil conditions within the City's roadway jurisdiction by obtaining samples for analytical testing to determine material characteristics and baseline conditions to help the City understand their management requirements for the intended Project. The scope of the Phase II ESA consisted of soil sampling, collection, and lab analysis (completed by Eurofins Environment Testing [Eurofins]) to determine the presence of impacted materials within the proposed improvement where soil will be disturbed due to Project activities.

3.0 Soil Investigation

On February 24, 2023, HDR directed the advancement of five soil boring locations with field ID SS1, SS2, SS3, SS4, and SS5. The soil investigation was to determine to what magnitude historic use or potential releases may have impacted soil within or adjacent to the City's right-of-way (ROW). The soil boring locations were selected based on information reviewed during the completion of the Phase I ESA and geophysical investigation and groundwater flow is assumed

to be to the southwest towards Clear Creek within the Project Corridor (**Appendix A, Figure 2-1,** and **Figure 2-2**). SS1 and SS2 were placed at the northern end of the Project Corridor near the intersection of Blackhawk Boulevard and FM 2351. SS3, SS4, and SS5 were placed at the southern end of the Project Corridor near the intersection of Blackhawk Boulevard and FM 528. No additional samples were collected due to the presence of utility lines.

Prior to drilling activities, Texas 811 locate requests by HDR and Braun Intertec (drilling subcontractor company) were completed no less than 48 hours prior to sampling to identify utilities within the Project Corridor. SS1 through SS4 were advanced to a depth of 10 feet below ground surface (bgs) at two sites. SS5 encountered refusal at approximately 8 feet bgs. HDR agreed with Braun Intertec to stop drilling operations at 8 feet bgs. Representative engineers from the City were also on site during the time of this encounter and supported the decision to terminate drilling to avoid damage to a potential unlabeled or unmarked water line.

SS1 was located within a vegetated media located west and adjacent to the northern end of the Project Corridor. This location was favorable because it was immediately adjacent to Smart Stop Food Mart 5103, downgradient of Randolph Park / Frankie Carter Randolph, and across Circle K 2741409 / Valero Energy Station and Corner Store.

SS2 was located within a vegetated media located in the center of the northern end of the Project Corridor. This location was favorable because it was in the middle of the Project Corridor, downgradient of Randolph Park / Frankie Carter Randolph, and southwest of Circle K 2741409 / Valero Energy Station and Corner Store. Any ground contamination could be identified at this site as groundwater flow is assumed to be to the southwest towards Clear Creek.

SS3 was located within a vegetated media located west and adjacent to the southern end of the Project Corridor. While this location was further north from Corner Food Mart, and 1.49 Jet Cleaners due to various utility lines, the location was favorable because it was immediately adjacent to Speedy Food Mart.

SS4 was located within a vegetated media located in the center of the southern end of the Project Corridor. This location was further west from Corner Food Mart, and 1.49 Jet Cleaners due to various utility lines identified on site. The location was still favorable because it was downgradient of Speedy Food Mart and across Corner Food Mart, and 1.49 Jet Cleaners.

SS5 was located within the same vegetated media SS4 was placed. This location was favorable because it was in the middle of the Project Corridor, and downgradient and southwest of Corner Food Mart, 1.49 Jet Cleaners, and Speedy Food Mart. Any ground contamination could be identified at this site as groundwater flow is assumed to be to the southwest towards Clear Creek.

Soil boring samples were collected from a depth interval between 0 to 10 feet using a direct push drill rig to advance a one-inch outside diameter nylon tube attached to an expendable point holder. Soil boring samples were also collected from the depth interval that exhibits the highest Photo Ionization Detector (PID) reading and/or other indications of contamination including odors, staining and sheens. Soil boring locations were based on field observation and future intended design of the property. All soil boring samples collected received the following lab analyses:

- Volatile Organic Compounds (VOCs);
- Semi-volatile Organic Compounds (SVOCs) / Polycyclic aromatic hydrocarbons (PAH);
- Total Petroleum Hydrocarbon (TPH);
  RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver);
- Polychlorinated Biphenyls (PCBs); and
- pH.

Each soil boring sample was properly containerized, preserved (as required) and stored on ice in coolers for laboratory analysis. At the end of the sampling day, coolers containing collected samples were dropped off at a designated laboratory for analysis. Soil encountered was mostly lean clay, sandy clay, and mixed caliche/fill.

SS1, SS2 and SS3 contained rock inclusions at depths of 6 to 10 inches bgs. SS4 contained rock inclusions at depths 1.5 to 4 inches bgs. SS5 contained rock inclusions from 4 to 8 inches bgs. Saturated soil conditions were not encountered during the field investigation. A list of sample collection depths and PID readings for each sample location is provided in **Table 2**, below. Representative photos for each sample location are provided in **Appendix B.** Boring logs are provided in **Appendix C**.

Table 2. Soil Boring Sample Collection Sites and Depths

Soil Boring Location	Field ID	Sample Depth (ft)	PID value (ppm)
FM 2351	SS1	6-8	9.5
	SS2	2-4	10.9
FM 528	SS3	2-4	10.8
	SS4	2-4	10.6
	SS5	1.5-2 & 2-4	12.7 &10.7

3.1 TCEQ TRRP Tier I PCL Evaluation

Soil boring sample results were compared to the March 2023 Texas Risk Reduction Program (TRRP) Tier I Protective Concentration Limits (PCLs) for soil remediation to determine when and where a response action is necessary (TCEQ, 2023a). For the purposes of this investigation, HDR utilized the specific median background concentrations (TCEQ, 2023b) or PCLs whichever holds the lowest value for maximum allowable concentration (MAC) for each chemical of concern (COC) in uncontaminated soil. This is defined as the lowest Tier 1 chemical-specific soil value of the exposure routes for residential and construction worker receptors set forth in the Texas Administrative Code Tile 30 Part 1 Chapter 350.

During the field investigation, HDR compared the analytical results from the collected soil boring samples against each analyte's appropriate TRRP Tier I PCL. Most of the analyte concentration levels (e.g., VOCs, PCBs, TPH, SVOCs) across all soil sample locations within the Project Corridor were not detected above the laboratory method detection limit (MDL). Some analytes

were detected at trace concentration levels, such as above the laboratory's MDL, but below Reporting Limits (RL). These analytes are represented in **Table 3** with the J (estimated) value. Detected COCs consisted of metals and VOCs. In all instances, reported COC concentrations were below their respective Tier 1 Residential Total Soil Combined PCLs. The complete Eurofins laboratory report is provided in **Appendix D**.

Metals were also compared to their respective TCEQ Median Background Concentrations, or those concentrations that are generally considered to be expected within the existing local environment. The following list of metals were found to exceed these concentrations within certain soil boring locations:

- Arsenic exceeded the 5.9 mg/kg median background concentration at SS1, with the reported range of arsenic concentrations at 5.91 mg/kg. Arsenic results did not exceed the Tier 1 Residential Soil Combined PCLs[1] - 0.5-acre source area (Tier 1 PCL) for arsenic of 24 mg/kg.

A summary of analytes detected above the laboratory MDL is provided below in **Table 3**.

[1] PCL – Protective Concentration Level. Combined soil PCLs for inhalation, ingestion, dermal, and vegetable consumption exposure pathways. PCL table last updated March 2023.

Table 3. Blackhawk Boulevard Reconstruction - Soil Boring Sample Results (mg/kg)[1]

Category/Analyte	*PCLs Total Soil Comb[2]	Texas Mean Background	SS1 (6-8) Result[3]	SS2 (2-4) Result[3]	SS3 (2-4) Result[3]	SS4 (2-4) Result[3]	SS5 (1.5-4) Result[3]
Metals							
Arsenic	24	5.9	***5.91***[4]	1.77	1.22 J	1.46 J	U
Barium	8100	300	102	120	37.8	34.7	77
Cadmium	52	N/A	0.25 J	U	U	U	U
Chromium	33000	30	15.2	12.1	6.27	4.3	5.51
Lead	500	15	7.69	7.23	6.44	9.38	10.4
VOCs							
Toluene	5900	N/A	0.00297 J	0.00251 J	U	U	U
General Chemistry							
pH	N/A	N/A	8.1 HF	7.9 HF	7.9 HF	8.3 HF	8.1 HF
Temperature	N/A	N/A	21 HF	21 HF	20.9 HF	21 HF	21.1 HF
Corrosivity	N/A	N/A	8.1 HF	7.9 HF	7.9 HF	8.3 HF	8.1 HF

Notes:

1. Table shows only analyte concentrations that exceed the MDL
2. Combined includes inhalation; ingestion; dermal; vegetable consumption pathways
3. J=Estimated Value; HF=Field parameter with a holding time of 15 minutes; U=Undetected; N/A= Not Applicable.
4. Value above the Texas Mean Background Concentration

*PCLs: Protective Concentration Limits (mg/kg) from Tier 1 Residential Soil, 0.5-acre source area, last revised March 2023.

4.0 Analytical Data Quality Control Procedures

The purpose of this Phase II ESA was to determine the presence or absence, and the magnitude of environmental impact at the site. Eurofins followed their internal Quality Assurance/Quality Control (QA/QC) and validation procedures. The laboratory provided a Level II data deliverable for all data generated during this investigation. In addition, an internal QA/QC check was completed by HDR on each analytical laboratory data package. This QA/QC check included a general systematic review of the data deliverable. The items/qualifiers in the QA/QC check included:

- Holding times did not expire prior to analysis.
- Samples contained the correct nomenclature.
- Matrix spike exceedance beyond control limits for two samples during Method 8260C.
- Methods 6010B, 6010C, 6010D, and 8270E: The matrix spike/matrix spike duplicate (MS/MSD) recoveries and precision for preparation were outside control limits. Sample matrix interferences are suspected. However, the associated laboratory control sample (LCS) met acceptance criteria.
- For some analytes at certain sample location qualifiers are provided; however, these qualifiers do not affect the determinations in this report.
- Correct analytical methods were used; and
- The reporting limits for soil samples were below the applicable TCEQ TRRP Tier I PCL concentrations.

The QA/QC check found the data to be satisfactory with only minor deficiencies and are useable for the purpose intended.

5.0 Conclusions

HDR collected five soil boring samples at two sites. Three soil boring samples were collected primarily within the 2-to-4-foot bgs range due to higher PID readings at these depths. The remaining soil boring samples were collected within the 1.5-to-4-foot bgs and 6-to-8-foot bgs. Concentration levels of arsenic in SS1 exceeded the TCEQ Median Background Concentrations, but levels remained below the TRRP Tier I PCL. Remaining targeted analytes, such as VOCs, PCBs, TPH, SVOCs, evaluated for this Phase II ESA report were below their respective TRRP Tier 1 PCL concentrations. Therefore, it was determined that the concentrations are below residential action levels and no TCEQ notification or reporting is required.

The elevated concentrations of some COCs above the TCEQs median background concentrations could be related to historical uses. HDR recommends a soil management plan and health and safety plan be completed. Each plan directs construction personnel on the known risks and provides guidance on proper management of soil disposal as required. The soil management plan can be supporting documentation to bid specifications along with this Phase II ESA report. These plans can also help constructors develop an appropriate health and safety plan for construction.

6.0 Limitations

This report is based upon the application of scientific principles and professional judgment to certain facts with resultant subjective interpretations. Professional judgments express herein are based on the current available facts within the limits of the existing data, scope of work, budget, and schedule.

The services provided by HDR during this project have been rendered in a manner consistent with the level of skill and care ordinarily exercised by member of the profession currently practicing under similar conditions. It is HDR's intent that the conclusions and recommendations stated herein are intended as guidance and not necessarily as a firm course of action, except where explicitly stated as such. The findings and conclusions presented herein apply to the environmental conditions existing at the time HDR's services were conducted.

6.1 Special Terms and Conditions

HDR gathered and/or prepared this report and all field data, notes, and laboratory test data in accordance with the agreed-upon scope of work as defined in HDR's proposal and generally accepted engineering and scientific practices in effect at the time of HDR's investigation of the sample sites.

The statements, conclusions and opinions contained in this report are intended to give approximations of the environmental conditions of the property with respect to the environmental issues actually targeted by HDR's investigation, as agreed upon by the City and HDR.

6.1 User Reliance

This report was prepared for the sole and exclusive benefit and use of the City. Notwithstanding delivery of this report by HDR or Clients to any third party, any copy of this report provided to a third party is provided for informational purposes only without the right to rely. Reliance on this report by any other person(s) or entity(ies) is strictly at their own risk, and HDR makes no warranties to person(s) or entity(ies), other than to the City for whose use the information is provided in this report. If other person(s) or entity(ies) wish to rely upon this report (i.e., lenders, mortgagers, insurance companies, or other parties to a transaction), HDR will require that such parties agree in writing to HDR's standard contractual terms.

7.0 References

HDR. 2023. Blackhawk Boulevard Reconstruction. Phase I Environmental Site Assessment (Phase I ESA). Unpublished.

Texas Commission on Environmental Quality (TCEQ). 2023. TCEQ Regulatory Guidance RG-366/TRRP-23: Tier 1 PCL Tables. Online at https://www.tceq.texas.gov/downloads/remediation/trrp/march-2023-pcl-tables.pdf. Accessed on March 19, 2023.

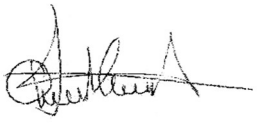
_____TCEQ. 2023b. TRRP Texas Background Concentrations. Online at https://www.tceq.texas.gov/downloads/remediation/trrp/background.pdf. Accessed on March 17, 2023.

8.0 Qualifications of Environmental Professionals

Signatures and Qualifications

We declare that, to the best of our professional knowledge and belief, we meet the definition of environmental professional as defined in Section 312.10 of 40 Code of Federal Regulations [C.F.R.] Part 312.

We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property. We have developed and performed the all appropriate inquires in conformance with standards and practices set forth in 40 CFR Part 312.



Phase II ESA Report Developer
Angie Quiroga Torres
Environmental Scientist

Quality Control / Quality Assurance
Todd Wilson, CHMM
Chemist, Environmental Professional

Qualifications of Environmental Professionals

This Phase II ESA was performed by the following HDR personnel:

Ms. Angie Quiroga Torres performed fieldwork and served as the preparer of this Phase II ESA. Ms. Quiroga Torres has over 1 year of experience in the assessment and remediation of impacted properties and compliance with environmental regulations. She has a BS in Biology from the University of Missouri and a MS in Environmental Sciences from the University of Illinois. Ms. Quiroga Torres has assisted other ESAs investigations and has completed HDR's required Phase I ESA Best Practices training course.

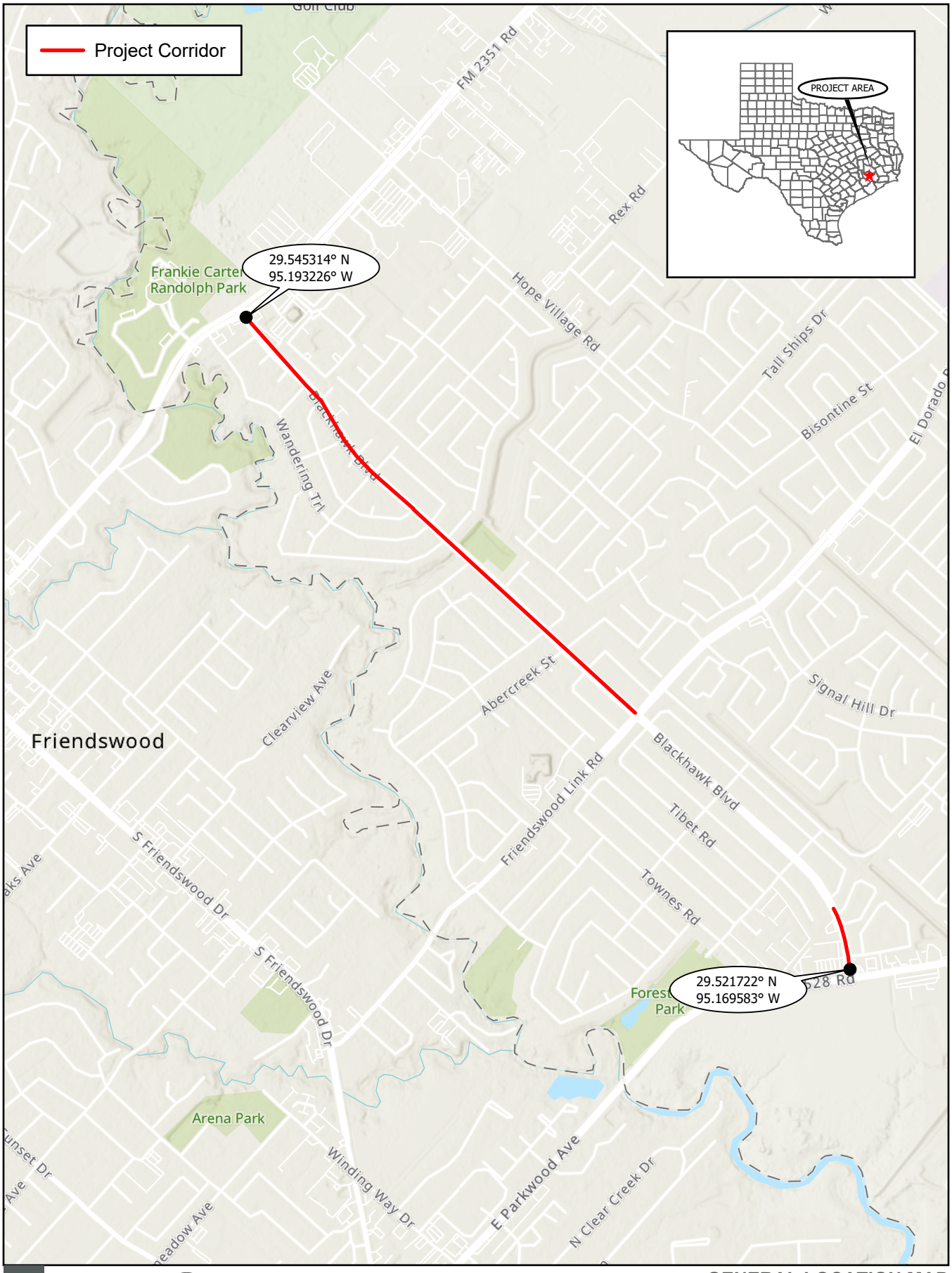
Mr. Michael Bell performed fieldwork for this project. Mr. Bell has significant work experience with both public and private sector clients throughout the U.S. and well versed in the requirements of the ASTM E 1527 series of standards. He has a B.S. and M.S. in Marine Biology from Texas A&M University, Galveston. Mr. Bell specializes in environmental permitting and delineation of Waters of the U.S., including wetlands, as well as the performance of environmental baseline and impact studies.

Quality Assurance / Quality Control was performed by the following HDR Personnel:

Mr. Todd Wilson, CHMM and Chemist, served as HDR's qualified signatory Environmental Professional (EP) for this project, as defined by ASTM Practice E 1527-21. Mr. Wilson has more than 30 years of experience in the assessment and remediation of affected properties and compliance with environmental regulations. He has a M.S. in Pharmaceutical Science from the University Nebraska Medical Center and a B.S. in Chemistry from the University of Nebraska-Lincoln. He is a Certified Hazardous Materials Manager (#16371). His experience covers the assessment of agricultural land from multigenerational industrial properties to large Superfund Sites. He is knowledgeable of federal, state, and local environmental regulations and standards.

A

Figures



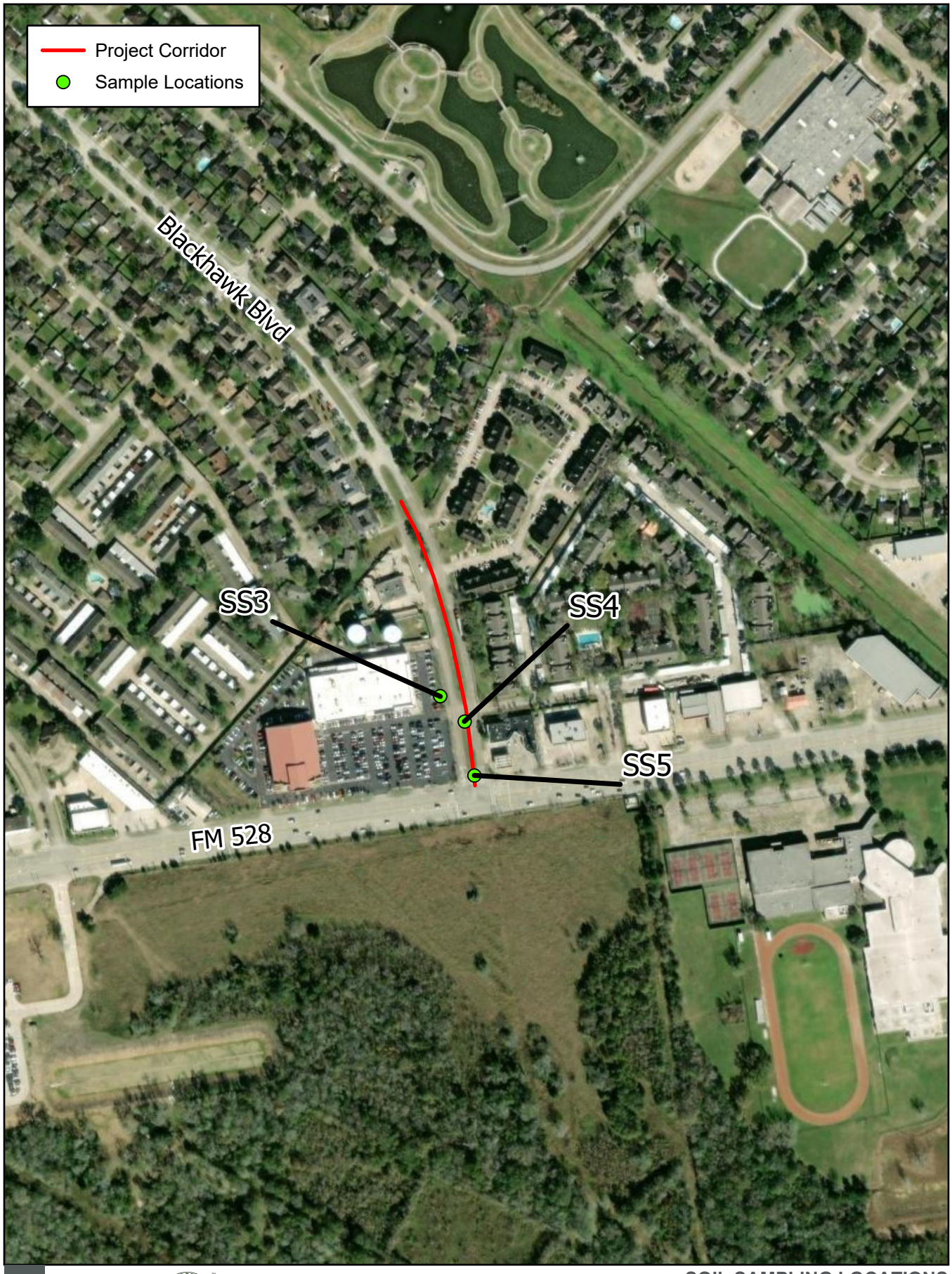
GENERAL LOCATION MAP
BLACKHAWK BOULEVARD PHASE II ESA
FIGURE 1

Y:\10357152_10191_BLACKHAWK_BLVD_RECONSTRUCTION\7.2_WIP\MAP_DOCS\ESA\ESA2.APRX DATE: 3/17/2023

0 220 FEET

SOIL SAMPLING LOCATIONS
BLACKHAWK BOULEVARD PHASE II ESA
FIGURE 2-1

Y:\10357152_10191_BLACKHAWK_BLVD_RECONSTRUCTION\7.2_WIP\MAP_DOCS\ESA\ESA2.APRX DATE: 3/28/2023



SOIL SAMPLING LOCATIONS
BLACKHAWK BOULEVARD PHASE II ESA
FIGURE 2-2

Y:\10357152_10191_BLACKHAWK_BLVD_RECONSTRUCTION\7.2_WIP\MAP_DOCS\ESA\ESA2.APRX DATE: 3/28/2023

B

Representative Photos

Representative Photo Log

Blackhawk Boulevard Reconstruction – Friendswood, Harris County, Texas

February 24, 2023

Photo 1 – Representative photo of direct push drill rig at SS1. SS1 was collected within the ROW near the intersection of Blackhawk Boulevard and FM 2351. SS1 was adjacent to Smart Stop Food Mart and downgradient from Randolph Park and Circle K/Valero Station. Photo taken to the southwest.

Photo 2 – Photo of SS1. Photo taken to the west.

Photo 3 – Photo of utility lines within vegetated median adjacent and west of Circle K 2741409 / Valero Energy Station and Corner Store, located at 5091 FM 2351. Photo taken to the north.

Photo 4 – Photo of direct push drill rig at SS2. SS2 was collected within vegetated median north of Wedgewood Village sign. Photo taken to the south.

Photo 5 – Photo of SS3. Photo taken to the west.

Photo 6 – Photo of SS4 within vegetated median. Photo taken to the east.

Photo 7 – Photo view at SS5. Photo taken to the north.

Photo 8 – Photo of SS5. Photo taken to the southwest.

C

Boring Logs

Project: Blackhawk Boulevard Reconstruction Phase II Package B and C	Project Number: 10357152	Client: City of Friendswood	HDR
Location: Blackhawk Blvd, Friendswood TX		Drilling Contractor: Braun Intertec	Boring No. SS1
Logged By: M. Bell	Date Started: 9:45 2/24/2023	Bit Type:	Type: Direct Push Drilling
Sampler(s): M. Bell, A. Torres	Date Completed: 10:10 2/24/2023	Hammer Type:	Diameter: 1"
	Groundwater Depth: N/A	29.5452536, -95.1933417	Total Depth of Boring: 10'

Depth (feet)	Sample Type	Sample Number	Recovery %	Graphic Log	Lithology Soil/Rock Description	PID	Moisture Content	Groundwater
	Soil	SS1(0-2)			Void	N/A	N/A	
2	Soil	SS1(2-4)	100%		Fill/Sandy clay Organic Material 10YR: 5/1, 7/2 Redox: 10YR 5/6 Rock/Caliche inclusions	6.5	Dry	
4	Soil	SS1(4-6)	100%		Clay 10YR: 3/2, 4/1 Redox: 10YR 5/6	8.7	10%	
6	Soil	SS1(6-8)	100%		Clay/ 6.5-7 ft Caliche inclusions 10YR: 5/2, 7/2, 8/1 Redox: 6/6	9.5	10%	
8	Soil	SS1(8-10)	100%		Clay/Rock Gravel inclusions 10YR 6/1 Redox: 10YR 5/6	7.9	10%	
10	Soil	SS1(10-12)						

Project: Blackhawk Boulevard Reconstruction Phase II Package B and C	Project Number: 10357152	Client: City of Friendswood	
Location: Blackhawk Blvd, Friendswood TX		Drilling Contractor: Braun Intertec	Boring No. SS2
Logged By: M. Bell	Date Started: 10:45 2/24/2023	Bit Type:	Type: Direct Push Drilling
Sampler(s): M. Bell, A. Torres	Date Completed: 11:00 2/24/2023	Hammer Type:	Diameter: 1"
	Groundwater Depth: N/A	29.5451582, -95.1931452	Total Depth of Boring: 10'

Depth (feet)	Sample Type	Sample Number	Recovery %	Graphic Log	Lithology Soil/Rock Description	PID	Moisture Content	Groundwater
	Soil	SS2(0-2)			Void	N/A	N/A	
2	Soil	SS2(2-4)	100%		Clay 10YR 3/2	10.9	5%	
4	Soil	SS2(4-6)	100%		Clay 10YR 4/2 5% 10YR 6/1	9.5	5%	
6	Soil	SS2(6-8)	100%		Rock fill at 6.5 ft Clay and small rock inclusion 10YR: 5/1, 5/2, 5/4, 3/1, 8/1	8.8	5%	
8	Soil	SS2(8-10)	100%		Clay/Rock gravel inclusions 7.5YR 4/6 10YR 5/3, 8/6,8/1	6.6	5%	
10	Soil	SS2(10-12)						

Project: Blackhawk Boulevard Reconstruction Phase II Package B and C	Project Number: 10357152	Client: City of Friendswood	
Location: Blackhawk Blvd, Friendswood TX		Drilling Contractor: Braun Intertec	Boring No. SS3
Logged By: M. Bell	Date Started: 12:30 2/24/2023	Bit Type:	Type: Direct Push Drilling
Sampler(s): M. Bell, A. Torres	Date Completed: 12:55 2/24/2023	Hammer Type:	Diameter: 1"
	Groundwater Depth: N/A	29.522352, -95.169878	Total Depth of Boring: 10'

Depth (feet)	Sample Type	Sample Number	Recovery %	Graphic Log	Lithology Soil/Rock Description	PID	Moisture Content	Groundwater
2	Soil	SS3(0-2)	100%		Clay 10YR: 4/1 Redox: 10YR 5/6	9	10%	
		SS392-4)	100%		Clay 10YR: 4/1 Redox: 10YR 4/6	10.8	5%	
4	Soil	SS3(4-6)	100%		Clay 4 to 5' 10YR: 4/1, Redox 10YR 4/6 5-6' 10YR: 3/2, 6/1	10.1	5%	
6		SS3(6-8)	100%		Clay/ Rock fill 10YR:7/2, 6/3, 8/2 Redox: 10YR 8/8	7.9	Dry	
8	Soil	SS3(8-10)	100%		Clay and small rock inclusion Gley 7/10Y, 10YR 6/6	6.1	Dry	
10		SS3(10-12)						

Project: Blackhawk Boulevard Reconstruction Phase II Package B and C	Project Number: 10357152	Client: City of Friendswood	
Location: Blackhawk Blvd, Friendswood TX		Drilling Contractor: Braun Intertec	Boring No. SS4
Logged By: M. Bell	Date Started: 13:00 2/24/2023	Bit Type:	Type: Direct Push Drilling
Sampler(s): M. Bell, A. Torres	Date Completed: 13:15 2/24/2023	Hammer Type:	Diameter: 1"
	Groundwater Depth: N/A	29.522141, -95.16966	Total Depth of Boring: 10'

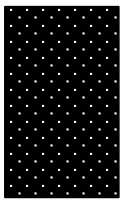
Depth (feet)	Sample Type	Sample Number	Recovery %	Graphic Log	Lithology Soil/Rock Description	PID	Moisture Content	Groundwater
2	Soil	SS4(0-2)	25%		0 to 1.5': Void Mixed caliche/sand/clay 10YR 3/3	9.8	2%	
		SS4(2-4)	100%		Mixed caliche/sand/clay 10YR 3/3	10.6	5%	
4	Soil	SS4(4-6)	100%		Clay 10YR: 3/3 Redox: 10YR 5/5	9.9	2%	
6		SS4(6-8)	100%		Clay 10YR: 4/2 Redox: 10YR 6/8	9.9	2%	
8	Soil	SS4(8-10)	100%		Clay 10YR: 4/2, 5/6 Redox: 10YR 6/6	7.2	10%	
10		SS4(10-12)						

Project: Blackhawk Boulevard Reconstruction Phase II Package B and C	Project Number: 10357152	Client: City of Friendswood	
Location: Blackhawk Blvd, Friendswood TX		Drilling Contractor: Braun Intertec	Boring No. SS5
Logged By: M. Bell	Date Started: 13:55 2/24/2023	Bit Type:	Type: Direct Push Drilling
Sampler(s): M. Bell, A. Torres	Date Completed: 14:15 2/24/2023	Hammer Type:	Diameter: 1"
	Groundwater Depth: N/A	29.521704, -95.169587	Total Depth of Boring: 10'

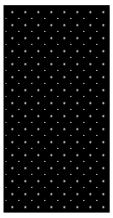
Depth (feet)	Sample Type	Sample Number	Recovery %	Graphic Log	Lithology Soil/Rock Description	PID	Moisture Content	Groundwater
2	Soil	SS5(0-2)	30%		Sandy Clay 10YR: 3/2, 7/1	12.7	5%	
		SS5(2-4)	100%		Sandy Clay/Clay 10YR: 4/2 10YR: 6/2 Redox: 10YR: 4/6 10YR: 5/4	10.7	2%	
4								
	Soil	SS5(4-6)	100%		Clay/Minor Rock Inclusion 10YR: 4/2, 7/2 10YR: 3/2 Redox: 7.5YR 3/4	8.9	2%	
6		SS5(6-8)	100%		Clay/Minor Rock Inclusion 10YR: 4/2, 7/2 10YR: 3/2 Redox: 7.5YR 3/4	7.2	2%	
8	Soil	SS5(8-10)			Refusal at 8 ft			
10		SS5(10-12)						

Log Key

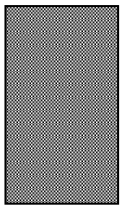
Rock/Pea Gravel Inclusions



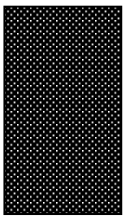
Rock/Fill



Sandy Clay



Mixed caliche/sand/clay



Clay

D

Laboratory Results

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: Kelsea D Hiebert
HDR Inc
555 N. Carancahua
Suite 1600
Corpus Christi, Texas 78401

Generated 3/10/2023 11:00:03 AM

JOB DESCRIPTION

City of Friendswood Blackhawk Blvd.

JOB NUMBER

860-43843-1

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477

See page two for job notes and contact information.

my EOL

Job Notes

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization

Generated
3/10/2023 11:00:03 AM

Authorized for release by
Lindy Maingot, Project Manager I
Lindy.Maingot@et.eurofinsus.com
(210)344-9751

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Definitions/Glossary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

GC/MS VOA TICs

Qualifier	Qualifier Description
J	Indicates an Estimated Value for TICs
T	Result is a tentatively identified compound (TIC) and an estimated value.

GC/MS Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

GC Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 860-43843-1

Laboratory: Eurofins Houston

Narrative

Job Narrative
860-43843-1

Comments
No additional comments.

Receipt
The samples were received on 2/24/2023 4:25 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 9.5º C.

Receipt Exceptions
A trip blank was submitted for analysis with these samples; however, it was not listed on the Chain of Custody (COC). The client was contacted about this on 02-27-23. The client said that they do not need to run this sample.

GC/MS VOA
Method 8260C: The matrix spike (MS) recoveries for preparation batch 860-91867 and analytical batch 860-91817 were outside control limits. Sample matrix interference is suspected.

Method 8260C: The large number of analytes included in the continuing calibration verification (CCV) gives a high probability that one or more analytes will be outside acceptance criteria. As indicated in the reference method, analysis may proceed as long as no more than 20% of the analytes of interest are outside the method-defined %D criteria for Bromoform (-20.3%), Carbon disulfide (-20.6%), Chloroethane (26.5%), Cyclohexanone (103.4%) and Methyl acetate (-25.1%) for batch 91817.

Method 8260C: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for analytical batch 860-91817 recovered outside control limits for the following analytes: Vinyl acetate. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method 8260C: Sample is a bulk jar.

(880-25165-B-1-B) and (880-25165-B-1-A MS)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC/MS Semi VOA
Method 8270E: The matrix spike / matrix spike duplicate (MS/MSD) recoveries and precision for preparation batch 860-91765 and analytical batch 860-91784 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample / laboratory sample control duplicate (LCS/LCSD) precision was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method TX_1005_S_Prep: sample >10g

SS1 (6-8) (860-43843-1), SS2 (2-4) (860-43843-2), SS3 (2-4) (860-43843-3), SS4 (2-4) (860-43843-4) and SS5 (1.5-4) (860-43843-5)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
Methods 6010B, 6010C, 6010D: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 860-91834 and analytical batch 860-91979 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry

Job ID: 860-43843-1 (Continued)

Laboratory: Eurofins Houston (Continued)

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS1 (6-8) — Lab Sample ID: 860-43843-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Toluene	0.00297	J	0.00369	0.00141	mg/Kg	1		8260C	Total/NA
Arsenic	5.91		1.39	1.15	mg/Kg	1		6010D	Total/NA
Barium	102		0.926	0.110	mg/Kg	1		6010D	Total/NA
Cadmium	0.250	J	0.926	0.221	mg/Kg	1		6010D	Total/NA
Chromium	15.2		0.926	0.480	mg/Kg	1		6010D	Total/NA
Lead	7.69		0.926	0.453	mg/Kg	1		6010D	Total/NA
pH	8.1	HF			SU	1		9045D	Soluble
Temperature	21.0	HF			Deg. C	1		9045D	Soluble
Corrosivity	8.1	HF			SU	1		9045D	Soluble

Client Sample ID: SS2 (2-4) — Lab Sample ID: 860-43843-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Toluene	0.00251	J	0.00420	0.00161	mg/Kg	1		8260C	Total/NA
Arsenic	1.77		1.50	1.24	mg/Kg	1		6010D	Total/NA
Barium	120		1.00	0.118	mg/Kg	1		6010D	Total/NA
Chromium	12.1		1.00	0.519	mg/Kg	1		6010D	Total/NA
Lead	7.23		1.00	0.489	mg/Kg	1		6010D	Total/NA
pH	7.9	HF			SU	1		9045D	Soluble
Temperature	21.0	HF			Deg. C	1		9045D	Soluble
Corrosivity	7.9	HF			SU	1		9045D	Soluble

Client Sample ID: SS3 (2-4) — Lab Sample ID: 860-43843-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	1.22	J	1.39	1.15	mg/Kg	1		6010D	Total/NA
Barium	37.8		0.926	0.110	mg/Kg	1		6010D	Total/NA
Chromium	6.27		0.926	0.480	mg/Kg	1		6010D	Total/NA
Lead	6.44		0.926	0.453	mg/Kg	1		6010D	Total/NA
pH	7.9	HF			SU	1		9045D	Soluble
Temperature	20.9	HF			Deg. C	1		9045D	Soluble
Corrosivity	7.9	HF			SU	1		9045D	Soluble

Client Sample ID: SS4 (2-4) — Lab Sample ID: 860-43843-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	1.46		1.34	1.11	mg/Kg	1		6010D	Total/NA
Barium	34.7		0.893	0.106	mg/Kg	1		6010D	Total/NA
Chromium	4.30		0.893	0.463	mg/Kg	1		6010D	Total/NA
Lead	9.38		0.893	0.437	mg/Kg	1		6010D	Total/NA
pH	8.3	HF			SU	1		9045D	Soluble
Temperature	21.0	HF			Deg. C	1		9045D	Soluble
Corrosivity	8.3	HF			SU	1		9045D	Soluble

Client Sample ID: SS5 (1.5-4) — Lab Sample ID: 860-43843-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	77.0		0.962	0.114	mg/Kg	1		6010D	Total/NA
Chromium	5.51		0.962	0.499	mg/Kg	1		6010D	Total/NA
Lead	10.4		0.962	0.470	mg/Kg	1		6010D	Total/NA
pH	8.1	HF			SU	1		9045D	Soluble
Temperature	21.1	HF			Deg. C	1		9045D	Soluble
Corrosivity	8.1	HF			SU	1		9045D	Soluble

This Detection Summary does not include radiochemical test results.

Eurofins Houston

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS1 (6-8)
Lab Sample ID: 860-43843-1

Date Collected: 02/24/23 09:45
Matrix: Solid

Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0124	U	0.0739	0.0124	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Benzene	0.000541	U	0.000739	0.000541	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Bromochloromethane	0.00129	U	0.00369	0.00129	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Dichlorobromomethane	0.00132	U	0.00369	0.00132	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Bromoform	0.00163	U	0.00369	0.00163	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Bromomethane	0.00179	U	0.00369	0.00179	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Methyl tert-butyl ether	0.00146	U	0.00369	0.00146	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
2-Butanone (MEK)	0.00415	U	0.0369	0.00415	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Carbon disulfide	0.00148	U	0.00369	0.00148	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Carbon tetrachloride	0.00134	U	0.00369	0.00134	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Chlorobenzene	0.00109	U	0.00369	0.00109	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Chloroethane	0.00118	U	0.00739	0.00118	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Chloroform	0.00126	U	0.00369	0.00126	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Chloromethane	0.00211	U	0.00369	0.00211	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Cyclohexane	0.00142	U	0.00369	0.00142	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Chlorodibromomethane	0.00135	U	0.00369	0.00135	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Ethylene Dibromide	0.00120	U	0.00369	0.00120	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,2-Dibromo-3-Chloropropane	0.00234	U	0.00369	0.00234	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,2-Dichlorobenzene	0.00107	U	0.00369	0.00107	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,3-Dichlorobenzene	0.00107	U	0.00369	0.00107	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,4-Dichlorobenzene	0.00106	U	0.00369	0.00106	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Dichlorodifluoromethane	0.00221	U	0.00369	0.00221	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,1-Dichloroethane	0.00121	U	0.00369	0.00121	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,2-Dichloroethane	0.00141	U	0.00369	0.00141	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,1-Dichloroethene	0.00131	U	0.00369	0.00131	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
cis-1,2-Dichloroethene	0.00110	U	0.00369	0.00110	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
trans-1,2-Dichloroethene	0.00117	U	0.00369	0.00117	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,2-Dichloropropane	0.00125	U	0.00369	0.00125	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
cis-1,3-Dichloropropene	0.00121	U	0.00369	0.00121	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
trans-1,3-Dichloropropene	0.00123	U	0.00369	0.00123	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Ethylbenzene	0.000491	U	0.000739	0.000491	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
2-Hexanone	0.00560	U	0.0369	0.00560	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Isopropylbenzene	0.00124	U	0.00369	0.00124	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Methylene Chloride	0.00920	U	0.0148	0.00920	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
4-Methyl-2-pentanone (MIBK)	0.00533	U	0.0369	0.00533	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Styrene	0.00110	U	0.00369	0.00110	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,1,2,2-Tetrachloroethane	0.000121	U	0.00369	0.000121	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Tetrachloroethene	0.00120	U	0.00369	0.00120	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Toluene	**0.00297**	**J**	0.00369	0.00141	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,2,4-Trichlorobenzene	0.00148	U	0.00369	0.00148	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,1,1-Trichloroethane	0.00124	U	0.00369	0.00124	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,1,2-Trichloroethane	0.00120	U	0.00369	0.00120	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Trichloroethene	0.00140	U	0.00369	0.00140	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.00123	U	0.00739	0.00123	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Vinyl acetate	0.00303	U *+	0.00739	0.00303	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Vinyl chloride	0.00136	U	0.00369	0.00136	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
Xylenes, Total	0.000665	U	0.00148	0.000665	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
o-Xylene	0.000665	U	0.000739	0.000665	mg/Kg		02/24/23 19:08	02/27/23 20:21	1
m-Xylene & p-Xylene	0.000591	U	0.00148	0.000591	mg/Kg		02/24/23 19:08	02/27/23 20:21	1

Client Sample ID: SS1 (6-8)
Lab Sample ID: 860-43843-1
Date Collected: 02/24/23 09:45
Matrix: Solid
Date Received: 02/24/23 16:25

Tentatively Identified Compound	Est. Result	Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Unknown	0.163	T J	mg/Kg		1.00	N/A	02/24/23 19:08	02/27/23 20:21	1
Unknown	0.00437	T J	mg/Kg		1.31	N/A	02/24/23 19:08	02/27/23 20:21	1
Ethylene oxide	0.0447		mg/Kg		1.39	75-21-8	02/24/23 19:08	02/27/23 20:21	1
Unknown	0.00496	T J	mg/Kg		2.60	N/A	02/24/23 19:08	02/27/23 20:21	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Dibromofluoromethane (Surr)	100		53 - 142	02/24/23 19:08	02/27/23 20:21	1
Toluene-d8 (Surr)	95		70 - 130	02/24/23 19:08	02/27/23 20:21	1
4-Bromofluorobenzene (Surr)	102		68 - 152	02/24/23 19:08	02/27/23 20:21	1
1,2-Dichloroethane-d4 (Surr)	89		56 - 150	02/24/23 19:08	02/27/23 20:21	1

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
1,2-Dichlorobenzene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
1,3-Dichlorobenzene	0.0139	U	0.166	0.0139	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
1,4-Dichlorobenzene	0.0150	U	0.166	0.0150	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,4,5-Trichlorophenol	0.0190	U	0.166	0.0190	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,4,6-Trichlorophenol	0.0157	U	0.166	0.0157	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,4-Dichlorophenol	0.0174	U	0.166	0.0174	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,4-Dimethylphenol	0.0164	U	0.166	0.0164	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,4-Dinitrophenol	0.0242	U	0.333	0.0242	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,4-Dinitrotoluene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2,6-Dinitrotoluene	0.0233	U	0.166	0.0233	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2-Chloronaphthalene	0.0290	U	0.166	0.0290	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2-Chlorophenol	0.0158	U	0.166	0.0158	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2-Methylnaphthalene	0.0451	U	0.166	0.0451	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2-Nitroaniline	0.0156	U	0.333	0.0156	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2-Nitrophenol	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
2-Methylphenol	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
3 & 4 Methylphenol	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
3,3'-Dichlorobenzidine	0.0154	U	0.333	0.0154	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
3-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4,6-Dinitro-2-methylphenol	0.0127	U	0.333	0.0127	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4-Bromophenyl phenyl ether	0.0132	U	0.166	0.0132	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4-Chloroaniline	0.0126	U	0.333	0.0126	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4-Chlorophenyl phenyl ether	0.0162	U	0.166	0.0162	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4-Nitroaniline	0.0138	U	0.333	0.0138	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4-Nitrophenol	0.0258	U	0.333	0.0258	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
4-Chloro-3-methylphenol	0.0184	U	0.166	0.0184	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Acenaphthene	0.0155	U	0.166	0.0155	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Acenaphthylene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.333	0.0136	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Anthracene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Benzo[a]anthracene	0.0140	U	0.166	0.0140	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Benzo[a]pyrene	0.0172	U	0.166	0.0172	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Benzo[b]fluoranthene	0.0125	U	0.166	0.0125	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Benzo[g,h,i]perylene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Benzo[k]fluoranthene	0.0193	U	0.166	0.0193	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Benzoic acid	0.0349	U	0.998	0.0349	mg/Kg		02/27/23 06:34	02/27/23 15:45	1

Client Sample ID: SS1 (6-8)
Lab Sample ID: 860-43843-1
Date Collected: 02/24/23 09:45
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Butyl benzyl phthalate	0.0181	U	0.166	0.0181	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Chrysene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Dibenz(a,h)anthracene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Dibenzofuran	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Diethyl phthalate	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Dimethyl phthalate	0.0159	U	0.166	0.0159	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Fluoranthene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Fluorene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Hexachlorobenzene	0.0162	U	0.166	0.0162	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Hexachlorobutadiene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Hexachlorocyclopentadiene	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Hexachloroethane	0.0173	U	0.166	0.0173	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Indeno[1,2,3-cd]pyrene	0.0134	U	0.166	0.0134	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Isophorone	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
N-Nitrosodi-n-propylamine	0.0174	U	0.166	0.0174	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
N-Nitrosodiphenylamine	0.0186	U	0.166	0.0186	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Naphthalene	0.0156	U	0.166	0.0156	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Nitrobenzene	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Pentachlorophenol	0.0121	U	0.333	0.0121	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Phenanthrene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Phenol	0.0149	U	0.333	0.0149	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Pyrene	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Pyridine	0.0167	U	0.333	0.0167	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Bis(2-chloroethoxy)methane	0.0168	U	0.166	0.0168	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Bis(2-chloroethyl)ether	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
bis (2-chloroisopropyl) ether	0.0178	U	0.166	0.0178	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Bis(2-ethylhexyl) phthalate	0.166	U	0.333	0.166	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Di-n-butyl phthalate	0.0160	U	0.166	0.0160	mg/Kg		02/27/23 06:34	02/27/23 15:45	1
Di-n-octyl phthalate	0.0133	U	0.166	0.0133	mg/Kg		02/27/23 06:34	02/27/23 15:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*62*		*19 - 122*	*02/27/23 06:34*	*02/27/23 15:45*	*1*
2-Fluorobiphenyl (Surr)	*61*		*30 - 115*	*02/27/23 06:34*	*02/27/23 15:45*	*1*
2-Fluorophenol (Surr)	*57*		*25 - 121*	*02/27/23 06:34*	*02/27/23 15:45*	*1*
Nitrobenzene-d5 (Surr)	*58*		*23 - 129*	*02/27/23 06:34*	*02/27/23 15:45*	*1*
p-Terphenyl-d14 (Surr)	*62*		*18 - 137*	*02/27/23 06:34*	*02/27/23 15:45*	*1*
Phenol-d5 (Surr)	*55*		*24 - 113*	*02/27/23 06:34*	*02/27/23 15:45*	*1*

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	16.3	U	38.5	16.3	mg/Kg		03/02/23 13:48	03/02/23 19:49	1
>C12-C28 Range Hydrocarbons	16.3	U	38.5	16.3	mg/Kg		03/02/23 13:48	03/02/23 19:49	1
>C28-C35 Range Hydrocarbons	16.3	U	38.5	16.3	mg/Kg		03/02/23 13:48	03/02/23 19:49	1
Total Petroleum Hydrocarbons (C6-C35)	16.3	U	38.5	16.3	mg/Kg			03/01/23 12:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*100*		*70 - 130*	*03/02/23 13:48*	*03/02/23 19:49*	*1*
o-Terphenyl (Surr)	*117*		*70 - 130*	*03/02/23 13:48*	*03/02/23 19:49*	*1*

Client Sample ID: SS1 (6-8)
Lab Sample ID: 860-43843-1
Date Collected: 02/24/23 09:45
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.549	U	1.85	0.549	mg/Kg		02/27/23 11:47	02/27/23 18:17	1
Arsenic	**5.91**		1.39	1.15	mg/Kg		02/27/23 11:47	02/27/23 18:17	1
Barium	**102**		0.926	0.110	mg/Kg		02/27/23 11:47	02/27/23 18:17	1
Cadmium	**0.250**	**J**	0.926	0.221	mg/Kg		02/27/23 11:47	02/27/23 18:17	1
Chromium	**15.2**		0.926	0.480	mg/Kg		02/27/23 11:47	02/27/23 18:17	1
Lead	**7.69**		0.926	0.453	mg/Kg		02/27/23 11:47	02/27/23 18:17	1
Selenium	1.20	U	2.78	1.20	mg/Kg		02/27/23 11:47	02/27/23 18:17	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 9045D)	**8.1**	**HF**			SU			03/02/23 15:34	1
Temperature (SW846 9045D)	**21.0**	**HF**			Deg. C			03/02/23 15:34	1
Corrosivity (SW846 9045D)	**8.1**	**HF**			SU			03/02/23 15:34	1

Client Sample ID: SS2 (2-4)
Lab Sample ID: 860-43843-2
Date Collected: 02/24/23 10:40
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0141	U	0.0840	0.0141	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Benzene	0.000616	U	0.000840	0.000616	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Bromochloromethane	0.00147	U	0.00420	0.00147	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Dichlorobromomethane	0.00150	U	0.00420	0.00150	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Bromoform	0.00186	U	0.00420	0.00186	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Bromomethane	0.00204	U	0.00420	0.00204	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Methyl tert-butyl ether	0.00166	U	0.00420	0.00166	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
2-Butanone (MEK)	0.00472	U	0.0420	0.00472	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Carbon disulfide	0.00168	U	0.00420	0.00168	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Carbon tetrachloride	0.00152	U	0.00420	0.00152	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Chlorobenzene	0.00124	U	0.00420	0.00124	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Chloroethane	0.00134	U	0.00840	0.00134	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Chloroform	0.00143	U	0.00420	0.00143	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Chloromethane	0.00240	U	0.00420	0.00240	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Cyclohexane	0.00161	U	0.00420	0.00161	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Chlorodibromomethane	0.00153	U	0.00420	0.00153	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Ethylene Dibromide	0.00137	U	0.00420	0.00137	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,2-Dibromo-3-Chloropropane	0.00267	U	0.00420	0.00267	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,2-Dichlorobenzene	0.00122	U	0.00420	0.00122	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,3-Dichlorobenzene	0.00122	U	0.00420	0.00122	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,4-Dichlorobenzene	0.00121	U	0.00420	0.00121	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Dichlorodifluoromethane	0.00252	U	0.00420	0.00252	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,1-Dichloroethane	0.00137	U	0.00420	0.00137	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,2-Dichloroethane	0.00161	U	0.00420	0.00161	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,1-Dichloroethene	0.00149	U	0.00420	0.00149	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
cis-1,2-Dichloroethene	0.00125	U	0.00420	0.00125	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
trans-1,2-Dichloroethene	0.00133	U	0.00420	0.00133	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,2-Dichloropropane	0.00142	U	0.00420	0.00142	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
cis-1,3-Dichloropropene	0.00137	U	0.00420	0.00137	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
trans-1,3-Dichloropropene	0.00140	U	0.00420	0.00140	mg/Kg		02/24/23 19:08	02/27/23 20:44	1

Client Sample ID: SS2 (2-4)
Date Collected: 02/24/23 10:40
Date Received: 02/24/23 16:25

Lab Sample ID: 860-43843-2
Matrix: Solid

Method: SW846 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	0.000559	U	0.000840	0.000559	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
2-Hexanone	0.00638	U	0.0420	0.00638	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Isopropylbenzene	0.00141	U	0.00420	0.00141	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Methylene Chloride	0.0105	U	0.0168	0.0105	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
4-Methyl-2-pentanone (MIBK)	0.00607	U	0.0420	0.00607	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Styrene	0.00125	U	0.00420	0.00125	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,1,2,2-Tetrachloroethane	0.000138	U	0.00420	0.000138	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Tetrachloroethene	0.00137	U	0.00420	0.00137	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Toluene	**0.00251**	**J**	0.00420	0.00161	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,2,4-Trichlorobenzene	0.00168	U	0.00420	0.00168	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,1,1-Trichloroethane	0.00141	U	0.00420	0.00141	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,1,2-Trichloroethane	0.00136	U	0.00420	0.00136	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Trichloroethene	0.00160	U	0.00420	0.00160	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.00140	U	0.00840	0.00140	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Vinyl acetate	0.00344	U *+	0.00840	0.00344	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Vinyl chloride	0.00155	U	0.00420	0.00155	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
Xylenes, Total	0.000756	U	0.00168	0.000756	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
o-Xylene	0.000756	U	0.000840	0.000756	mg/Kg		02/24/23 19:08	02/27/23 20:44	1
m-Xylene & p-Xylene	0.000672	U	0.00168	0.000672	mg/Kg		02/24/23 19:08	02/27/23 20:44	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*0.184*	*T J*	*mg/Kg*		*1.00*	*N/A*	*02/24/23 19:08*	*02/27/23 20:44*	*1*
Unknown	*0.00586*	*T J*	*mg/Kg*		*2.60*	*N/A*	*02/24/23 19:08*	*02/27/23 20:44*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*95*		*53 - 142*	*02/24/23 19:08*	*02/27/23 20:44*	*1*
Toluene-d8 (Surr)	*95*		*70 - 130*	*02/24/23 19:08*	*02/27/23 20:44*	*1*
4-Bromofluorobenzene (Surr)	*102*		*68 - 152*	*02/24/23 19:08*	*02/27/23 20:44*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*56 - 150*	*02/24/23 19:08*	*02/27/23 20:44*	*1*

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0144	U	0.166	0.0144	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
1,2-Dichlorobenzene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
1,3-Dichlorobenzene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
1,4-Dichlorobenzene	0.0149	U	0.166	0.0149	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,4,5-Trichlorophenol	0.0190	U	0.166	0.0190	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,4,6-Trichlorophenol	0.0157	U	0.166	0.0157	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,4-Dichlorophenol	0.0173	U	0.166	0.0173	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,4-Dimethylphenol	0.0164	U	0.166	0.0164	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,4-Dinitrophenol	0.0241	U	0.331	0.0241	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,4-Dinitrotoluene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2,6-Dinitrotoluene	0.0232	U	0.166	0.0232	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2-Chloronaphthalene	0.0289	U	0.166	0.0289	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2-Chlorophenol	0.0157	U	0.166	0.0157	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2-Methylnaphthalene	0.0449	U	0.166	0.0449	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2-Nitroaniline	0.0155	U	0.331	0.0155	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2-Nitrophenol	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
2-Methylphenol	0.0184	U	0.166	0.0184	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
3 & 4 Methylphenol	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 06:34	02/27/23 16:06	1

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS2 (2-4)
Lab Sample ID: 860-43843-2
Date Collected: 02/24/23 10:40
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
3,3'-Dichlorobenzidine	0.0153	U	0.331	0.0153	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
3-Nitroaniline	0.0139	U	0.331	0.0139	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4,6-Dinitro-2-methylphenol	0.0126	U	0.331	0.0126	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4-Bromophenyl phenyl ether	0.0132	U	0.166	0.0132	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4-Chloroaniline	0.0126	U	0.331	0.0126	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4-Chlorophenyl phenyl ether	0.0161	U	0.166	0.0161	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4-Nitroaniline	0.0138	U	0.331	0.0138	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4-Nitrophenol	0.0257	U	0.331	0.0257	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
4-Chloro-3-methylphenol	0.0183	U	0.166	0.0183	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Acenaphthene	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Acenaphthylene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.331	0.0136	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Anthracene	0.0137	U	0.166	0.0137	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Benzo[a]anthracene	0.0140	U	0.166	0.0140	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Benzo[a]pyrene	0.0171	U	0.166	0.0171	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Benzo[b]fluoranthene	0.0125	U	0.166	0.0125	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Benzo[g,h,i]perylene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Benzo[k]fluoranthene	0.0193	U	0.166	0.0193	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Benzoic acid	0.0348	U	0.994	0.0348	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Butyl benzyl phthalate	0.0181	U	0.166	0.0181	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Chrysene	0.0164	U	0.166	0.0164	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Dibenz(a,h)anthracene	0.0126	U	0.166	0.0126	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Dibenzofuran	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Diethyl phthalate	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Dimethyl phthalate	0.0158	U	0.166	0.0158	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Fluoranthene	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Fluorene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Hexachlorobenzene	0.0161	U	0.166	0.0161	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Hexachlorobutadiene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Hexachlorocyclopentadiene	0.0151	U	0.166	0.0151	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Hexachloroethane	0.0172	U	0.166	0.0172	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Indeno[1,2,3-cd]pyrene	0.0134	U	0.166	0.0134	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Isophorone	0.0144	U	0.166	0.0144	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
N-Nitrosodi-n-propylamine	0.0173	U	0.166	0.0173	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
N-Nitrosodiphenylamine	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Naphthalene	0.0155	U	0.166	0.0155	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Nitrobenzene	0.0184	U	0.166	0.0184	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Pentachlorophenol	0.0121	U	0.331	0.0121	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Phenanthrene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Phenol	0.0149	U	0.331	0.0149	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Pyrene	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Pyridine	0.0166	U	0.331	0.0166	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Bis(2-chloroethoxy)methane	0.0167	U	0.166	0.0167	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Bis(2-chloroethyl)ether	0.0151	U	0.166	0.0151	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
bis (2-chloroisopropyl) ether	0.0177	U	0.166	0.0177	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Bis(2-ethylhexyl) phthalate	0.166	U	0.331	0.166	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Di-n-butyl phthalate	0.0159	U	0.166	0.0159	mg/Kg		02/27/23 06:34	02/27/23 16:06	1
Di-n-octyl phthalate	0.0132	U	0.166	0.0132	mg/Kg		02/27/23 06:34	02/27/23 16:06	1

Client Sample ID: SS2 (2-4)
Lab Sample ID: 860-43843-2
Date Collected: 02/24/23 10:40
Matrix: Solid
Date Received: 02/24/23 16:25

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*54*		*19 - 122*	*02/27/23 06:34*	*02/27/23 16:06*	*1*
2-Fluorobiphenyl (Surr)	*52*		*30 - 115*	*02/27/23 06:34*	*02/27/23 16:06*	*1*
2-Fluorophenol (Surr)	*47*		*25 - 121*	*02/27/23 06:34*	*02/27/23 16:06*	*1*
Nitrobenzene-d5 (Surr)	*48*		*23 - 129*	*02/27/23 06:34*	*02/27/23 16:06*	*1*
p-Terphenyl-d14 (Surr)	*55*		*18 - 137*	*02/27/23 06:34*	*02/27/23 16:06*	*1*
Phenol-d5 (Surr)	*46*		*24 - 113*	*02/27/23 06:34*	*02/27/23 16:06*	*1*

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	17.1	U	40.5	17.1	mg/Kg		03/02/23 13:48	03/02/23 20:09	1
>C12-C28 Range Hydrocarbons	17.1	U	40.5	17.1	mg/Kg		03/02/23 13:48	03/02/23 20:09	1
>C28-C35 Range Hydrocarbons	17.1	U	40.5	17.1	mg/Kg		03/02/23 13:48	03/02/23 20:09	1
Total Petroleum Hydrocarbons (C6-C35)	17.1	U	40.5	17.1	mg/Kg			03/01/23 12:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*97*		*70 - 130*	*03/02/23 13:48*	*03/02/23 20:09*	*1*
o-Terphenyl (Surr)	*115*		*70 - 130*	*03/02/23 13:48*	*03/02/23 20:09*	*1*

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.593	U	2.00	0.593	mg/Kg		02/27/23 11:47	02/27/23 18:20	1
Arsenic	**1.77**		1.50	1.24	mg/Kg		02/27/23 11:47	02/27/23 18:20	1
Barium	**120**		1.00	0.118	mg/Kg		02/27/23 11:47	02/27/23 18:20	1
Cadmium	0.239	U	1.00	0.239	mg/Kg		02/27/23 11:47	02/27/23 18:20	1
Chromium	**12.1**		1.00	0.519	mg/Kg		02/27/23 11:47	02/27/23 18:20	1
Lead	**7.23**		1.00	0.489	mg/Kg		02/27/23 11:47	02/27/23 18:20	1
Selenium	1.30	U	3.00	1.30	mg/Kg		02/27/23 11:47	02/27/23 18:20	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 9045D)	**7.9**	**HF**			SU			03/02/23 15:34	1
Temperature (SW846 9045D)	**21.0**	**HF**			Deg. C			03/02/23 15:34	1
Corrosivity (SW846 9045D)	**7.9**	**HF**			SU			03/02/23 15:34	1

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3
Date Collected: 02/24/23 12:55
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0128	U	0.0763	0.0128	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Benzene	0.000560	U	0.000763	0.000560	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Bromochloromethane	0.00134	U	0.00382	0.00134	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Dichlorobromomethane	0.00136	U	0.00382	0.00136	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Bromoform	0.00169	U	0.00382	0.00169	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Bromomethane	0.00185	U	0.00382	0.00185	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Methyl tert-butyl ether	0.00151	U	0.00382	0.00151	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
2-Butanone (MEK)	0.00429	U	0.0382	0.00429	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Carbon disulfide	0.00153	U	0.00382	0.00153	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Carbon tetrachloride	0.00138	U	0.00382	0.00138	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Chlorobenzene	0.00112	U	0.00382	0.00112	mg/Kg		02/24/23 19:08	02/27/23 21:07	1

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3
Date Collected: 02/24/23 12:55
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroethane	0.00122	U	0.00763	0.00122	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Chloroform	0.00130	U	0.00382	0.00130	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Chloromethane	0.00218	U	0.00382	0.00218	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Cyclohexane	0.00146	U	0.00382	0.00146	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Chlorodibromomethane	0.00139	U	0.00382	0.00139	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Ethylene Dibromide	0.00125	U	0.00382	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,2-Dibromo-3-Chloropropane	0.00242	U	0.00382	0.00242	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,2-Dichlorobenzene	0.00111	U	0.00382	0.00111	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,3-Dichlorobenzene	0.00111	U	0.00382	0.00111	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,4-Dichlorobenzene	0.00110	U	0.00382	0.00110	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Dichlorodifluoromethane	0.00229	U	0.00382	0.00229	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,1-Dichloroethane	0.00125	U	0.00382	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,2-Dichloroethane	0.00146	U	0.00382	0.00146	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,1-Dichloroethene	0.00136	U	0.00382	0.00136	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
cis-1,2-Dichloroethene	0.00114	U	0.00382	0.00114	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
trans-1,2-Dichloroethene	0.00121	U	0.00382	0.00121	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,2-Dichloropropane	0.00129	U	0.00382	0.00129	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
cis-1,3-Dichloropropene	0.00125	U	0.00382	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
trans-1,3-Dichloropropene	0.00127	U	0.00382	0.00127	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Ethylbenzene	0.000508	U	0.000763	0.000508	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
2-Hexanone	0.00579	U	0.0382	0.00579	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Isopropylbenzene	0.00128	U	0.00382	0.00128	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Methylene Chloride	0.00951	U	0.0153	0.00951	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
4-Methyl-2-pentanone (MIBK)	0.00551	U	0.0382	0.00551	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Styrene	0.00114	U	0.00382	0.00114	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,1,2,2-Tetrachloroethane	0.000125	U	0.00382	0.000125	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Tetrachloroethene	0.00124	U	0.00382	0.00124	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Toluene	0.00146	U	0.00382	0.00146	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,2,4-Trichlorobenzene	0.00153	U	0.00382	0.00153	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,1,1-Trichloroethane	0.00128	U	0.00382	0.00128	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,1,2-Trichloroethane	0.00124	U	0.00382	0.00124	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Trichloroethene	0.00145	U	0.00382	0.00145	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.00127	U	0.00763	0.00127	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Vinyl acetate	0.00313	U *+	0.00763	0.00313	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Vinyl chloride	0.00141	U	0.00382	0.00141	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
Xylenes, Total	0.000687	U	0.00153	0.000687	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
o-Xylene	0.000687	U	0.000763	0.000687	mg/Kg		02/24/23 19:08	02/27/23 21:07	1
m-Xylene & p-Xylene	0.000611	U	0.00153	0.000611	mg/Kg		02/24/23 19:08	02/27/23 21:07	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*0.156*	*T J*	*mg/Kg*		*1.01*	*N/A*	*02/24/23 19:08*	*02/27/23 21:07*	*1*
Unknown	*0.00458*	*T J*	*mg/Kg*		*2.60*	*N/A*	*02/24/23 19:08*	*02/27/23 21:07*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*97*		*53 - 142*	*02/24/23 19:08*	*02/27/23 21:07*	*1*
Toluene-d8 (Surr)	*96*		*70 - 130*	*02/24/23 19:08*	*02/27/23 21:07*	*1*
4-Bromofluorobenzene (Surr)	*103*		*68 - 152*	*02/24/23 19:08*	*02/27/23 21:07*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*56 - 150*	*02/24/23 19:08*	*02/27/23 21:07*	*1*

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3

Date Collected: 02/24/23 12:55
Matrix: Solid

Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0145	U	0.167	0.0145	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
1,2-Dichlorobenzene	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
1,3-Dichlorobenzene	0.0139	U	0.167	0.0139	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
1,4-Dichlorobenzene	0.0150	U	0.167	0.0150	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,4,5-Trichlorophenol	0.0190	U	0.167	0.0190	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,4,6-Trichlorophenol	0.0157	U	0.167	0.0157	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,4-Dichlorophenol	0.0174	U	0.167	0.0174	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,4-Dimethylphenol	0.0165	U	0.167	0.0165	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,4-Dinitrophenol	0.0242	U	0.333	0.0242	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,4-Dinitrotoluene	0.0127	U	0.167	0.0127	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2,6-Dinitrotoluene	0.0233	U	0.167	0.0233	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2-Chloronaphthalene	0.0290	U	0.167	0.0290	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2-Chlorophenol	0.0158	U	0.167	0.0158	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2-Methylnaphthalene	0.0451	U	0.167	0.0451	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2-Nitroaniline	0.0156	U	0.333	0.0156	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2-Nitrophenol	0.0146	U	0.167	0.0146	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
2-Methylphenol	0.0185	U	0.167	0.0185	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
3 & 4 Methylphenol	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
3,3'-Dichlorobenzidine	0.0154	U	0.333	0.0154	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
3-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4,6-Dinitro-2-methylphenol	0.0127	U	0.333	0.0127	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4-Bromophenyl phenyl ether	0.0132	U	0.167	0.0132	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4-Chloroaniline	0.0126	U	0.333	0.0126	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4-Chlorophenyl phenyl ether	0.0162	U	0.167	0.0162	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4-Nitroaniline	0.0138	U	0.333	0.0138	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4-Nitrophenol	0.0258	U	0.333	0.0258	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
4-Chloro-3-methylphenol	0.0184	U	0.167	0.0184	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Acenaphthene	0.0155	U	0.167	0.0155	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Acenaphthylene	0.0148	U	0.167	0.0148	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.333	0.0136	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Anthracene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Benzo[a]anthracene	0.0141	U	0.167	0.0141	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Benzo[a]pyrene	0.0172	U	0.167	0.0172	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Benzo[b]fluoranthene	0.0126	U	0.167	0.0126	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Benzo[g,h,i]perylene	0.0153	U	0.167	0.0153	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Benzo[k]fluoranthene	0.0193	U	0.167	0.0193	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Benzoic acid	0.0349	U	0.999	0.0349	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Butyl benzyl phthalate	0.0181	U	0.167	0.0181	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Chrysene	0.0165	U	0.167	0.0165	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Dibenz(a,h)anthracene	0.0127	U	0.167	0.0127	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Dibenzofuran	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Diethyl phthalate	0.0153	U	0.167	0.0153	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Dimethyl phthalate	0.0159	U	0.167	0.0159	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Fluoranthene	0.0147	U	0.167	0.0147	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Fluorene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Hexachlorobenzene	0.0162	U	0.167	0.0162	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Hexachlorobutadiene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Hexachlorocyclopentadiene	0.0152	U	0.167	0.0152	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Hexachloroethane	0.0173	U	0.167	0.0173	mg/Kg		02/27/23 13:15	02/28/23 18:50	1

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3

Date Collected: 02/24/23 12:55
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	0.0134	U	0.167	0.0134	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Isophorone	0.0145	U	0.167	0.0145	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
N-Nitrosodi-n-propylamine	0.0174	U	0.167	0.0174	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
N-Nitrosodiphenylamine	0.0186	U	0.167	0.0186	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Naphthalene	0.0156	U	0.167	0.0156	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Nitrobenzene	0.0185	U	0.167	0.0185	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Pentachlorophenol	0.0121	U	0.333	0.0121	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Phenanthrene	0.0166	U	0.167	0.0166	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Phenol	0.0149	U	0.333	0.0149	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Pyrene	0.0146	U	0.167	0.0146	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Pyridine	0.0167	U	0.333	0.0167	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Bis(2-chloroethoxy)methane	0.0168	U	0.167	0.0168	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Bis(2-chloroethyl)ether	0.0152	U	0.167	0.0152	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
bis (2-chloroisopropyl) ether	0.0178	U	0.167	0.0178	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Bis(2-ethylhexyl) phthalate	0.167	U	0.333	0.167	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Di-n-butyl phthalate	0.0160	U	0.167	0.0160	mg/Kg		02/27/23 13:15	02/28/23 18:50	1
Di-n-octyl phthalate	0.0133	U	0.167	0.0133	mg/Kg		02/27/23 13:15	02/28/23 18:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*77*		*19 - 122*	*02/27/23 13:15*	*02/28/23 18:50*	*1*
2-Fluorobiphenyl (Surr)	*66*		*30 - 115*	*02/27/23 13:15*	*02/28/23 18:50*	*1*
2-Fluorophenol (Surr)	*56*		*25 - 121*	*02/27/23 13:15*	*02/28/23 18:50*	*1*
Nitrobenzene-d5 (Surr)	*56*		*23 - 129*	*02/27/23 13:15*	*02/28/23 18:50*	*1*
p-Terphenyl-d14 (Surr)	*70*		*18 - 137*	*02/27/23 13:15*	*02/28/23 18:50*	*1*
Phenol-d5 (Surr)	*55*		*24 - 113*	*02/27/23 13:15*	*02/28/23 18:50*	*1*

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	16.3	U	38.6	16.3	mg/Kg		03/02/23 13:48	03/02/23 20:29	1
>C12-C28 Range Hydrocarbons	16.3	U	38.6	16.3	mg/Kg		03/02/23 13:48	03/02/23 20:29	1
>C28-C35 Range Hydrocarbons	16.3	U	38.6	16.3	mg/Kg		03/02/23 13:48	03/02/23 20:29	1
Total Petroleum Hydrocarbons (C6-C35)	16.3	U	38.6	16.3	mg/Kg			03/01/23 12:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*98*		*70 - 130*	*03/02/23 13:48*	*03/02/23 20:29*	*1*
o-Terphenyl (Surr)	*120*		*70 - 130*	*03/02/23 13:48*	*03/02/23 20:29*	*1*

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.549	U	1.85	0.549	mg/Kg		02/27/23 11:47	02/27/23 18:23	1
Arsenic	**1.22**	**J**	1.39	1.15	mg/Kg		02/27/23 11:47	02/27/23 18:23	1
Barium	**37.8**		0.926	0.110	mg/Kg		02/27/23 11:47	02/27/23 18:23	1
Cadmium	0.221	U	0.926	0.221	mg/Kg		02/27/23 11:47	02/27/23 18:23	1
Chromium	**6.27**		0.926	0.480	mg/Kg		02/27/23 11:47	02/27/23 18:23	1
Lead	**6.44**		0.926	0.453	mg/Kg		02/27/23 11:47	02/27/23 18:23	1
Selenium	1.20	U	2.78	1.20	mg/Kg		02/27/23 11:47	02/27/23 18:23	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 9045D)	**7.9**	**HF**			SU			03/02/23 15:34	1

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3
Date Collected: 02/24/23 12:55
Matrix: Solid
Date Received: 02/24/23 16:25

General Chemistry - Soluble (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Temperature (SW846 9045D)	20.9	HF			Deg. C			03/02/23 15:34	1
Corrosivity (SW846 9045D)	7.9	HF			SU			03/02/23 15:34	1

Client Sample ID: SS4 (2-4)
Lab Sample ID: 860-43843-4
Date Collected: 02/24/23 13:20
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0118	U	0.0703	0.0118	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Benzene	0.000515	U	0.000703	0.000515	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Bromochloromethane	0.00123	U	0.00352	0.00123	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Dichlorobromomethane	0.00126	U	0.00352	0.00126	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Bromoform	0.00155	U	0.00352	0.00155	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Bromomethane	0.00170	U	0.00352	0.00170	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Methyl tert-butyl ether	0.00139	U	0.00352	0.00139	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
2-Butanone (MEK)	0.00395	U	0.0352	0.00395	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Carbon disulfide	0.00141	U	0.00352	0.00141	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Carbon tetrachloride	0.00127	U	0.00352	0.00127	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Chlorobenzene	0.00104	U	0.00352	0.00104	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Chloroethane	0.00112	U	0.00703	0.00112	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Chloroform	0.00120	U	0.00352	0.00120	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Chloromethane	0.00201	U	0.00352	0.00201	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Cyclohexane	0.00135	U	0.00352	0.00135	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Chlorodibromomethane	0.00128	U	0.00352	0.00128	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Ethylene Dibromide	0.00115	U	0.00352	0.00115	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,2-Dibromo-3-Chloropropane	0.00223	U	0.00352	0.00223	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,2-Dichlorobenzene	0.00102	U	0.00352	0.00102	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,3-Dichlorobenzene	0.00102	U	0.00352	0.00102	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,4-Dichlorobenzene	0.00101	U	0.00352	0.00101	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Dichlorodifluoromethane	0.00211	U	0.00352	0.00211	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,1-Dichloroethane	0.00115	U	0.00352	0.00115	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,2-Dichloroethane	0.00135	U	0.00352	0.00135	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,1-Dichloroethene	0.00125	U	0.00352	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
cis-1,2-Dichloroethene	0.00105	U	0.00352	0.00105	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
trans-1,2-Dichloroethene	0.00112	U	0.00352	0.00112	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,2-Dichloropropane	0.00119	U	0.00352	0.00119	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
cis-1,3-Dichloropropene	0.00115	U	0.00352	0.00115	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
trans-1,3-Dichloropropene	0.00117	U	0.00352	0.00117	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Ethylbenzene	0.000468	U	0.000703	0.000468	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
2-Hexanone	0.00534	U	0.0352	0.00534	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Isopropylbenzene	0.00118	U	0.00352	0.00118	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Methylene Chloride	0.00876	U	0.0141	0.00876	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
4-Methyl-2-pentanone (MIBK)	0.00508	U	0.0352	0.00508	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Styrene	0.00105	U	0.00352	0.00105	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,1,2,2-Tetrachloroethane	0.000116	U	0.00352	0.000116	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Tetrachloroethene	0.00114	U	0.00352	0.00114	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Toluene	0.00134	U	0.00352	0.00134	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,2,4-Trichlorobenzene	0.00141	U	0.00352	0.00141	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,1,1-Trichloroethane	0.00118	U	0.00352	0.00118	mg/Kg		02/24/23 19:08	02/27/23 21:30	1

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS4 (2-4)
Lab Sample ID: 860-43843-4
Date Collected: 02/24/23 13:20
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,2-Trichloroethane	0.00114	U	0.00352	0.00114	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Trichloroethene	0.00134	U	0.00352	0.00134	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.00117	U	0.00703	0.00117	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Vinyl acetate	0.00288	U *+	0.00703	0.00288	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Vinyl chloride	0.00130	U	0.00352	0.00130	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
Xylenes, Total	0.000633	U	0.00141	0.000633	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
o-Xylene	0.000633	U	0.000703	0.000633	mg/Kg		02/24/23 19:08	02/27/23 21:30	1
m-Xylene & p-Xylene	0.000563	U	0.00141	0.000563	mg/Kg		02/24/23 19:08	02/27/23 21:30	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*0.127*	*T J*	*mg/Kg*		*1.00*	*N/A*	*02/24/23 19:08*	*02/27/23 21:30*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*101*		*53 - 142*	*02/24/23 19:08*	*02/27/23 21:30*	*1*
Toluene-d8 (Surr)	*93*		*70 - 130*	*02/24/23 19:08*	*02/27/23 21:30*	*1*
4-Bromofluorobenzene (Surr)	*100*		*68 - 152*	*02/24/23 19:08*	*02/27/23 21:30*	*1*
1,2-Dichloroethane-d4 (Surr)	*102*		*56 - 150*	*02/24/23 19:08*	*02/27/23 21:30*	*1*

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
1,2-Dichlorobenzene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
1,3-Dichlorobenzene	0.0139	U	0.166	0.0139	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
1,4-Dichlorobenzene	0.0150	U	0.166	0.0150	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,4,5-Trichlorophenol	0.0190	U	0.166	0.0190	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,4,6-Trichlorophenol	0.0157	U	0.166	0.0157	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,4-Dichlorophenol	0.0174	U	0.166	0.0174	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,4-Dimethylphenol	0.0164	U	0.166	0.0164	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,4-Dinitrophenol	0.0242	U	0.333	0.0242	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,4-Dinitrotoluene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2,6-Dinitrotoluene	0.0233	U	0.166	0.0233	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2-Chloronaphthalene	0.0290	U	0.166	0.0290	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2-Chlorophenol	0.0158	U	0.166	0.0158	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2-Methylnaphthalene	0.0451	U	0.166	0.0451	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2-Nitroaniline	0.0156	U	0.333	0.0156	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2-Nitrophenol	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
2-Methylphenol	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
3 & 4 Methylphenol	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
3,3'-Dichlorobenzidine	0.0154	U	0.333	0.0154	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
3-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4,6-Dinitro-2-methylphenol	0.0127	U	0.333	0.0127	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4-Bromophenyl phenyl ether	0.0132	U	0.166	0.0132	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4-Chloroaniline	0.0126	U	0.333	0.0126	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4-Chlorophenyl phenyl ether	0.0162	U	0.166	0.0162	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4-Nitroaniline	0.0138	U	0.333	0.0138	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4-Nitrophenol	0.0258	U	0.333	0.0258	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
4-Chloro-3-methylphenol	0.0184	U	0.166	0.0184	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Acenaphthene	0.0155	U	0.166	0.0155	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Acenaphthylene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.333	0.0136	mg/Kg		02/27/23 13:15	02/28/23 12:54	1

Client Sample ID: SS4 (2-4)
Lab Sample ID: 860-43843-4
Date Collected: 02/24/23 13:20
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Anthracene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Benzo[a]anthracene	0.0140	U	0.166	0.0140	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Benzo[a]pyrene	0.0172	U	0.166	0.0172	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Benzo[b]fluoranthene	0.0125	U	0.166	0.0125	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Benzo[g,h,i]perylene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Benzo[k]fluoranthene	0.0193	U	0.166	0.0193	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Benzoic acid	0.0349	U	0.998	0.0349	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Butyl benzyl phthalate	0.0181	U	0.166	0.0181	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Chrysene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Dibenz(a,h)anthracene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Dibenzofuran	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Diethyl phthalate	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Dimethyl phthalate	0.0159	U	0.166	0.0159	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Fluoranthene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Fluorene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Hexachlorobenzene	0.0162	U	0.166	0.0162	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Hexachlorobutadiene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Hexachlorocyclopentadiene	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Hexachloroethane	0.0173	U	0.166	0.0173	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Indeno[1,2,3-cd]pyrene	0.0134	U	0.166	0.0134	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Isophorone	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
N-Nitrosodi-n-propylamine	0.0174	U	0.166	0.0174	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
N-Nitrosodiphenylamine	0.0186	U	0.166	0.0186	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Naphthalene	0.0156	U	0.166	0.0156	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Nitrobenzene	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Pentachlorophenol	0.0121	U	0.333	0.0121	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Phenanthrene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Phenol	0.0149	U	0.333	0.0149	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Pyrene	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Pyridine	0.0167	U	0.333	0.0167	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Bis(2-chloroethoxy)methane	0.0168	U	0.166	0.0168	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Bis(2-chloroethyl)ether	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
bis (2-chloroisopropyl) ether	0.0178	U	0.166	0.0178	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Bis(2-ethylhexyl) phthalate	0.166	U	0.333	0.166	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Di-n-butyl phthalate	0.0160	U	0.166	0.0160	mg/Kg		02/27/23 13:15	02/28/23 12:54	1
Di-n-octyl phthalate	0.0133	U	0.166	0.0133	mg/Kg		02/27/23 13:15	02/28/23 12:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*73*		*19 - 122*	*02/27/23 13:15*	*02/28/23 12:54*	*1*
2-Fluorobiphenyl (Surr)	*61*		*30 - 115*	*02/27/23 13:15*	*02/28/23 12:54*	*1*
2-Fluorophenol (Surr)	*52*		*25 - 121*	*02/27/23 13:15*	*02/28/23 12:54*	*1*
Nitrobenzene-d5 (Surr)	*54*		*23 - 129*	*02/27/23 13:15*	*02/28/23 12:54*	*1*
p-Terphenyl-d14 (Surr)	*72*		*18 - 137*	*02/27/23 13:15*	*02/28/23 12:54*	*1*
Phenol-d5 (Surr)	*50*		*24 - 113*	*02/27/23 13:15*	*02/28/23 12:54*	*1*

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	16.4	U	38.8	16.4	mg/Kg		03/02/23 13:48	03/02/23 20:48	1
>C12-C28 Range Hydrocarbons	16.4	U	38.8	16.4	mg/Kg		03/02/23 13:48	03/02/23 20:48	1
>C28-C35 Range Hydrocarbons	16.4	U	38.8	16.4	mg/Kg		03/02/23 13:48	03/02/23 20:48	1

Client Sample ID: SS4 (2-4)
Lab Sample ID: 860-43843-4

Date Collected: 02/24/23 13:20
Matrix: Solid
Date Received: 02/24/23 16:25

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Petroleum Hydrocarbons (C6-C35)	16.4	U	38.8	16.4	mg/Kg			03/01/23 12:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*96*		*70 - 130*	*03/02/23 13:48*	*03/02/23 20:48*	*1*
o-Terphenyl (Surr)	*111*		*70 - 130*	*03/02/23 13:48*	*03/02/23 20:48*	*1*

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.529	U	1.79	0.529	mg/Kg		02/27/23 11:47	02/27/23 18:26	1
Arsenic	**1.46**		1.34	1.11	mg/Kg		02/27/23 11:47	02/27/23 18:26	1
Barium	**34.7**		0.893	0.106	mg/Kg		02/27/23 11:47	02/27/23 18:26	1
Cadmium	0.213	U	0.893	0.213	mg/Kg		02/27/23 11:47	02/27/23 18:26	1
Chromium	**4.30**		0.893	0.463	mg/Kg		02/27/23 11:47	02/27/23 18:26	1
Lead	**9.38**		0.893	0.437	mg/Kg		02/27/23 11:47	02/27/23 18:26	1
Selenium	1.16	U	2.68	1.16	mg/Kg		02/27/23 11:47	02/27/23 18:26	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 9045D)	**8.3**	**HF**			SU			03/02/23 15:34	1
Temperature (SW846 9045D)	**21.0**	**HF**			Deg. C			03/02/23 15:34	1
Corrosivity (SW846 9045D)	**8.3**	**HF**			SU			03/02/23 15:34	1

Client Sample ID: SS5 (1.5-4)
Lab Sample ID: 860-43843-5

Date Collected: 02/24/23 14:15
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0128	U	0.0765	0.0128	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Benzene	0.000560	U	0.000765	0.000560	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Bromochloromethane	0.00134	U	0.00382	0.00134	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Dichlorobromomethane	0.00137	U	0.00382	0.00137	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Bromoform	0.00169	U	0.00382	0.00169	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Bromomethane	0.00185	U	0.00382	0.00185	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Methyl tert-butyl ether	0.00151	U	0.00382	0.00151	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
2-Butanone (MEK)	0.00430	U	0.0382	0.00430	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Carbon disulfide	0.00153	U	0.00382	0.00153	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Carbon tetrachloride	0.00139	U	0.00382	0.00139	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Chlorobenzene	0.00113	U	0.00382	0.00113	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Chloroethane	0.00122	U	0.00765	0.00122	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Chloroform	0.00130	U	0.00382	0.00130	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Chloromethane	0.00218	U	0.00382	0.00218	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Cyclohexane	0.00147	U	0.00382	0.00147	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Chlorodibromomethane	0.00139	U	0.00382	0.00139	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Ethylene Dibromide	0.00125	U	0.00382	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,2-Dibromo-3-Chloropropane	0.00243	U	0.00382	0.00243	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,2-Dichlorobenzene	0.00111	U	0.00382	0.00111	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,3-Dichlorobenzene	0.00111	U	0.00382	0.00111	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,4-Dichlorobenzene	0.00110	U	0.00382	0.00110	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Dichlorodifluoromethane	0.00229	U	0.00382	0.00229	mg/Kg		02/24/23 19:08	02/27/23 21:53	1

Client Sample ID: SS5 (1.5-4)
Lab Sample ID: 860-43843-5
Date Collected: 02/24/23 14:15
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	0.00125	U	0.00382	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,2-Dichloroethane	0.00146	U	0.00382	0.00146	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,1-Dichloroethene	0.00136	U	0.00382	0.00136	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
cis-1,2-Dichloroethene	0.00114	U	0.00382	0.00114	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
trans-1,2-Dichloroethene	0.00121	U	0.00382	0.00121	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,2-Dichloropropane	0.00129	U	0.00382	0.00129	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
cis-1,3-Dichloropropene	0.00125	U	0.00382	0.00125	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
trans-1,3-Dichloropropene	0.00127	U	0.00382	0.00127	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Ethylbenzene	0.000508	U	0.000765	0.000508	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
2-Hexanone	0.00580	U	0.0382	0.00580	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Isopropylbenzene	0.00128	U	0.00382	0.00128	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Methylene Chloride	0.00952	U	0.0153	0.00952	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
4-Methyl-2-pentanone (MIBK)	0.00552	U	0.0382	0.00552	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Styrene	0.00114	U	0.00382	0.00114	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,1,2,2-Tetrachloroethane	0.000126	U	0.00382	0.000126	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Tetrachloroethene	0.00124	U	0.00382	0.00124	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Toluene	0.00146	U	0.00382	0.00146	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,2,4-Trichlorobenzene	0.00153	U	0.00382	0.00153	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,1,1-Trichloroethane	0.00128	U	0.00382	0.00128	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,1,2-Trichloroethane	0.00124	U	0.00382	0.00124	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Trichloroethene	0.00145	U	0.00382	0.00145	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.00127	U	0.00765	0.00127	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Vinyl acetate	0.00313	U *+	0.00765	0.00313	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Vinyl chloride	0.00141	U	0.00382	0.00141	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
Xylenes, Total	0.000688	U	0.00153	0.000688	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
o-Xylene	0.000688	U	0.000765	0.000688	mg/Kg		02/24/23 19:08	02/27/23 21:53	1
m-Xylene & p-Xylene	0.000612	U	0.00153	0.000612	mg/Kg		02/24/23 19:08	02/27/23 21:53	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*0.170*	*T J*	*mg/Kg*		*1.01*	*N/A*	*02/24/23 19:08*	*02/27/23 21:53*	*1*
Unknown	*0.00425*	*T J*	*mg/Kg*		*2.60*	*N/A*	*02/24/23 19:08*	*02/27/23 21:53*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*98*		*53 - 142*	*02/24/23 19:08*	*02/27/23 21:53*	*1*
Toluene-d8 (Surr)	*97*		*70 - 130*	*02/24/23 19:08*	*02/27/23 21:53*	*1*
4-Bromofluorobenzene (Surr)	*104*		*68 - 152*	*02/24/23 19:08*	*02/27/23 21:53*	*1*
1,2-Dichloroethane-d4 (Surr)	*95*		*56 - 150*	*02/24/23 19:08*	*02/27/23 21:53*	*1*

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
1,2-Dichlorobenzene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
1,3-Dichlorobenzene	0.0139	U	0.166	0.0139	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
1,4-Dichlorobenzene	0.0149	U	0.166	0.0149	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2,4,5-Trichlorophenol	0.0190	U	0.166	0.0190	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2,4,6-Trichlorophenol	0.0157	U	0.166	0.0157	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2,4-Dichlorophenol	0.0174	U	0.166	0.0174	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2,4-Dimethylphenol	0.0164	U	0.166	0.0164	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2,4-Dinitrophenol	0.0242	U	0.333	0.0242	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2,4-Dinitrotoluene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 13:15	02/28/23 19:09	1

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS5 (1.5-4)
Lab Sample ID: 860-43843-5
Date Collected: 02/24/23 14:15
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,6-Dinitrotoluene	0.0232	U	0.166	0.0232	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2-Chloronaphthalene	0.0290	U	0.166	0.0290	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2-Chlorophenol	0.0158	U	0.166	0.0158	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2-Methylnaphthalene	0.0451	U	0.166	0.0451	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2-Nitroaniline	0.0156	U	0.333	0.0156	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2-Nitrophenol	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
2-Methylphenol	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
3 & 4 Methylphenol	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
3,3'-Dichlorobenzidine	0.0154	U	0.333	0.0154	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
3-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4,6-Dinitro-2-methylphenol	0.0127	U	0.333	0.0127	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4-Bromophenyl phenyl ether	0.0132	U	0.166	0.0132	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4-Chloroaniline	0.0126	U	0.333	0.0126	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4-Chlorophenyl phenyl ether	0.0162	U	0.166	0.0162	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4-Nitroaniline	0.0138	U	0.333	0.0138	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4-Nitrophenol	0.0258	U	0.333	0.0258	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
4-Chloro-3-methylphenol	0.0184	U	0.166	0.0184	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Acenaphthene	0.0155	U	0.166	0.0155	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Acenaphthylene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.333	0.0136	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Anthracene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Benzo[a]anthracene	0.0140	U	0.166	0.0140	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Benzo[a]pyrene	0.0172	U	0.166	0.0172	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Benzo[b]fluoranthene	0.0125	U	0.166	0.0125	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Benzo[g,h,i]perylene	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Benzo[k]fluoranthene	0.0193	U	0.166	0.0193	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Benzoic acid	0.0349	U	0.998	0.0349	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Butyl benzyl phthalate	0.0181	U	0.166	0.0181	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Chrysene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Dibenz(a,h)anthracene	0.0127	U	0.166	0.0127	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Dibenzofuran	0.0154	U	0.166	0.0154	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Diethyl phthalate	0.0153	U	0.166	0.0153	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Dimethyl phthalate	0.0158	U	0.166	0.0158	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Fluoranthene	0.0147	U	0.166	0.0147	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Fluorene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Hexachlorobenzene	0.0162	U	0.166	0.0162	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Hexachlorobutadiene	0.0138	U	0.166	0.0138	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Hexachlorocyclopentadiene	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Hexachloroethane	0.0172	U	0.166	0.0172	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Indeno[1,2,3-cd]pyrene	0.0134	U	0.166	0.0134	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Isophorone	0.0145	U	0.166	0.0145	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
N-Nitrosodi-n-propylamine	0.0174	U	0.166	0.0174	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
N-Nitrosodiphenylamine	0.0186	U	0.166	0.0186	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Naphthalene	0.0156	U	0.166	0.0156	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Nitrobenzene	0.0185	U	0.166	0.0185	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Pentachlorophenol	0.0121	U	0.333	0.0121	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Phenanthrene	0.0165	U	0.166	0.0165	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Phenol	0.0149	U	0.333	0.0149	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Pyrene	0.0146	U	0.166	0.0146	mg/Kg		02/27/23 13:15	02/28/23 19:09	1

Client Sample ID: SS5 (1.5-4)
Lab Sample ID: 860-43843-5

Date Collected: 02/24/23 14:15
Matrix: Solid
Date Received: 02/24/23 16:25

Method: SW846 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pyridine	0.0167	U	0.333	0.0167	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Bis(2-chloroethoxy)methane	0.0168	U	0.166	0.0168	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Bis(2-chloroethyl)ether	0.0152	U	0.166	0.0152	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
bis (2-chloroisopropyl) ether	0.0177	U	0.166	0.0177	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Bis(2-ethylhexyl) phthalate	0.166	U	0.333	0.166	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Di-n-butyl phthalate	0.0160	U	0.166	0.0160	mg/Kg		02/27/23 13:15	02/28/23 19:09	1
Di-n-octyl phthalate	0.0132	U	0.166	0.0132	mg/Kg		02/27/23 13:15	02/28/23 19:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*73*		*19 - 122*	*02/27/23 13:15*	*02/28/23 19:09*	*1*
2-Fluorobiphenyl (Surr)	*59*		*30 - 115*	*02/27/23 13:15*	*02/28/23 19:09*	*1*
2-Fluorophenol (Surr)	*49*		*25 - 121*	*02/27/23 13:15*	*02/28/23 19:09*	*1*
Nitrobenzene-d5 (Surr)	*50*		*23 - 129*	*02/27/23 13:15*	*02/28/23 19:09*	*1*
p-Terphenyl-d14 (Surr)	*70*		*18 - 137*	*02/27/23 13:15*	*02/28/23 19:09*	*1*
Phenol-d5 (Surr)	*49*		*24 - 113*	*02/27/23 13:15*	*02/28/23 19:09*	*1*

Method: TCEQ TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	16.9	U	39.9	16.9	mg/Kg		03/02/23 13:48	03/03/23 00:39	1
>C12-C28 Range Hydrocarbons	16.9	U	39.9	16.9	mg/Kg		03/02/23 13:48	03/03/23 00:39	1
>C28-C35 Range Hydrocarbons	16.9	U	39.9	16.9	mg/Kg		03/02/23 13:48	03/03/23 00:39	1
Total Petroleum Hydrocarbons (C6-C35)	16.9	U	39.9	16.9	mg/Kg			03/01/23 12:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1-Chlorooctane (Surr)	*93*		*70 - 130*	*03/02/23 13:48*	*03/03/23 00:39*	*1*
o-Terphenyl (Surr)	*103*		*70 - 130*	*03/02/23 13:48*	*03/03/23 00:39*	*1*

Method: SW846 6010D - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.570	U	1.92	0.570	mg/Kg		02/27/23 11:47	02/27/23 18:29	1
Arsenic	1.19	U	1.44	1.19	mg/Kg		02/27/23 11:47	02/27/23 18:29	1
Barium	**77.0**		0.962	0.114	mg/Kg		02/27/23 11:47	02/27/23 18:29	1
Cadmium	0.230	U	0.962	0.230	mg/Kg		02/27/23 11:47	02/27/23 18:29	1
Chromium	**5.51**		0.962	0.499	mg/Kg		02/27/23 11:47	02/27/23 18:29	1
Lead	**10.4**		0.962	0.470	mg/Kg		02/27/23 11:47	02/27/23 18:29	1
Selenium	1.25	U	2.88	1.25	mg/Kg		02/27/23 11:47	02/27/23 18:29	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SW846 9045D)	**8.1**	**HF**			SU			03/02/23 15:34	1
Temperature (SW846 9045D)	**21.1**	**HF**			Deg. C			03/02/23 15:34	1
Corrosivity (SW846 9045D)	**8.1**	**HF**			SU			03/02/23 15:34	1

Surrogate Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Method: 8260C - Volatile Organic Compounds by GC/MS

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		DBFM	TOL	BFB	DCA
Lab Sample ID	Client Sample ID	(53-142)	(70-130)	(68-152)	(56-150)
860-43843-1	SS1 (6-8)	100	95	102	89
860-43843-2	SS2 (2-4)	95	95	102	96
860-43843-3	SS3 (2-4)	97	96	103	91
860-43843-4	SS4 (2-4)	101	93	100	102
860-43843-5	SS5 (1.5-4)	98	97	104	95
LCS 860-91817/4	Lab Control Sample	100	93	100	90
LCSD 860-91817/5	Lab Control Sample Dup	101	91	99	93
MB 860-91817/8	Method Blank	99	94	101	91

Surrogate Legend

DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DCA = 1,2-Dichloroethane-d4 (Surr)

Method: 8270E - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)					
		TBP	FBP	2FP	NBZ	TPHd14	PHL
Lab Sample ID	Client Sample ID	(19-122)	(30-115)	(25-121)	(23-129)	(18-137)	(24-113)
860-43843-1	SS1 (6-8)	62	61	57	58	62	55
860-43843-2	SS2 (2-4)	54	52	47	48	55	46
860-43843-3	SS3 (2-4)	77	66	56	56	70	55
860-43843-4	SS4 (2-4)	73	61	52	54	72	50
860-43843-4 MS	SS4 (2-4)	67	54	47	48	67	47
860-43843-4 MSD	SS4 (2-4)	73	65	58	59	70	58
860-43843-5	SS5 (1.5-4)	73	59	49	50	70	49
LCS 860-91765/2-A	Lab Control Sample	84	77	80	75	77	77
LCS 860-91856/2-A	Lab Control Sample	68	62	56	55	64	56
LCSD 860-91765/3-A	Lab Control Sample Dup	82	75	75	74	76	75
LCSD 860-91856/3-A	Lab Control Sample Dup	70	60	55	54	64	55
MB 860-91765/1-A	Method Blank	61	62	60	61	65	58
MB 860-91856/1-A	Method Blank	69	60	52	52	72	52

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)
FBP = 2-Fluorobiphenyl (Surr)
2FP = 2-Fluorophenol (Surr)
NBZ = Nitrobenzene-d5 (Surr)
TPHd14 = p-Terphenyl-d14 (Surr)
PHL = Phenol-d5 (Surr)

Method: TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		1CO	OTPH
Lab Sample ID	Client Sample ID	(70-130)	(70-130)
860-43843-1	SS1 (6-8)	100	117
860-43843-2	SS2 (2-4)	97	115

Surrogate Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Method: TX 1005 - Texas - Total Petroleum Hydrocarbon (GC) (Continued)

Matrix: Solid
Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)									
		1CO	OTPH								
Lab Sample ID	Client Sample ID	(70-130)	(70-130)								
860-43843-3	SS3 (2-4)	98	120								
860-43843-4	SS4 (2-4)	96	111								
860-43843-5	SS5 (1.5-4)	93	103								
LCS 860-92434/2-A	Lab Control Sample	88	100								
LCSD 860-92434/3-A	Lab Control Sample Dup	90	104								
MB 860-92434/1-A	Method Blank	91	105								

Surrogate Legend

1CO = 1-Chlorooctane (Surr)
OTPH = o-Terphenyl (Surr)

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 860-91817/8
Matrix: Solid
Analysis Batch: 91817

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	0.0167	U	0.100	0.0167	mg/Kg			02/27/23 14:43	1
Benzene	0.000733	U	0.00100	0.000733	mg/Kg			02/27/23 14:43	1
Bromochloromethane	0.00175	U	0.00500	0.00175	mg/Kg			02/27/23 14:43	1
Dichlorobromomethane	0.00179	U	0.00500	0.00179	mg/Kg			02/27/23 14:43	1
Bromoform	0.00221	U	0.00500	0.00221	mg/Kg			02/27/23 14:43	1
Bromomethane	0.00242	U	0.00500	0.00242	mg/Kg			02/27/23 14:43	1
Methyl tert-butyl ether	0.00198	U	0.00500	0.00198	mg/Kg			02/27/23 14:43	1
2-Butanone (MEK)	0.00562	U	0.0500	0.00562	mg/Kg			02/27/23 14:43	1
Carbon disulfide	0.00201	U	0.00500	0.00201	mg/Kg			02/27/23 14:43	1
Carbon tetrachloride	0.00181	U	0.00500	0.00181	mg/Kg			02/27/23 14:43	1
Chlorobenzene	0.00147	U	0.00500	0.00147	mg/Kg			02/27/23 14:43	1
Chloroethane	0.00159	U	0.0100	0.00159	mg/Kg			02/27/23 14:43	1
Chloroform	0.00170	U	0.00500	0.00170	mg/Kg			02/27/23 14:43	1
Chloromethane	0.00286	U	0.00500	0.00286	mg/Kg			02/27/23 14:43	1
Cyclohexane	0.00192	U	0.00500	0.00192	mg/Kg			02/27/23 14:43	1
Chlorodibromomethane	0.00182	U	0.00500	0.00182	mg/Kg			02/27/23 14:43	1
Ethylene Dibromide	0.00163	U	0.00500	0.00163	mg/Kg			02/27/23 14:43	1
1,2-Dibromo-3-Chloropropane	0.00317	U	0.00500	0.00317	mg/Kg			02/27/23 14:43	1
1,2-Dichlorobenzene	0.00145	U	0.00500	0.00145	mg/Kg			02/27/23 14:43	1
1,3-Dichlorobenzene	0.00145	U	0.00500	0.00145	mg/Kg			02/27/23 14:43	1
1,4-Dichlorobenzene	0.00144	U	0.00500	0.00144	mg/Kg			02/27/23 14:43	1
Dichlorodifluoromethane	0.00300	U	0.00500	0.00300	mg/Kg			02/27/23 14:43	1
1,1-Dichloroethane	0.00164	U	0.00500	0.00164	mg/Kg			02/27/23 14:43	1
1,2-Dichloroethane	0.00191	U	0.00500	0.00191	mg/Kg			02/27/23 14:43	1
1,1-Dichloroethene	0.00178	U	0.00500	0.00178	mg/Kg			02/27/23 14:43	1
cis-1,2-Dichloroethene	0.00149	U	0.00500	0.00149	mg/Kg			02/27/23 14:43	1
trans-1,2-Dichloroethene	0.00159	U	0.00500	0.00159	mg/Kg			02/27/23 14:43	1
1,2-Dichloropropane	0.00169	U	0.00500	0.00169	mg/Kg			02/27/23 14:43	1
cis-1,3-Dichloropropene	0.00164	U	0.00500	0.00164	mg/Kg			02/27/23 14:43	1
trans-1,3-Dichloropropene	0.00167	U	0.00500	0.00167	mg/Kg			02/27/23 14:43	1
Ethylbenzene	0.000665	U	0.00100	0.000665	mg/Kg			02/27/23 14:43	1
2-Hexanone	0.00759	U	0.0500	0.00759	mg/Kg			02/27/23 14:43	1
Isopropylbenzene	0.00168	U	0.00500	0.00168	mg/Kg			02/27/23 14:43	1
Methylene Chloride	0.0125	U	0.0200	0.0125	mg/Kg			02/27/23 14:43	1
4-Methyl-2-pentanone (MIBK)	0.00722	U	0.0500	0.00722	mg/Kg			02/27/23 14:43	1
Styrene	0.00149	U	0.00500	0.00149	mg/Kg			02/27/23 14:43	1
1,1,2,2-Tetrachloroethane	0.000164	U	0.00500	0.000164	mg/Kg			02/27/23 14:43	1
Tetrachloroethene	0.00163	U	0.00500	0.00163	mg/Kg			02/27/23 14:43	1
Toluene	0.00191	U	0.00500	0.00191	mg/Kg			02/27/23 14:43	1
1,2,4-Trichlorobenzene	0.00200	U	0.00500	0.00200	mg/Kg			02/27/23 14:43	1
1,1,1-Trichloroethane	0.00168	U	0.00500	0.00168	mg/Kg			02/27/23 14:43	1
1,1,2-Trichloroethane	0.00162	U	0.00500	0.00162	mg/Kg			02/27/23 14:43	1
Trichloroethene	0.00190	U	0.00500	0.00190	mg/Kg			02/27/23 14:43	1
1,1,2-Trichloro-1,2,2-trifluoroethane	0.00167	U	0.0100	0.00167	mg/Kg			02/27/23 14:43	1
Vinyl acetate	0.00410	U	0.0100	0.00410	mg/Kg			02/27/23 14:43	1
Vinyl chloride	0.00185	U	0.00500	0.00185	mg/Kg			02/27/23 14:43	1
Xylenes, Total	0.000900	U	0.00200	0.000900	mg/Kg			02/27/23 14:43	1
o-Xylene	0.000900	U	0.00100	0.000900	mg/Kg			02/27/23 14:43	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 860-91817/8
Matrix: Solid
Analysis Batch: 91817

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
m-Xylene & p-Xylene	0.000800	U	0.00200	0.000800	mg/Kg			02/27/23 14:43	1

Tentatively Identified Compound	*MB Est. Result*	*MB Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*0.1561*	*T J*	*mg/Kg*		*1.01*	*N/A*		*02/27/23 14:43*	*1*

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*99*		*53 - 142*		*02/27/23 14:43*	*1*
Toluene-d8 (Surr)	*94*		*70 - 130*		*02/27/23 14:43*	*1*
4-Bromofluorobenzene (Surr)	*101*		*68 - 152*		*02/27/23 14:43*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*56 - 150*		*02/27/23 14:43*	*1*

Lab Sample ID: LCS 860-91817/4
Matrix: Solid
Analysis Batch: 91817

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Acetone	0.250	0.2997		mg/Kg		120	50 - 150
Benzene	0.0500	0.04846		mg/Kg		97	66 - 142
Bromochloromethane	0.0500	0.05261		mg/Kg		105	71 - 130
Dichlorobromomethane	0.0500	0.04832		mg/Kg		97	78 - 130
Bromoform	0.0500	0.04305		mg/Kg		86	63 - 136
Bromomethane	0.0500	0.05604		mg/Kg		112	60 - 140
Methyl tert-butyl ether	0.0500	0.05413		mg/Kg		108	64 - 148
2-Butanone (MEK)	0.250	0.3171		mg/Kg		127	75 - 130
Carbon disulfide	0.0500	0.03884		mg/Kg		78	65 - 135
Carbon tetrachloride	0.0500	0.04645		mg/Kg		93	63 - 135
Chlorobenzene	0.0500	0.04699		mg/Kg		94	83 - 130
Chloroethane	0.0500	0.06010		mg/Kg		120	57 - 130
Chloroform	0.0500	0.05152		mg/Kg		103	74 - 130
Chloromethane	0.0500	0.04606		mg/Kg		92	58 - 130
Cyclohexane	0.0500	0.04584		mg/Kg		92	70 - 130
Chlorodibromomethane	0.0500	0.04555		mg/Kg		91	77 - 130
Ethylene Dibromide	0.0500	0.04695		mg/Kg		94	73 - 130
1,2-Dibromo-3-Chloropropane	0.0500	0.04323		mg/Kg		86	58 - 133
1,2-Dichlorobenzene	0.0500	0.04576		mg/Kg		92	84 - 130
1,3-Dichlorobenzene	0.0500	0.04629		mg/Kg		93	84 - 130
1,4-Dichlorobenzene	0.0500	0.04623		mg/Kg		92	82 - 130
Dichlorodifluoromethane	0.0500	0.04949		mg/Kg		99	54 - 130
1,1-Dichloroethane	0.0500	0.04985		mg/Kg		100	73 - 130
1,2-Dichloroethane	0.0500	0.04850		mg/Kg		97	70 - 130
1,1-Dichloroethene	0.0500	0.04936		mg/Kg		99	68 - 130
cis-1,2-Dichloroethene	0.0500	0.05039		mg/Kg		101	72 - 131
trans-1,2-Dichloroethene	0.0500	0.04934		mg/Kg		99	63 - 130
1,2-Dichloropropane	0.0500	0.04996		mg/Kg		100	75 - 130
cis-1,3-Dichloropropene	0.0500	0.05105		mg/Kg		102	74 - 135
trans-1,3-Dichloropropene	0.0500	0.04787		mg/Kg		96	73 - 130
Ethylbenzene	0.0500	0.04668		mg/Kg		93	80 - 130
2-Hexanone	0.250	0.2487		mg/Kg		99	75 - 130

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 860-91817/4
Matrix: Solid
Analysis Batch: 91817

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Isopropylbenzene	0.0500	0.04743		mg/Kg		95	55 - 155
Methylene Chloride	0.0500	0.05337		mg/Kg		107	57 - 134
4-Methyl-2-pentanone (MIBK)	0.250	0.2728		mg/Kg		109	60 - 140
Styrene	0.0500	0.04660		mg/Kg		93	80 - 130
1,1,2,2-Tetrachloroethane	0.0500	0.04673		mg/Kg		93	75 - 133
Tetrachloroethene	0.0500	0.04445		mg/Kg		89	79 - 130
Toluene	0.0500	0.04407		mg/Kg		88	74 - 130
1,2,4-Trichlorobenzene	0.0500	0.04728		mg/Kg		95	79 - 130
1,1,1-Trichloroethane	0.0500	0.05246		mg/Kg		105	71 - 130
1,1,2-Trichloroethane	0.0500	0.04973		mg/Kg		99	75 - 131
Trichloroethene	0.0500	0.04939		mg/Kg		99	78 - 130
1,1,2-Trichloro-1,2,2-trifluoroethane	0.0500	0.05242		mg/Kg		105	65 - 135
Vinyl acetate	0.250	0.3350	*+	mg/Kg		134	75 - 130
Vinyl chloride	0.0500	0.05171		mg/Kg		103	60 - 130
Xylenes, Total	0.100	0.09208		mg/Kg		92	70 - 130
o-Xylene	0.0500	0.04592		mg/Kg		92	79 - 130
m-Xylene & p-Xylene	0.0500	0.04616		mg/Kg		92	78 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Dibromofluoromethane (Surr)	*100*		*53 - 142*
Toluene-d8 (Surr)	*93*		*70 - 130*
4-Bromofluorobenzene (Surr)	*100*		*68 - 152*
1,2-Dichloroethane-d4 (Surr)	*90*		*56 - 150*

Lab Sample ID: LCSD 860-91817/5
Matrix: Solid
Analysis Batch: 91817

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Acetone	0.250	0.3010		mg/Kg		120	50 - 150	0	25
Benzene	0.0500	0.04629		mg/Kg		93	66 - 142	5	25
Bromochloromethane	0.0500	0.05270		mg/Kg		105	71 - 130	0	25
Dichlorobromomethane	0.0500	0.04688		mg/Kg		94	78 - 130	3	25
Bromoform	0.0500	0.04212		mg/Kg		84	63 - 136	2	25
Bromomethane	0.0500	0.05520		mg/Kg		110	60 - 140	2	25
Methyl tert-butyl ether	0.0500	0.05464		mg/Kg		109	64 - 148	1	25
2-Butanone (MEK)	0.250	0.3241		mg/Kg		130	75 - 130	2	25
Carbon disulfide	0.0500	0.03728		mg/Kg		75	65 - 135	4	25
Carbon tetrachloride	0.0500	0.04476		mg/Kg		90	63 - 135	4	25
Chlorobenzene	0.0500	0.04494		mg/Kg		90	83 - 130	4	25
Chloroethane	0.0500	0.05862		mg/Kg		117	57 - 130	3	25
Chloroform	0.0500	0.05034		mg/Kg		101	74 - 130	2	25
Chloromethane	0.0500	0.04335		mg/Kg		87	58 - 130	6	25
Cyclohexane	0.0500	0.04564		mg/Kg		91	70 - 130	0	25
Chlorodibromomethane	0.0500	0.04420		mg/Kg		88	77 - 130	3	25
Ethylene Dibromide	0.0500	0.04668		mg/Kg		93	73 - 130	1	25
1,2-Dibromo-3-Chloropropane	0.0500	0.04443		mg/Kg		89	58 - 133	3	25
1,2-Dichlorobenzene	0.0500	0.04391		mg/Kg		88	84 - 130	4	25

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 860-91817/5
Matrix: Solid
Analysis Batch: 91817

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,3-Dichlorobenzene			0.0500	0.04354		mg/Kg		87	84 - 130	6	25
1,4-Dichlorobenzene			0.0500	0.04408		mg/Kg		88	82 - 130	5	25
Dichlorodifluoromethane			0.0500	0.04651		mg/Kg		93	54 - 130	6	25
1,1-Dichloroethane			0.0500	0.04682		mg/Kg		94	73 - 130	6	25
1,2-Dichloroethane			0.0500	0.04738		mg/Kg		95	70 - 130	2	25
1,1-Dichloroethene			0.0500	0.04730		mg/Kg		95	68 - 130	4	25
cis-1,2-Dichloroethene			0.0500	0.04915		mg/Kg		98	72 - 131	3	25
trans-1,2-Dichloroethene			0.0500	0.04645		mg/Kg		93	63 - 130	6	25
1,2-Dichloropropane			0.0500	0.04833		mg/Kg		97	75 - 130	3	25
cis-1,3-Dichloropropene			0.0500	0.04902		mg/Kg		98	74 - 135	4	25
trans-1,3-Dichloropropene			0.0500	0.04669		mg/Kg		93	73 - 130	2	25
Ethylbenzene			0.0500	0.04438		mg/Kg		89	80 - 130	5	25
2-Hexanone			0.250	0.2494		mg/Kg		100	75 - 130	0	25
Isopropylbenzene			0.0500	0.04482		mg/Kg		90	55 - 155	6	25
Methylene Chloride			0.0500	0.05292		mg/Kg		106	57 - 134	1	25
4-Methyl-2-pentanone (MIBK)			0.250	0.2793		mg/Kg		112	60 - 140	2	25
Styrene			0.0500	0.04468		mg/Kg		89	80 - 130	4	25
1,1,2,2-Tetrachloroethane			0.0500	0.04615		mg/Kg		92	75 - 133	1	25
Tetrachloroethene			0.0500	0.04164		mg/Kg		83	79 - 130	7	25
Toluene			0.0500	0.04107		mg/Kg		82	74 - 130	7	25
1,2,4-Trichlorobenzene			0.0500	0.04619		mg/Kg		92	79 - 130	2	25
1,1,1-Trichloroethane			0.0500	0.05029		mg/Kg		101	71 - 130	4	25
1,1,2-Trichloroethane			0.0500	0.04833		mg/Kg		97	75 - 131	3	25
Trichloroethene			0.0500	0.04795		mg/Kg		96	78 - 130	3	25
1,1,2-Trichloro-1,2,2-trifluoroethane			0.0500	0.05019		mg/Kg		100	65 - 135	4	25
Vinyl acetate			0.250	0.3457	*+	mg/Kg		138	75 - 130	3	25
Vinyl chloride			0.0500	0.04876		mg/Kg		98	60 - 130	6	25
Xylenes, Total			0.100	0.08705		mg/Kg		87	70 - 130	6	25
o-Xylene			0.0500	0.04392		mg/Kg		88	79 - 130	4	25
m-Xylene & p-Xylene			0.0500	0.04313		mg/Kg		86	78 - 130	7	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Dibromofluoromethane (Surr)	*101*		*53 - 142*
Toluene-d8 (Surr)	*91*		*70 - 130*
4-Bromofluorobenzene (Surr)	*99*		*68 - 152*
1,2-Dichloroethane-d4 (Surr)	*93*		*56 - 150*

Method: 8270E - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 860-91765/1-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91765

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0145	U	0.167	0.0145	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
1,2-Dichlorobenzene	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
1,3-Dichlorobenzene	0.0139	U	0.167	0.0139	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
1,4-Dichlorobenzene	0.0150	U	0.167	0.0150	mg/Kg		02/27/23 06:34	02/27/23 13:38	1

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 860-91765/1-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91765

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4,5-Trichlorophenol	0.0191	U	0.167	0.0191	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2,4,6-Trichlorophenol	0.0158	U	0.167	0.0158	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2,4-Dichlorophenol	0.0174	U	0.167	0.0174	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2,4-Dimethylphenol	0.0165	U	0.167	0.0165	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2,4-Dinitrophenol	0.0242	U	0.333	0.0242	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2,4-Dinitrotoluene	0.0127	U	0.167	0.0127	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2,6-Dinitrotoluene	0.0233	U	0.167	0.0233	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2-Chloronaphthalene	0.0290	U	0.167	0.0290	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2-Chlorophenol	0.0158	U	0.167	0.0158	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2-Methylnaphthalene	0.0452	U	0.167	0.0452	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2-Nitroaniline	0.0156	U	0.333	0.0156	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2-Nitrophenol	0.0146	U	0.167	0.0146	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
2-Methylphenol	0.0185	U	0.167	0.0185	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
3 & 4 Methylphenol	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
3,3'-Dichlorobenzidine	0.0154	U	0.333	0.0154	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
3-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4,6-Dinitro-2-methylphenol	0.0127	U	0.333	0.0127	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4-Bromophenyl phenyl ether	0.0133	U	0.167	0.0133	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4-Chloroaniline	0.0126	U	0.333	0.0126	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4-Chlorophenyl phenyl ether	0.0162	U	0.167	0.0162	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4-Nitrophenol	0.0258	U	0.333	0.0258	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
4-Chloro-3-methylphenol	0.0184	U	0.167	0.0184	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Acenaphthene	0.0155	U	0.167	0.0155	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Acenaphthylene	0.0148	U	0.167	0.0148	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.333	0.0136	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Anthracene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Benzo[a]anthracene	0.0141	U	0.167	0.0141	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Benzo[a]pyrene	0.0172	U	0.167	0.0172	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Benzo[b]fluoranthene	0.0126	U	0.167	0.0126	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Benzo[g,h,i]perylene	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Benzo[k]fluoranthene	0.0194	U	0.167	0.0194	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Benzoic acid	0.0350	U	1.00	0.0350	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Butyl benzyl phthalate	0.0182	U	0.167	0.0182	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Chrysene	0.0165	U	0.167	0.0165	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Dibenz(a,h)anthracene	0.0127	U	0.167	0.0127	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Dibenzofuran	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Diethyl phthalate	0.0153	U	0.167	0.0153	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Dimethyl phthalate	0.0159	U	0.167	0.0159	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Fluoranthene	0.0147	U	0.167	0.0147	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Fluorene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Hexachlorobenzene	0.0162	U	0.167	0.0162	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Hexachlorobutadiene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Hexachlorocyclopentadiene	0.0152	U	0.167	0.0152	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Hexachloroethane	0.0173	U	0.167	0.0173	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Indeno[1,2,3-cd]pyrene	0.0134	U	0.167	0.0134	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Isophorone	0.0145	U	0.167	0.0145	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
N-Nitrosodi-n-propylamine	0.0174	U	0.167	0.0174	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
N-Nitrosodiphenylamine	0.0186	U	0.167	0.0186	mg/Kg		02/27/23 06:34	02/27/23 13:38	1

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 860-91765/1-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91765

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	0.0156	U	0.167	0.0156	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Nitrobenzene	0.0185	U	0.167	0.0185	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Pentachlorophenol	0.0121	U	0.333	0.0121	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Phenanthrene	0.0166	U	0.167	0.0166	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Phenol	0.0150	U	0.333	0.0150	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Pyrene	0.0146	U	0.167	0.0146	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Pyridine	0.0167	U	0.333	0.0167	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Bis(2-chloroethoxy)methane	0.0168	U	0.167	0.0168	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Bis(2-chloroethyl)ether	0.0152	U	0.167	0.0152	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
bis (2-chloroisopropyl) ether	0.0178	U	0.167	0.0178	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Bis(2-ethylhexyl) phthalate	0.167	U	0.333	0.167	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Di-n-butyl phthalate	0.0160	U	0.167	0.0160	mg/Kg		02/27/23 06:34	02/27/23 13:38	1
Di-n-octyl phthalate	0.0133	U	0.167	0.0133	mg/Kg		02/27/23 06:34	02/27/23 13:38	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*61*		*19 - 122*	*02/27/23 06:34*	*02/27/23 13:38*	*1*
2-Fluorobiphenyl (Surr)	*62*		*30 - 115*	*02/27/23 06:34*	*02/27/23 13:38*	*1*
2-Fluorophenol (Surr)	*60*		*25 - 121*	*02/27/23 06:34*	*02/27/23 13:38*	*1*
Nitrobenzene-d5 (Surr)	*61*		*23 - 129*	*02/27/23 06:34*	*02/27/23 13:38*	*1*
p-Terphenyl-d14 (Surr)	*65*		*18 - 137*	*02/27/23 06:34*	*02/27/23 13:38*	*1*
Phenol-d5 (Surr)	*58*		*24 - 113*	*02/27/23 06:34*	*02/27/23 13:38*	*1*

Lab Sample ID: LCS 860-91765/2-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91765

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,2,4-Trichlorobenzene	1.33	0.9757		mg/Kg		73	35 - 129
1,2-Dichlorobenzene	1.33	0.9679		mg/Kg		73	38 - 122
1,3-Dichlorobenzene	1.33	0.9731		mg/Kg		73	38 - 120
1,4-Dichlorobenzene	1.33	0.9722		mg/Kg		73	37 - 121
2,4,5-Trichlorophenol	1.33	1.081		mg/Kg		81	40 - 135
2,4,6-Trichlorophenol	1.33	1.060		mg/Kg		79	39 - 139
2,4-Dichlorophenol	1.33	1.052		mg/Kg		79	36 - 135
2,4-Dimethylphenol	1.33	1.018		mg/Kg		76	38 - 133
2,4-Dinitrophenol	1.33	1.253		mg/Kg		94	19 - 131
2,4-Dinitrotoluene	1.33	1.094		mg/Kg		82	48 - 131
2,6-Dinitrotoluene	1.33	1.037		mg/Kg		78	42 - 136
2-Chloronaphthalene	1.33	1.031		mg/Kg		77	32 - 138
2-Chlorophenol	1.33	0.9820		mg/Kg		74	38 - 125
2-Methylnaphthalene	1.33	0.9906		mg/Kg		74	36 - 126
2-Nitroaniline	1.33	1.052		mg/Kg		79	30 - 133
2-Nitrophenol	1.33	0.9696		mg/Kg		73	33 - 142
2-Methylphenol	1.33	1.019		mg/Kg		76	37 - 128
3 & 4 Methylphenol	1.33	1.038		mg/Kg		78	38 - 126
3,3'-Dichlorobenzidine	1.33	0.9473		mg/Kg		71	35 - 134
3-Nitroaniline	1.33	1.059		mg/Kg		79	41 - 135
4,6-Dinitro-2-methylphenol	1.33	1.097		mg/Kg		82	30 - 146

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 860-91765/2-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91765

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
4-Bromophenyl phenyl ether	1.33	1.047		mg/Kg		78	37 - 140
4-Chloroaniline	1.33	0.9961		mg/Kg		75	34 - 124
4-Chlorophenyl phenyl ether	1.33	1.040		mg/Kg		78	41 - 131
4-Nitroaniline	1.33	1.076		mg/Kg		81	46 - 132
4-Nitrophenol	1.33	1.153		mg/Kg		87	21 - 152
4-Chloro-3-methylphenol	1.33	1.075		mg/Kg		81	40 - 134
Acenaphthene	1.33	1.024		mg/Kg		77	37 - 131
Acenaphthylene	1.33	1.034		mg/Kg		78	39 - 129
Aniline (Phenylamine, Aminobenzene)	1.33	0.8686		mg/Kg		65	33 - 117
Anthracene	1.33	1.081		mg/Kg		81	39 - 139
Benzo[a]anthracene	1.33	1.021		mg/Kg		77	44 - 135
Benzo[a]pyrene	1.33	1.048		mg/Kg		79	43 - 153
Benzo[b]fluoranthene	1.33	1.067		mg/Kg		80	40 - 153
Benzo[g,h,i]perylene	1.33	1.072		mg/Kg		80	40 - 153
Benzo[k]fluoranthene	1.33	1.023		mg/Kg		77	33 - 156
Benzoic acid	4.00	2.051		mg/Kg		51	31 - 165
Butyl benzyl phthalate	1.33	1.002		mg/Kg		75	43 - 145
Chrysene	1.33	1.035		mg/Kg		78	42 - 135
Dibenz(a,h)anthracene	1.33	1.083		mg/Kg		81	41 - 155
Dibenzofuran	1.33	1.040		mg/Kg		78	39 - 132
Diethyl phthalate	1.33	1.061		mg/Kg		80	45 - 131
Dimethyl phthalate	1.33	1.044		mg/Kg		78	43 - 132
Fluoranthene	1.33	1.099		mg/Kg		82	41 - 138
Fluorene	1.33	1.061		mg/Kg		80	41 - 131
Hexachlorobenzene	1.33	1.028		mg/Kg		77	36 - 142
Hexachlorobutadiene	1.33	1.003		mg/Kg		75	35 - 129
Hexachlorocyclopentadiene	1.33	0.9313		mg/Kg		70	16 - 106
Hexachloroethane	1.33	0.9811		mg/Kg		74	36 - 121
Indeno[1,2,3-cd]pyrene	1.33	1.086		mg/Kg		81	39 - 154
Isophorone	1.33	0.9728		mg/Kg		73	36 - 128
N-Nitrosodi-n-propylamine	1.33	0.9556		mg/Kg		72	34 - 129
N-Nitrosodiphenylamine	1.33	1.022		mg/Kg		77	27 - 155
Naphthalene	1.33	0.9820		mg/Kg		74	35 - 128
Nitrobenzene	1.33	0.9803		mg/Kg		74	32 - 129
Pentachlorophenol	1.33	1.371		mg/Kg		103	14 - 148
Phenanthrene	1.33	1.069		mg/Kg		80	37 - 139
Phenol	1.33	0.9570		mg/Kg		72	34 - 127
Pyrene	1.33	1.017		mg/Kg		76	42 - 138
Pyridine	1.33	0.8164		mg/Kg		61	30 - 113
Bis(2-chloroethoxy)methane	1.33	0.9782		mg/Kg		73	30 - 129
Bis(2-chloroethyl)ether	1.33	1.023		mg/Kg		77	33 - 127
bis (2-chloroisopropyl) ether	1.33	0.9408		mg/Kg		71	25 - 124
Bis(2-ethylhexyl) phthalate	1.33	1.028		mg/Kg		77	46 - 145
Di-n-butyl phthalate	1.33	1.053		mg/Kg		79	43 - 142
Di-n-octyl phthalate	1.33	1.037		mg/Kg		78	34 - 166

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 860-91765/2-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91765

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2,4,6-Tribromophenol (Surr)	84		19 - 122
2-Fluorobiphenyl (Surr)	77		30 - 115
2-Fluorophenol (Surr)	80		25 - 121
Nitrobenzene-d5 (Surr)	75		23 - 129
p-Terphenyl-d14 (Surr)	77		18 - 137
Phenol-d5 (Surr)	77		24 - 113

Lab Sample ID: LCSD 860-91765/3-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 91765

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,2,4-Trichlorobenzene			1.33	0.9175		mg/Kg		69	35 - 129	6	30
1,2-Dichlorobenzene			1.33	0.9179		mg/Kg		69	38 - 122	5	30
1,3-Dichlorobenzene			1.33	0.9159		mg/Kg		69	38 - 120	6	30
1,4-Dichlorobenzene			1.33	0.9053		mg/Kg		68	37 - 121	7	30
2,4,5-Trichlorophenol			1.33	1.085		mg/Kg		81	40 - 135	0	30
2,4,6-Trichlorophenol			1.33	1.039		mg/Kg		78	39 - 139	2	30
2,4-Dichlorophenol			1.33	1.024		mg/Kg		77	36 - 135	3	30
2,4-Dimethylphenol			1.33	0.9979		mg/Kg		75	38 - 133	2	30
2,4-Dinitrophenol			1.33	1.193		mg/Kg		89	19 - 131	5	40
2,4-Dinitrotoluene			1.33	1.068		mg/Kg		80	48 - 131	2	30
2,6-Dinitrotoluene			1.33	1.025		mg/Kg		77	42 - 136	1	30
2-Chloronaphthalene			1.33	1.001		mg/Kg		75	32 - 138	3	30
2-Chlorophenol			1.33	0.9508		mg/Kg		71	38 - 125	3	30
2-Methylnaphthalene			1.33	0.9685		mg/Kg		73	36 - 126	2	30
2-Nitroaniline			1.33	1.027		mg/Kg		77	30 - 133	2	40
2-Nitrophenol			1.33	0.9613		mg/Kg		72	33 - 142	1	30
2-Methylphenol			1.33	0.9903		mg/Kg		74	37 - 128	3	30
3 & 4 Methylphenol			1.33	1.018		mg/Kg		76	38 - 126	2	30
3,3'-Dichlorobenzidine			1.33	0.9391		mg/Kg		70	35 - 134	1	40
3-Nitroaniline			1.33	1.058		mg/Kg		79	41 - 135	0	40
4,6-Dinitro-2-methylphenol			1.33	1.074		mg/Kg		81	30 - 146	2	40
4-Bromophenyl phenyl ether			1.33	1.046		mg/Kg		78	37 - 140	0	30
4-Chloroaniline			1.33	0.9804		mg/Kg		74	34 - 124	2	40
4-Chlorophenyl phenyl ether			1.33	1.016		mg/Kg		76	41 - 131	2	30
4-Nitroaniline			1.33	1.050		mg/Kg		79	46 - 132	2	40
4-Nitrophenol			1.33	1.122		mg/Kg		84	21 - 152	3	40
4-Chloro-3-methylphenol			1.33	1.041		mg/Kg		78	40 - 134	3	30
Acenaphthene			1.33	0.9923		mg/Kg		74	37 - 131	3	30
Acenaphthylene			1.33	1.010		mg/Kg		76	39 - 129	2	30
Aniline (Phenylamine, Aminobenzene)			1.33	0.8709		mg/Kg		65	33 - 117	0	40
Anthracene			1.33	1.055		mg/Kg		79	39 - 139	2	30
Benzo[a]anthracene			1.33	1.029		mg/Kg		77	44 - 135	1	30
Benzo[a]pyrene			1.33	1.036		mg/Kg		78	43 - 153	1	30
Benzo[b]fluoranthene			1.33	1.047		mg/Kg		79	40 - 153	2	30
Benzo[g,h,i]perylene			1.33	1.056		mg/Kg		79	40 - 153	1	30
Benzo[k]fluoranthene			1.33	1.017		mg/Kg		76	33 - 156	1	30

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 860-91765/3-A
Matrix: Solid
Analysis Batch: 91784

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 91765

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Benzoic acid			4.00	1.423		mg/Kg		36	31 - 165	36	50
Butyl benzyl phthalate			1.33	1.013		mg/Kg		76	43 - 145	1	30
Chrysene			1.33	1.002		mg/Kg		75	42 - 135	3	30
Dibenz(a,h)anthracene			1.33	1.067		mg/Kg		80	41 - 155	1	30
Dibenzofuran			1.33	1.012		mg/Kg		76	39 - 132	3	30
Diethyl phthalate			1.33	1.048		mg/Kg		79	45 - 131	1	30
Dimethyl phthalate			1.33	1.018		mg/Kg		76	43 - 132	3	30
Fluoranthene			1.33	1.086		mg/Kg		81	41 - 138	1	30
Fluorene			1.33	1.036		mg/Kg		78	41 - 131	2	30
Hexachlorobenzene			1.33	1.016		mg/Kg		76	36 - 142	1	30
Hexachlorobutadiene			1.33	0.9573		mg/Kg		72	35 - 129	5	30
Hexachlorocyclopentadiene			1.33	0.9072		mg/Kg		68	16 - 106	3	30
Hexachloroethane			1.33	0.9120		mg/Kg		68	36 - 121	7	30
Indeno[1,2,3-cd]pyrene			1.33	1.053		mg/Kg		79	39 - 154	3	30
Isophorone			1.33	0.9514		mg/Kg		71	36 - 128	2	30
N-Nitrosodi-n-propylamine			1.33	0.9344		mg/Kg		70	34 - 129	2	30
N-Nitrosodiphenylamine			1.33	1.013		mg/Kg		76	27 - 155	1	30
Naphthalene			1.33	0.9488		mg/Kg		71	35 - 128	3	30
Nitrobenzene			1.33	0.9421		mg/Kg		71	32 - 129	4	30
Pentachlorophenol			1.33	1.310		mg/Kg		98	14 - 148	5	40
Phenanthrene			1.33	1.045		mg/Kg		78	37 - 139	2	30
Phenol			1.33	0.9743		mg/Kg		73	34 - 127	2	40
Pyrene			1.33	1.008		mg/Kg		76	42 - 138	1	30
Pyridine			1.33	0.7871		mg/Kg		59	30 - 113	4	40
Bis(2-chloroethoxy)methane			1.33	0.9750		mg/Kg		73	30 - 129	0	30
Bis(2-chloroethyl)ether			1.33	0.9803		mg/Kg		74	33 - 127	4	30
bis (2-chloroisopropyl) ether			1.33	0.9040		mg/Kg		68	25 - 124	4	30
Bis(2-ethylhexyl) phthalate			1.33	1.018		mg/Kg		76	46 - 145	1	30
Di-n-butyl phthalate			1.33	1.048		mg/Kg		79	43 - 142	1	30
Di-n-octyl phthalate			1.33	1.024		mg/Kg		77	34 - 166	1	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2,4,6-Tribromophenol (Surr)	*82*		*19 - 122*
2-Fluorobiphenyl (Surr)	*75*		*30 - 115*
2-Fluorophenol (Surr)	*75*		*25 - 121*
Nitrobenzene-d5 (Surr)	*74*		*23 - 129*
p-Terphenyl-d14 (Surr)	*76*		*18 - 137*
Phenol-d5 (Surr)	*75*		*24 - 113*

Lab Sample ID: MB 860-91856/1-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91856

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,4-Trichlorobenzene	0.0145	U	0.167	0.0145	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
1,2-Dichlorobenzene	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
1,3-Dichlorobenzene	0.0139	U	0.167	0.0139	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
1,4-Dichlorobenzene	0.0150	U	0.167	0.0150	mg/Kg		02/27/23 13:15	02/28/23 11:56	1

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 860-91856/1-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91856

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4,5-Trichlorophenol	0.0191	U	0.167	0.0191	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2,4,6-Trichlorophenol	0.0158	U	0.167	0.0158	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2,4-Dichlorophenol	0.0174	U	0.167	0.0174	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2,4-Dimethylphenol	0.0165	U	0.167	0.0165	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2,4-Dinitrophenol	0.0242	U	0.333	0.0242	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2,4-Dinitrotoluene	0.0127	U	0.167	0.0127	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2,6-Dinitrotoluene	0.0233	U	0.167	0.0233	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2-Chloronaphthalene	0.0290	U	0.167	0.0290	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2-Chlorophenol	0.0158	U	0.167	0.0158	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2-Methylnaphthalene	0.0452	U	0.167	0.0452	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2-Nitroaniline	0.0156	U	0.333	0.0156	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2-Nitrophenol	0.0146	U	0.167	0.0146	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
2-Methylphenol	0.0185	U	0.167	0.0185	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
3 & 4 Methylphenol	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
3,3'-Dichlorobenzidine	0.0154	U	0.333	0.0154	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
3-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4,6-Dinitro-2-methylphenol	0.0127	U	0.333	0.0127	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4-Bromophenyl phenyl ether	0.0133	U	0.167	0.0133	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4-Chloroaniline	0.0126	U	0.333	0.0126	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4-Chlorophenyl phenyl ether	0.0162	U	0.167	0.0162	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4-Nitroaniline	0.0139	U	0.333	0.0139	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4-Nitrophenol	0.0258	U	0.333	0.0258	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
4-Chloro-3-methylphenol	0.0184	U	0.167	0.0184	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Acenaphthene	0.0155	U	0.167	0.0155	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Acenaphthylene	0.0148	U	0.167	0.0148	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Aniline (Phenylamine, Aminobenzene)	0.0136	U	0.333	0.0136	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Anthracene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Benzo[a]anthracene	0.0141	U	0.167	0.0141	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Benzo[a]pyrene	0.0172	U	0.167	0.0172	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Benzo[b]fluoranthene	0.0126	U	0.167	0.0126	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Benzo[g,h,i]perylene	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Benzo[k]fluoranthene	0.0194	U	0.167	0.0194	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Benzoic acid	0.0350	U	1.00	0.0350	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Butyl benzyl phthalate	0.0182	U	0.167	0.0182	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Chrysene	0.0165	U	0.167	0.0165	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Dibenz(a,h)anthracene	0.0127	U	0.167	0.0127	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Dibenzofuran	0.0154	U	0.167	0.0154	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Diethyl phthalate	0.0153	U	0.167	0.0153	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Dimethyl phthalate	0.0159	U	0.167	0.0159	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Fluoranthene	0.0147	U	0.167	0.0147	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Fluorene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Hexachlorobenzene	0.0162	U	0.167	0.0162	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Hexachlorobutadiene	0.0138	U	0.167	0.0138	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Hexachlorocyclopentadiene	0.0152	U	0.167	0.0152	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Hexachloroethane	0.0173	U	0.167	0.0173	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Indeno[1,2,3-cd]pyrene	0.0134	U	0.167	0.0134	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Isophorone	0.0145	U	0.167	0.0145	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
N-Nitrosodi-n-propylamine	0.0174	U	0.167	0.0174	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
N-Nitrosodiphenylamine	0.0186	U	0.167	0.0186	mg/Kg		02/27/23 13:15	02/28/23 11:56	1

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: MB 860-91856/1-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91856

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Naphthalene	0.0156	U	0.167	0.0156	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Nitrobenzene	0.0185	U	0.167	0.0185	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Pentachlorophenol	0.0121	U	0.333	0.0121	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Phenanthrene	0.0166	U	0.167	0.0166	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Phenol	0.0150	U	0.333	0.0150	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Pyrene	0.0146	U	0.167	0.0146	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Pyridine	0.0167	U	0.333	0.0167	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Bis(2-chloroethoxy)methane	0.0168	U	0.167	0.0168	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Bis(2-chloroethyl)ether	0.0152	U	0.167	0.0152	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
bis (2-chloroisopropyl) ether	0.0178	U	0.167	0.0178	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Bis(2-ethylhexyl) phthalate	0.167	U	0.333	0.167	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Di-n-butyl phthalate	0.0160	U	0.167	0.0160	mg/Kg		02/27/23 13:15	02/28/23 11:56	1
Di-n-octyl phthalate	0.0133	U	0.167	0.0133	mg/Kg		02/27/23 13:15	02/28/23 11:56	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2,4,6-Tribromophenol (Surr)	*69*		*19 - 122*	*02/27/23 13:15*	*02/28/23 11:56*	*1*
2-Fluorobiphenyl (Surr)	*60*		*30 - 115*	*02/27/23 13:15*	*02/28/23 11:56*	*1*
2-Fluorophenol (Surr)	*52*		*25 - 121*	*02/27/23 13:15*	*02/28/23 11:56*	*1*
Nitrobenzene-d5 (Surr)	*52*		*23 - 129*	*02/27/23 13:15*	*02/28/23 11:56*	*1*
p-Terphenyl-d14 (Surr)	*72*		*18 - 137*	*02/27/23 13:15*	*02/28/23 11:56*	*1*
Phenol-d5 (Surr)	*52*		*24 - 113*	*02/27/23 13:15*	*02/28/23 11:56*	*1*

Lab Sample ID: LCS 860-91856/2-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,2,4-Trichlorobenzene	1.33	0.8057		mg/Kg		60	35 - 129
1,2-Dichlorobenzene	1.33	0.7630		mg/Kg		57	38 - 122
1,3-Dichlorobenzene	1.33	0.7692		mg/Kg		58	38 - 120
1,4-Dichlorobenzene	1.33	0.7510		mg/Kg		56	37 - 121
2,4,5-Trichlorophenol	1.33	0.8173		mg/Kg		61	40 - 135
2,4,6-Trichlorophenol	1.33	0.8532		mg/Kg		64	39 - 139
2,4-Dichlorophenol	1.33	0.8068		mg/Kg		61	36 - 135
2,4-Dimethylphenol	1.33	0.7619		mg/Kg		57	38 - 133
2,4-Dinitrophenol	1.33	0.7968		mg/Kg		60	19 - 131
2,4-Dinitrotoluene	1.33	0.8056		mg/Kg		60	48 - 131
2,6-Dinitrotoluene	1.33	0.8102		mg/Kg		61	42 - 136
2-Chloronaphthalene	1.33	0.8091		mg/Kg		61	32 - 138
2-Chlorophenol	1.33	0.7674		mg/Kg		58	38 - 125
2-Methylnaphthalene	1.33	0.7668		mg/Kg		58	36 - 126
2-Nitroaniline	1.33	0.7439		mg/Kg		56	30 - 133
2-Nitrophenol	1.33	0.7786		mg/Kg		58	33 - 142
2-Methylphenol	1.33	0.7573		mg/Kg		57	37 - 128
3 & 4 Methylphenol	1.33	0.7253		mg/Kg		54	38 - 126
3,3'-Dichlorobenzidine	1.33	0.7819		mg/Kg		59	35 - 134
3-Nitroaniline	1.33	0.7333		mg/Kg		55	41 - 135
4,6-Dinitro-2-methylphenol	1.33	0.8519		mg/Kg		64	30 - 146

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 860-91856/2-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
4-Bromophenyl phenyl ether	1.33	0.8666		mg/Kg		65	37 - 140
4-Chloroaniline	1.33	0.6844		mg/Kg		51	34 - 124
4-Chlorophenyl phenyl ether	1.33	0.8096		mg/Kg		61	41 - 131
4-Nitroaniline	1.33	0.6894		mg/Kg		52	46 - 132
4-Nitrophenol	1.33	0.7385		mg/Kg		55	21 - 152
4-Chloro-3-methylphenol	1.33	0.7547		mg/Kg		57	40 - 134
Acenaphthene	1.33	0.7987		mg/Kg		60	37 - 131
Acenaphthylene	1.33	0.8056		mg/Kg		60	39 - 129
Aniline (Phenylamine, Aminobenzene)	1.33	0.6642		mg/Kg		50	33 - 117
Anthracene	1.33	0.8222		mg/Kg		62	39 - 139
Benzo[a]anthracene	1.33	0.8133		mg/Kg		61	44 - 135
Benzo[a]pyrene	1.33	0.8083		mg/Kg		61	43 - 153
Benzo[b]fluoranthene	1.33	0.7855		mg/Kg		59	40 - 153
Benzo[g,h,i]perylene	1.33	0.8586		mg/Kg		64	40 - 153
Benzo[k]fluoranthene	1.33	0.8068		mg/Kg		61	33 - 156
Benzoic acid	4.00	1.851		mg/Kg		46	31 - 165
Butyl benzyl phthalate	1.33	0.7896		mg/Kg		59	43 - 145
Chrysene	1.33	0.8097		mg/Kg		61	42 - 135
Dibenz(a,h)anthracene	1.33	0.8912		mg/Kg		67	41 - 155
Dibenzofuran	1.33	0.8131		mg/Kg		61	39 - 132
Diethyl phthalate	1.33	0.7913		mg/Kg		59	45 - 131
Dimethyl phthalate	1.33	0.7959		mg/Kg		60	43 - 132
Fluoranthene	1.33	0.8029		mg/Kg		60	41 - 138
Fluorene	1.33	0.7978		mg/Kg		60	41 - 131
Hexachlorobenzene	1.33	0.8667		mg/Kg		65	36 - 142
Hexachlorobutadiene	1.33	0.8250		mg/Kg		62	35 - 129
Hexachlorocyclopentadiene	1.33	1.011		mg/Kg		76	16 - 106
Hexachloroethane	1.33	0.7714		mg/Kg		58	36 - 121
Indeno[1,2,3-cd]pyrene	1.33	0.8551		mg/Kg		64	39 - 154
Isophorone	1.33	0.7293		mg/Kg		55	36 - 128
N-Nitrosodi-n-propylamine	1.33	0.6528		mg/Kg		49	34 - 129
N-Nitrosodiphenylamine	1.33	0.8331		mg/Kg		62	27 - 155
Naphthalene	1.33	0.7833		mg/Kg		59	35 - 128
Nitrobenzene	1.33	0.7254		mg/Kg		54	32 - 129
Pentachlorophenol	1.33	0.9214		mg/Kg		69	14 - 148
Phenanthrene	1.33	0.8175		mg/Kg		61	37 - 139
Phenol	1.33	0.7412		mg/Kg		56	34 - 127
Pyrene	1.33	0.7909		mg/Kg		59	42 - 138
Pyridine	1.33	0.6005		mg/Kg		45	30 - 113
Bis(2-chloroethoxy)methane	1.33	0.7392		mg/Kg		55	30 - 129
Bis(2-chloroethyl)ether	1.33	0.7239		mg/Kg		54	33 - 127
bis (2-chloroisopropyl) ether	1.33	0.6594		mg/Kg		49	25 - 124
Bis(2-ethylhexyl) phthalate	1.33	0.8354		mg/Kg		63	46 - 145
Di-n-butyl phthalate	1.33	0.8079		mg/Kg		61	43 - 142
Di-n-octyl phthalate	1.33	0.7714		mg/Kg		58	34 - 166

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 860-91856/2-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91856

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2,4,6-Tribromophenol (Surr)	68		19 - 122
2-Fluorobiphenyl (Surr)	62		30 - 115
2-Fluorophenol (Surr)	56		25 - 121
Nitrobenzene-d5 (Surr)	55		23 - 129
p-Terphenyl-d14 (Surr)	64		18 - 137
Phenol-d5 (Surr)	56		24 - 113

Lab Sample ID: LCSD 860-91856/3-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 91856

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,2,4-Trichlorobenzene			1.33	0.7918		mg/Kg		59	35 - 129	2	30
1,2-Dichlorobenzene			1.33	0.7487		mg/Kg		56	38 - 122	2	30
1,3-Dichlorobenzene			1.33	0.7558		mg/Kg		57	38 - 120	2	30
1,4-Dichlorobenzene			1.33	0.7482		mg/Kg		56	37 - 121	0	30
2,4,5-Trichlorophenol			1.33	0.8348		mg/Kg		63	40 - 135	2	30
2,4,6-Trichlorophenol			1.33	0.8500		mg/Kg		64	39 - 139	0	30
2,4-Dichlorophenol			1.33	0.7802		mg/Kg		59	36 - 135	3	30
2,4-Dimethylphenol			1.33	0.7460		mg/Kg		56	38 - 133	2	30
2,4-Dinitrophenol			1.33	0.8295		mg/Kg		62	19 - 131	4	40
2,4-Dinitrotoluene			1.33	0.8335		mg/Kg		63	48 - 131	3	30
2,6-Dinitrotoluene			1.33	0.8133		mg/Kg		61	42 - 136	0	30
2-Chloronaphthalene			1.33	0.7966		mg/Kg		60	32 - 138	2	30
2-Chlorophenol			1.33	0.7460		mg/Kg		56	38 - 125	3	30
2-Methylnaphthalene			1.33	0.7488		mg/Kg		56	36 - 126	2	30
2-Nitroaniline			1.33	0.7264		mg/Kg		54	30 - 133	2	40
2-Nitrophenol			1.33	0.7624		mg/Kg		57	33 - 142	2	30
2-Methylphenol			1.33	0.7417		mg/Kg		56	37 - 128	2	30
3 & 4 Methylphenol			1.33	0.7095		mg/Kg		53	38 - 126	2	30
3,3'-Dichlorobenzidine			1.33	0.8012		mg/Kg		60	35 - 134	2	40
3-Nitroaniline			1.33	0.7714		mg/Kg		58	41 - 135	5	40
4,6-Dinitro-2-methylphenol			1.33	0.8781		mg/Kg		66	30 - 146	3	40
4-Bromophenyl phenyl ether			1.33	0.8667		mg/Kg		65	37 - 140	0	30
4-Chloroaniline			1.33	0.6596		mg/Kg		49	34 - 124	4	40
4-Chlorophenyl phenyl ether			1.33	0.8091		mg/Kg		61	41 - 131	0	30
4-Nitroaniline			1.33	0.7124		mg/Kg		53	46 - 132	3	40
4-Nitrophenol			1.33	0.7717		mg/Kg		58	21 - 152	4	40
4-Chloro-3-methylphenol			1.33	0.7259		mg/Kg		54	40 - 134	4	30
Acenaphthene			1.33	0.7716		mg/Kg		58	37 - 131	3	30
Acenaphthylene			1.33	0.7916		mg/Kg		59	39 - 129	2	30
Aniline (Phenylamine, Aminobenzene)			1.33	0.6434		mg/Kg		48	33 - 117	3	40
Anthracene			1.33	0.8394		mg/Kg		63	39 - 139	2	30
Benzo[a]anthracene			1.33	0.8173		mg/Kg		61	44 - 135	0	30
Benzo[a]pyrene			1.33	0.8316		mg/Kg		62	43 - 153	3	30
Benzo[b]fluoranthene			1.33	0.8392		mg/Kg		63	40 - 153	7	30
Benzo[g,h,i]perylene			1.33	0.8980		mg/Kg		67	40 - 153	4	30
Benzo[k]fluoranthene			1.33	0.7987		mg/Kg		60	33 - 156	1	30

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 860-91856/3-A
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 91856

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Benzoic acid			4.00	1.791		mg/Kg		45	31 - 165	3	50
Butyl benzyl phthalate			1.33	0.8177		mg/Kg		61	43 - 145	3	30
Chrysene			1.33	0.8164		mg/Kg		61	42 - 135	1	30
Dibenz(a,h)anthracene			1.33	0.8840		mg/Kg		66	41 - 155	1	30
Dibenzofuran			1.33	0.7951		mg/Kg		60	39 - 132	2	30
Diethyl phthalate			1.33	0.7814		mg/Kg		59	45 - 131	1	30
Dimethyl phthalate			1.33	0.8000		mg/Kg		60	43 - 132	1	30
Fluoranthene			1.33	0.8139		mg/Kg		61	41 - 138	1	30
Fluorene			1.33	0.8077		mg/Kg		61	41 - 131	1	30
Hexachlorobenzene			1.33	0.8734		mg/Kg		66	36 - 142	1	30
Hexachlorobutadiene			1.33	0.8190		mg/Kg		61	35 - 129	1	30
Hexachlorocyclopentadiene			1.33	0.9619		mg/Kg		72	16 - 106	5	30
Hexachloroethane			1.33	0.7373		mg/Kg		55	36 - 121	5	30
Indeno[1,2,3-cd]pyrene			1.33	0.8879		mg/Kg		67	39 - 154	4	30
Isophorone			1.33	0.6997		mg/Kg		52	36 - 128	4	30
N-Nitrosodi-n-propylamine			1.33	0.6341		mg/Kg		48	34 - 129	3	30
N-Nitrosodiphenylamine			1.33	0.8323		mg/Kg		62	27 - 155	0	30
Naphthalene			1.33	0.7597		mg/Kg		57	35 - 128	3	30
Nitrobenzene			1.33	0.7036		mg/Kg		53	32 - 129	3	30
Pentachlorophenol			1.33	0.9552		mg/Kg		72	14 - 148	4	40
Phenanthrene			1.33	0.8233		mg/Kg		62	37 - 139	1	30
Phenol			1.33	0.7109		mg/Kg		53	34 - 127	4	40
Pyrene			1.33	0.8008		mg/Kg		60	42 - 138	1	30
Pyridine			1.33	0.5723		mg/Kg		43	30 - 113	5	40
Bis(2-chloroethoxy)methane			1.33	0.7234		mg/Kg		54	30 - 129	2	30
Bis(2-chloroethyl)ether			1.33	0.7081		mg/Kg		53	33 - 127	2	30
bis (2-chloroisopropyl) ether			1.33	0.6545		mg/Kg		49	25 - 124	1	30
Bis(2-ethylhexyl) phthalate			1.33	0.8576		mg/Kg		64	46 - 145	3	30
Di-n-butyl phthalate			1.33	0.8274		mg/Kg		62	43 - 142	2	30
Di-n-octyl phthalate			1.33	0.8184		mg/Kg		61	34 - 166	6	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2,4,6-Tribromophenol (Surr)	*70*		*19 - 122*
2-Fluorobiphenyl (Surr)	*60*		*30 - 115*
2-Fluorophenol (Surr)	*55*		*25 - 121*
Nitrobenzene-d5 (Surr)	*54*		*23 - 129*
p-Terphenyl-d14 (Surr)	*64*		*18 - 137*
Phenol-d5 (Surr)	*55*		*24 - 113*

Lab Sample ID: 860-43843-4 MS
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: SS4 (2-4)
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
1,2,4-Trichlorobenzene	0.0145	U	1.33	0.6892		mg/Kg		52	35 - 129
1,2-Dichlorobenzene	0.0153	U	1.33	0.6416		mg/Kg		48	38 - 122
1,3-Dichlorobenzene	0.0139	U	1.33	0.6515		mg/Kg		49	38 - 120
1,4-Dichlorobenzene	0.0150	U	1.33	0.6436		mg/Kg		48	37 - 121

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 860-43843-4 MS
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: SS4 (2-4)
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
2,4,5-Trichlorophenol	0.0190	U	1.33	0.7398		mg/Kg		56	40 - 135
2,4,6-Trichlorophenol	0.0157	U	1.33	0.7553		mg/Kg		57	39 - 139
2,4-Dichlorophenol	0.0174	U	1.33	0.6788		mg/Kg		51	36 - 135
2,4-Dimethylphenol	0.0164	U	1.33	0.6574		mg/Kg		49	38 - 133
2,4-Dinitrophenol	0.0242	U	1.33	0.7351		mg/Kg		55	19 - 131
2,4-Dinitrotoluene	0.0127	U	1.33	0.7760		mg/Kg		58	48 - 131
2,6-Dinitrotoluene	0.0233	U	1.33	0.7682		mg/Kg		58	42 - 136
2-Chloronaphthalene	0.0290	U	1.33	0.7264		mg/Kg		55	32 - 138
2-Chlorophenol	0.0158	U	1.33	0.6325		mg/Kg		48	38 - 125
2-Methylnaphthalene	0.0451	U	1.33	0.6600		mg/Kg		50	36 - 126
2-Nitroaniline	0.0156	U	1.33	0.6885		mg/Kg		52	30 - 133
2-Nitrophenol	0.0146	U	1.33	0.6670		mg/Kg		50	33 - 142
2-Methylphenol	0.0185	U	1.33	0.6249		mg/Kg		47	37 - 128
3 & 4 Methylphenol	0.0154	U	1.33	0.6176		mg/Kg		46	38 - 126
3,3'-Dichlorobenzidine	0.0154	U	1.33	0.8607		mg/Kg		65	35 - 134
3-Nitroaniline	0.0139	U	1.33	0.7263		mg/Kg		55	41 - 135
4,6-Dinitro-2-methylphenol	0.0127	U	1.33	0.8544		mg/Kg		64	30 - 146
4-Bromophenyl phenyl ether	0.0132	U	1.33	0.8097		mg/Kg		61	37 - 140
4-Chloroaniline	0.0126	U	1.33	0.6338		mg/Kg		48	34 - 124
4-Chlorophenyl phenyl ether	0.0162	U	1.33	0.7567		mg/Kg		57	41 - 131
4-Nitroaniline	0.0138	U	1.33	0.7061		mg/Kg		53	46 - 132
4-Nitrophenol	0.0258	U	1.33	0.7450		mg/Kg		56	21 - 152
4-Chloro-3-methylphenol	0.0184	U	1.33	0.6680		mg/Kg		50	40 - 134
Acenaphthene	0.0155	U	1.33	0.6882		mg/Kg		52	37 - 131
Acenaphthylene	0.0147	U	1.33	0.7053		mg/Kg		53	39 - 129
Aniline (Phenylamine, Aminobenzene)	0.0136	U	1.33	0.5620		mg/Kg		42	33 - 117
Anthracene	0.0138	U	1.33	0.8281		mg/Kg		62	39 - 139
Benzo[a]anthracene	0.0140	U	1.33	0.8377		mg/Kg		63	44 - 135
Benzo[a]pyrene	0.0172	U	1.33	0.8436		mg/Kg		63	43 - 153
Benzo[b]fluoranthene	0.0125	U	1.33	0.8299		mg/Kg		62	40 - 153
Benzo[g,h,i]perylene	0.0153	U	1.33	0.9080		mg/Kg		68	40 - 153
Benzo[k]fluoranthene	0.0193	U	1.33	0.8237		mg/Kg		62	33 - 156
Benzoic acid	0.0349	U	3.99	1.422		mg/Kg		36	31 - 171
Butyl benzyl phthalate	0.0181	U	1.33	0.8198		mg/Kg		62	43 - 145
Chrysene	0.0165	U	1.33	0.8376		mg/Kg		63	42 - 135
Dibenz(a,h)anthracene	0.0127	U	1.33	0.9212		mg/Kg		69	41 - 155
Dibenzofuran	0.0154	U	1.33	0.7117		mg/Kg		53	39 - 132
Diethyl phthalate	0.0153	U	1.33	0.7661		mg/Kg		58	45 - 131
Dimethyl phthalate	0.0159	U	1.33	0.7489		mg/Kg		56	43 - 132
Fluoranthene	0.0147	U	1.33	0.8133		mg/Kg		61	41 - 138
Fluorene	0.0138	U	1.33	0.7459		mg/Kg		56	41 - 131
Hexachlorobenzene	0.0162	U	1.33	0.8401		mg/Kg		63	36 - 142
Hexachlorobutadiene	0.0138	U	1.33	0.7059		mg/Kg		53	35 - 129
Hexachlorocyclopentadiene	0.0152	U	1.33	0.8518		mg/Kg		64	16 - 106
Hexachloroethane	0.0173	U	1.33	0.6367		mg/Kg		48	36 - 121
Indeno[1,2,3-cd]pyrene	0.0134	U	1.33	0.9156		mg/Kg		69	39 - 154
Isophorone	0.0145	U	1.33	0.6152		mg/Kg		46	36 - 128
N-Nitrosodi-n-propylamine	0.0174	U	1.33	0.5690		mg/Kg		43	34 - 129

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 860-43843-4 MS
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: SS4 (2-4)
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
N-Nitrosodiphenylamine	0.0186	U	1.33	0.7920		mg/Kg		60	27 - 155
Naphthalene	0.0156	U	1.33	0.6696		mg/Kg		50	35 - 128
Nitrobenzene	0.0185	U	1.33	0.6182		mg/Kg		46	32 - 129
Pentachlorophenol	0.0121	U	1.33	0.9491		mg/Kg		71	14 - 148
Phenanthrene	0.0165	U	1.33	0.8078		mg/Kg		61	37 - 139
Phenol	0.0149	U	1.33	0.6159		mg/Kg		46	34 - 127
Pyrene	0.0146	U	1.33	0.8054		mg/Kg		61	42 - 138
Pyridine	0.0167	U	1.33	0.4900		mg/Kg		37	30 - 113
Bis(2-chloroethoxy)methane	0.0168	U	1.33	0.6207		mg/Kg		47	30 - 129
Bis(2-chloroethyl)ether	0.0152	U	1.33	0.6055		mg/Kg		46	33 - 127
bis (2-chloroisopropyl) ether	0.0178	U	1.33	0.5571		mg/Kg		42	25 - 124
Bis(2-ethylhexyl) phthalate	0.166	U	1.33	0.8468		mg/Kg		64	46 - 145
Di-n-butyl phthalate	0.0160	U	1.33	0.8223		mg/Kg		62	43 - 142
Di-n-octyl phthalate	0.0133	U	1.33	0.8137		mg/Kg		61	34 - 166

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2,4,6-Tribromophenol (Surr)	*67*		*19 - 122*
2-Fluorobiphenyl (Surr)	*54*		*30 - 115*
2-Fluorophenol (Surr)	*47*		*25 - 121*
Nitrobenzene-d5 (Surr)	*48*		*23 - 129*
p-Terphenyl-d14 (Surr)	*67*		*18 - 137*
Phenol-d5 (Surr)	*47*		*24 - 113*

Lab Sample ID: 860-43843-4 MSD
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: SS4 (2-4)
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,2,4-Trichlorobenzene	0.0145	U	1.33	0.8395		mg/Kg		63	35 - 129	20	30
1,2-Dichlorobenzene	0.0153	U	1.33	0.7928		mg/Kg		60	38 - 122	21	30
1,3-Dichlorobenzene	0.0139	U	1.33	0.8012		mg/Kg		60	38 - 120	21	30
1,4-Dichlorobenzene	0.0150	U	1.33	0.7809		mg/Kg		59	37 - 121	19	30
2,4,5-Trichlorophenol	0.0190	U	1.33	0.8533		mg/Kg		64	40 - 135	14	30
2,4,6-Trichlorophenol	0.0157	U	1.33	0.8790		mg/Kg		66	39 - 139	15	30
2,4-Dichlorophenol	0.0174	U	1.33	0.8240		mg/Kg		62	36 - 135	19	30
2,4-Dimethylphenol	0.0164	U	1.33	0.8097		mg/Kg		61	38 - 133	21	30
2,4-Dinitrophenol	0.0242	U	1.33	0.7213		mg/Kg		54	19 - 131	2	40
2,4-Dinitrotoluene	0.0127	U	1.33	0.8485		mg/Kg		64	48 - 131	9	30
2,6-Dinitrotoluene	0.0233	U	1.33	0.8574		mg/Kg		64	42 - 136	11	30
2-Chloronaphthalene	0.0290	U	1.33	0.8434		mg/Kg		63	32 - 138	15	30
2-Chlorophenol	0.0158	U	1.33	0.7830		mg/Kg		59	38 - 125	21	30
2-Methylnaphthalene	0.0451	U	1.33	0.8026		mg/Kg		60	36 - 126	20	30
2-Nitroaniline	0.0156	U	1.33	0.7771		mg/Kg		58	30 - 133	12	40
2-Nitrophenol	0.0146	U	1.33	0.8231		mg/Kg		62	33 - 142	21	30
2-Methylphenol	0.0185	U	1.33	0.7930		mg/Kg		60	37 - 128	24	30
3 & 4 Methylphenol	0.0154	U	1.33	0.7657		mg/Kg		58	38 - 126	21	30
3,3'-Dichlorobenzidine	0.0154	U	1.33	0.8718		mg/Kg		65	35 - 134	1	40
3-Nitroaniline	0.0139	U	1.33	0.7867		mg/Kg		59	41 - 135	8	40

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 860-43843-4 MSD
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: SS4 (2-4)
Prep Type: Total/NA
Prep Batch: 91856

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
4,6-Dinitro-2-methylphenol	0.0127	U	1.33	0.8828		mg/Kg		66	30 - 146	3	40
4-Bromophenyl phenyl ether	0.0132	U	1.33	0.9254		mg/Kg		69	37 - 140	13	30
4-Chloroaniline	0.0126	U	1.33	0.7355		mg/Kg		55	34 - 124	15	40
4-Chlorophenyl phenyl ether	0.0162	U	1.33	0.8561		mg/Kg		64	41 - 131	12	30
4-Nitroaniline	0.0138	U	1.33	0.7604		mg/Kg		57	46 - 132	7	40
4-Nitrophenol	0.0258	U	1.33	0.7799		mg/Kg		59	21 - 152	5	40
4-Chloro-3-methylphenol	0.0184	U	1.33	0.7870		mg/Kg		59	40 - 134	16	30
Acenaphthene	0.0155	U	1.33	0.8212		mg/Kg		62	37 - 131	18	30
Acenaphthylene	0.0147	U	1.33	0.8295		mg/Kg		62	39 - 129	16	30
Aniline (Phenylamine, Aminobenzene)	0.0136	U	1.33	0.6811		mg/Kg		51	33 - 117	19	40
Anthracene	0.0138	U	1.33	0.8739		mg/Kg		66	39 - 139	5	30
Benzo[a]anthracene	0.0140	U	1.33	0.8673		mg/Kg		65	44 - 135	3	30
Benzo[a]pyrene	0.0172	U	1.33	0.8943		mg/Kg		67	43 - 153	6	30
Benzo[b]fluoranthene	0.0125	U	1.33	0.8661		mg/Kg		65	40 - 153	4	30
Benzo[g,h,i]perylene	0.0153	U	1.33	0.9641		mg/Kg		72	40 - 153	6	30
Benzo[k]fluoranthene	0.0193	U	1.33	0.8790		mg/Kg		66	33 - 156	6	30
Benzoic acid	0.0349	U	3.99	1.240		mg/Kg		31	31 - 171	14	50
Butyl benzyl phthalate	0.0181	U	1.33	0.8759		mg/Kg		66	43 - 145	7	30
Chrysene	0.0165	U	1.33	0.8767		mg/Kg		66	42 - 135	5	30
Dibenz(a,h)anthracene	0.0127	U	1.33	0.9800		mg/Kg		74	41 - 155	6	30
Dibenzofuran	0.0154	U	1.33	0.8232		mg/Kg		62	39 - 132	15	30
Diethyl phthalate	0.0153	U	1.33	0.8360		mg/Kg		63	45 - 131	9	30
Dimethyl phthalate	0.0159	U	1.33	0.8312		mg/Kg		62	43 - 132	10	30
Fluoranthene	0.0147	U	1.33	0.8379		mg/Kg		63	41 - 138	3	30
Fluorene	0.0138	U	1.33	0.8455		mg/Kg		63	41 - 131	13	30
Hexachlorobenzene	0.0162	U	1.33	0.9250		mg/Kg		69	36 - 142	10	30
Hexachlorobutadiene	0.0138	U	1.33	0.8753		mg/Kg		66	35 - 129	21	30
Hexachlorocyclopentadiene	0.0152	U	1.33	1.037		mg/Kg		78	16 - 106	20	30
Hexachloroethane	0.0173	U	1.33	0.7857		mg/Kg		59	36 - 121	21	30
Indeno[1,2,3-cd]pyrene	0.0134	U	1.33	0.9587		mg/Kg		72	39 - 154	5	30
Isophorone	0.0145	U	1.33	0.7549		mg/Kg		57	36 - 128	20	30
N-Nitrosodi-n-propylamine	0.0174	U	1.33	0.6835		mg/Kg		51	34 - 129	18	30
N-Nitrosodiphenylamine	0.0186	U	1.33	0.8779		mg/Kg		66	27 - 155	10	30
Naphthalene	0.0156	U	1.33	0.8132		mg/Kg		61	35 - 128	19	30
Nitrobenzene	0.0185	U	1.33	0.7659		mg/Kg		58	32 - 129	21	30
Pentachlorophenol	0.0121	U	1.33	0.9957		mg/Kg		75	14 - 148	5	40
Phenanthrene	0.0165	U	1.33	0.8648		mg/Kg		65	37 - 139	7	30
Phenol	0.0149	U	1.33	0.7517		mg/Kg		56	34 - 127	20	40
Pyrene	0.0146	U	1.33	0.8550		mg/Kg		64	42 - 138	6	30
Pyridine	0.0167	U	1.33	0.5697		mg/Kg		43	30 - 113	15	40
Bis(2-chloroethoxy)methane	0.0168	U	1.33	0.7690		mg/Kg		58	30 - 129	21	30
Bis(2-chloroethyl)ether	0.0152	U	1.33	0.7511		mg/Kg		56	33 - 127	21	30
bis (2-chloroisopropyl) ether	0.0178	U	1.33	0.6905		mg/Kg		52	25 - 124	21	30
Bis(2-ethylhexyl) phthalate	0.166	U	1.33	0.8895		mg/Kg		67	46 - 145	5	30
Di-n-butyl phthalate	0.0160	U	1.33	0.8799		mg/Kg		66	43 - 142	7	30
Di-n-octyl phthalate	0.0133	U	1.33	0.8806		mg/Kg		66	34 - 166	8	30

Method: 8270E - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 860-43843-4 MSD
Matrix: Solid
Analysis Batch: 91960

Client Sample ID: SS4 (2-4)
Prep Type: Total/NA
Prep Batch: 91856

Surrogate	MSD %Recovery	MSD Qualifier	Limits
2,4,6-Tribromophenol (Surr)	*73*		*19 - 122*
2-Fluorobiphenyl (Surr)	*65*		*30 - 115*
2-Fluorophenol (Surr)	*58*		*25 - 121*
Nitrobenzene-d5 (Surr)	*59*		*23 - 129*
p-Terphenyl-d14 (Surr)	*70*		*18 - 137*
Phenol-d5 (Surr)	*58*		*24 - 113*

Method: TX 1005 - Texas - Total Petroleum Hydrocarbon (GC)

Lab Sample ID: MB 860-92434/1-A
Matrix: Solid
Analysis Batch: 92391

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 92434

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6-C12 Range Hydrocarbons	21.1	U	50.0	21.1	mg/Kg		03/02/23 13:47	03/02/23 19:09	1
>C12-C28 Range Hydrocarbons	21.1	U	50.0	21.1	mg/Kg		03/02/23 13:47	03/02/23 19:09	1
>C28-C35 Range Hydrocarbons	21.1	U	50.0	21.1	mg/Kg		03/02/23 13:47	03/02/23 19:09	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1-Chlorooctane (Surr)	*91*		*70 - 130*	*03/02/23 13:47*	*03/02/23 19:09*	*1*
o-Terphenyl (Surr)	*105*		*70 - 130*	*03/02/23 13:47*	*03/02/23 19:09*	*1*

Lab Sample ID: LCS 860-92434/2-A
Matrix: Solid
Analysis Batch: 92391

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 92434

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
C6-C12 Range Hydrocarbons			998	1036		mg/Kg		104	75 - 125		
>C12-C28 Range Hydrocarbons			1000	1028		mg/Kg		103	75 - 125		

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1-Chlorooctane (Surr)	*88*		*70 - 130*
o-Terphenyl (Surr)	*100*		*70 - 130*

Lab Sample ID: LCSD 860-92434/3-A
Matrix: Solid
Analysis Batch: 92391

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 92434

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
C6-C12 Range Hydrocarbons			998	1031		mg/Kg		103	75 - 125	0	20
>C12-C28 Range Hydrocarbons			1000	1045		mg/Kg		105	75 - 125	2	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
1-Chlorooctane (Surr)	*90*		*70 - 130*
o-Terphenyl (Surr)	*104*		*70 - 130*

Method: 6010D - Metals (ICP)

Lab Sample ID: MB 860-91834/1-A
Matrix: Solid
Analysis Batch: 91979

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 91834

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.581	U	1.96	0.581	mg/Kg		02/27/23 11:47	02/27/23 17:36	1
Arsenic	1.22	U	1.47	1.22	mg/Kg		02/27/23 11:47	02/27/23 17:36	1
Barium	0.116	U	0.980	0.116	mg/Kg		02/27/23 11:47	02/27/23 17:36	1
Cadmium	0.234	U	0.980	0.234	mg/Kg		02/27/23 11:47	02/27/23 17:36	1
Chromium	0.509	U	0.980	0.509	mg/Kg		02/27/23 11:47	02/27/23 17:36	1
Lead	0.480	U	0.980	0.480	mg/Kg		02/27/23 11:47	02/27/23 17:36	1
Selenium	1.27	U	2.94	1.27	mg/Kg		02/27/23 11:47	02/27/23 17:36	1

Lab Sample ID: LCS 860-91834/2-A
Matrix: Solid
Analysis Batch: 91979

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 91834

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Silver	48.1	41.92		mg/Kg		87	80 - 120
Arsenic	96.2	82.50		mg/Kg		86	80 - 120
Barium	96.2	82.79		mg/Kg		86	80 - 120
Cadmium	96.2	84.90		mg/Kg		88	80 - 120
Chromium	96.2	83.37		mg/Kg		87	80 - 120
Lead	96.2	85.38		mg/Kg		89	80 - 120
Selenium	96.2	80.96		mg/Kg		84	80 - 120

Lab Sample ID: LCSD 860-91834/3-A
Matrix: Solid
Analysis Batch: 91979

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 91834

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Silver	49.0	42.84		mg/Kg		87	80 - 120	2	20
Arsenic	98.0	84.41		mg/Kg		86	80 - 120	2	20
Barium	98.0	84.51		mg/Kg		86	80 - 120	2	20
Cadmium	98.0	86.76		mg/Kg		88	80 - 120	2	20
Chromium	98.0	85.29		mg/Kg		87	80 - 120	2	20
Lead	98.0	87.06		mg/Kg		89	80 - 120	2	20
Selenium	98.0	82.35		mg/Kg		84	80 - 120	2	20

QC Association Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

GC/MS VOA

Analysis Batch: 91817

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	8260C	91908
860-43843-2	SS2 (2-4)	Total/NA	Solid	8260C	91908
860-43843-3	SS3 (2-4)	Total/NA	Solid	8260C	91908
860-43843-4	SS4 (2-4)	Total/NA	Solid	8260C	91908
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	8260C	91908
MB 860-91817/8	Method Blank	Total/NA	Solid	8260C	
LCS 860-91817/4	Lab Control Sample	Total/NA	Solid	8260C	
LCSD 860-91817/5	Lab Control Sample Dup	Total/NA	Solid	8260C	

Prep Batch: 91908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	5035	
860-43843-2	SS2 (2-4)	Total/NA	Solid	5035	
860-43843-3	SS3 (2-4)	Total/NA	Solid	5035	
860-43843-4	SS4 (2-4)	Total/NA	Solid	5035	
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	5035	

GC/MS Semi VOA

Prep Batch: 91765

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	3550C	
860-43843-2	SS2 (2-4)	Total/NA	Solid	3550C	
MB 860-91765/1-A	Method Blank	Total/NA	Solid	3550C	
LCS 860-91765/2-A	Lab Control Sample	Total/NA	Solid	3550C	
LCSD 860-91765/3-A	Lab Control Sample Dup	Total/NA	Solid	3550C	

Analysis Batch: 91784

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	8270E	91765
860-43843-2	SS2 (2-4)	Total/NA	Solid	8270E	91765
MB 860-91765/1-A	Method Blank	Total/NA	Solid	8270E	91765
LCS 860-91765/2-A	Lab Control Sample	Total/NA	Solid	8270E	91765
LCSD 860-91765/3-A	Lab Control Sample Dup	Total/NA	Solid	8270E	91765

Prep Batch: 91856

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-3	SS3 (2-4)	Total/NA	Solid	3550C	
860-43843-4	SS4 (2-4)	Total/NA	Solid	3550C	
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	3550C	
MB 860-91856/1-A	Method Blank	Total/NA	Solid	3550C	
LCS 860-91856/2-A	Lab Control Sample	Total/NA	Solid	3550C	
LCSD 860-91856/3-A	Lab Control Sample Dup	Total/NA	Solid	3550C	
860-43843-4 MS	SS4 (2-4)	Total/NA	Solid	3550C	
860-43843-4 MSD	SS4 (2-4)	Total/NA	Solid	3550C	

Analysis Batch: 91960

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-3	SS3 (2-4)	Total/NA	Solid	8270E	91856
860-43843-4	SS4 (2-4)	Total/NA	Solid	8270E	91856
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	8270E	91856

GC/MS Semi VOA (Continued)

Analysis Batch: 91960 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 860-91856/1-A	Method Blank	Total/NA	Solid	8270E	91856
LCS 860-91856/2-A	Lab Control Sample	Total/NA	Solid	8270E	91856
LCSD 860-91856/3-A	Lab Control Sample Dup	Total/NA	Solid	8270E	91856
860-43843-4 MS	SS4 (2-4)	Total/NA	Solid	8270E	91856
860-43843-4 MSD	SS4 (2-4)	Total/NA	Solid	8270E	91856

GC Semi VOA

Analysis Batch: 91932

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	TX 1005	
860-43843-2	SS2 (2-4)	Total/NA	Solid	TX 1005	
860-43843-3	SS3 (2-4)	Total/NA	Solid	TX 1005	
860-43843-4	SS4 (2-4)	Total/NA	Solid	TX 1005	
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	TX 1005	

Analysis Batch: 92391

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 860-92434/1-A	Method Blank	Total/NA	Solid	TX 1005	92434
LCS 860-92434/2-A	Lab Control Sample	Total/NA	Solid	TX 1005	92434
LCSD 860-92434/3-A	Lab Control Sample Dup	Total/NA	Solid	TX 1005	92434

Analysis Batch: 92394

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	TX 1005	92434
860-43843-2	SS2 (2-4)	Total/NA	Solid	TX 1005	92434
860-43843-3	SS3 (2-4)	Total/NA	Solid	TX 1005	92434
860-43843-4	SS4 (2-4)	Total/NA	Solid	TX 1005	92434

Analysis Batch: 92398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	TX 1005	92434

Prep Batch: 92434

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	TX_1005_S_Prep	
860-43843-2	SS2 (2-4)	Total/NA	Solid	TX_1005_S_Prep	
860-43843-3	SS3 (2-4)	Total/NA	Solid	TX_1005_S_Prep	
860-43843-4	SS4 (2-4)	Total/NA	Solid	TX_1005_S_Prep	
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	TX_1005_S_Prep	
MB 860-92434/1-A	Method Blank	Total/NA	Solid	TX_1005_S_Prep	
LCS 860-92434/2-A	Lab Control Sample	Total/NA	Solid	TX_1005_S_Prep	
LCSD 860-92434/3-A	Lab Control Sample Dup	Total/NA	Solid	TX_1005_S_Prep	

QC Association Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Metals

Prep Batch: 91834

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	3051A	
860-43843-2	SS2 (2-4)	Total/NA	Solid	3051A	
860-43843-3	SS3 (2-4)	Total/NA	Solid	3051A	
860-43843-4	SS4 (2-4)	Total/NA	Solid	3051A	
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	3051A	
MB 860-91834/1-A	Method Blank	Total/NA	Solid	3051A	
LCS 860-91834/2-A	Lab Control Sample	Total/NA	Solid	3051A	
LCSD 860-91834/3-A	Lab Control Sample Dup	Total/NA	Solid	3051A	

Analysis Batch: 91979

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	6010D	91834
860-43843-2	SS2 (2-4)	Total/NA	Solid	6010D	91834
860-43843-3	SS3 (2-4)	Total/NA	Solid	6010D	91834
860-43843-4	SS4 (2-4)	Total/NA	Solid	6010D	91834
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	6010D	91834
MB 860-91834/1-A	Method Blank	Total/NA	Solid	6010D	91834
LCS 860-91834/2-A	Lab Control Sample	Total/NA	Solid	6010D	91834
LCSD 860-91834/3-A	Lab Control Sample Dup	Total/NA	Solid	6010D	91834

General Chemistry

Analysis Batch: 92051

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Total/NA	Solid	Moisture	
860-43843-2	SS2 (2-4)	Total/NA	Solid	Moisture	
860-43843-3	SS3 (2-4)	Total/NA	Solid	Moisture	
860-43843-4	SS4 (2-4)	Total/NA	Solid	Moisture	
860-43843-5	SS5 (1.5-4)	Total/NA	Solid	Moisture	
MB 860-92051/1	Method Blank	Total/NA	Solid	Moisture	
860-43843-1 DU	SS1 (6-8)	Total/NA	Solid	Moisture	

Leach Batch: 92439

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Soluble	Solid	DI Leach	
860-43843-2	SS2 (2-4)	Soluble	Solid	DI Leach	
860-43843-3	SS3 (2-4)	Soluble	Solid	DI Leach	
860-43843-4	SS4 (2-4)	Soluble	Solid	DI Leach	
860-43843-5	SS5 (1.5-4)	Soluble	Solid	DI Leach	

Analysis Batch: 92457

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
860-43843-1	SS1 (6-8)	Soluble	Solid	9045D	92439
860-43843-2	SS2 (2-4)	Soluble	Solid	9045D	92439
860-43843-3	SS3 (2-4)	Soluble	Solid	9045D	92439
860-43843-4	SS4 (2-4)	Soluble	Solid	9045D	92439
860-43843-5	SS5 (1.5-4)	Soluble	Solid	9045D	92439

Lab Chronicle

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS1 (6-8)
Lab Sample ID: 860-43843-1
Date Collected: 02/24/23 09:45
Matrix: Solid
Date Received: 02/24/23 16:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			6.77 g	5 mL	91908	02/24/23 19:08	KLV	EET HOU
Total/NA	Analysis	8260C		1	5 mL	5 mL	91817	02/27/23 20:21	MTMG	EET HOU
Total/NA	Prep	3550C			30.05 g	1 mL	91765	02/27/23 06:34	TH	EET HOU
Total/NA	Analysis	8270E		1	1 mL	1 mL	91784	02/27/23 15:45	LPL	EET HOU
Total/NA	Prep	TX_1005_S_Prep			12.984 g	10 mL	92434	03/02/23 13:48	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			92394	03/02/23 19:49	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			91932	03/01/23 12:41	DD	EET HOU
Total/NA	Prep	3051A			.54 g	50 mL	91834	02/27/23 11:47	PB	EET HOU
Total/NA	Analysis	6010D		1			91979	02/27/23 18:17	JDM	EET HOU
Soluble	Leach	DI Leach			20.07 g	20 mL	92439	03/02/23 14:08	TL	EET HOU
Soluble	Analysis	9045D		1	20.07 g	20 mL	92457	03/02/23 15:34	TL	EET HOU
Total/NA	Analysis	Moisture		1			92051	02/28/23 11:16	JM	EET HOU

Client Sample ID: SS2 (2-4)
Lab Sample ID: 860-43843-2
Date Collected: 02/24/23 10:40
Matrix: Solid
Date Received: 02/24/23 16:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			5.95 g	5 mL	91908	02/24/23 19:08	KLV	EET HOU
Total/NA	Analysis	8260C		1	5 mL	5 mL	91817	02/27/23 20:44	MTMG	EET HOU
Total/NA	Prep	3550C			30.17 g	1 mL	91765	02/27/23 06:34	TH	EET HOU
Total/NA	Analysis	8270E		1	1 mL	1 mL	91784	02/27/23 16:06	LPL	EET HOU
Total/NA	Prep	TX_1005_S_Prep			12.331 g	10 mL	92434	03/02/23 13:48	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			92394	03/02/23 20:09	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			91932	03/01/23 12:41	DD	EET HOU
Total/NA	Prep	3051A			.5 g	50 mL	91834	02/27/23 11:47	PB	EET HOU
Total/NA	Analysis	6010D		1			91979	02/27/23 18:20	JDM	EET HOU
Soluble	Leach	DI Leach			20.05 g	20 mL	92439	03/02/23 14:08	TL	EET HOU
Soluble	Analysis	9045D		1	20.05 g	20 mL	92457	03/02/23 15:34	TL	EET HOU
Total/NA	Analysis	Moisture		1			92051	02/28/23 11:16	JM	EET HOU

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3
Date Collected: 02/24/23 12:55
Matrix: Solid
Date Received: 02/24/23 16:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			6.55 g	5 mL	91908	02/24/23 19:08	KLV	EET HOU
Total/NA	Analysis	8260C		1	5 mL	5 mL	91817	02/27/23 21:07	MTMG	EET HOU
Total/NA	Prep	3550C			30.03 g	1 mL	91856	02/27/23 13:15	JN	EET HOU
Total/NA	Analysis	8270E		1	1 mL	1 mL	91960	02/28/23 18:50	LPL	EET HOU
Total/NA	Prep	TX_1005_S_Prep			12.94 g	10 mL	92434	03/02/23 13:48	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			92394	03/02/23 20:29	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			91932	03/01/23 12:41	DD	EET HOU

Lab Chronicle

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Client Sample ID: SS3 (2-4)
Lab Sample ID: 860-43843-3
Date Collected: 02/24/23 12:55
Matrix: Solid
Date Received: 02/24/23 16:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3051A			.54 g	50 mL	91834	02/27/23 11:47	PB	EET HOU
Total/NA	Analysis	6010D		1			91979	02/27/23 18:23	JDM	EET HOU
Soluble	Leach	DI Leach			20.14 g	20 mL	92439	03/02/23 14:08	TL	EET HOU
Soluble	Analysis	9045D		1	20.14 g	20 mL	92457	03/02/23 15:34	TL	EET HOU
Total/NA	Analysis	Moisture		1			92051	02/28/23 11:16	JM	EET HOU

Client Sample ID: SS4 (2-4)
Lab Sample ID: 860-43843-4
Date Collected: 02/24/23 13:20
Matrix: Solid
Date Received: 02/24/23 16:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			7.11 g	5 mL	91908	02/24/23 19:08	KLV	EET HOU
Total/NA	Analysis	8260C		1	5 mL	5 mL	91817	02/27/23 21:30	MTMG	EET HOU
Total/NA	Prep	3550C			30.05 g	1 mL	91856	02/27/23 13:15	JN	EET HOU
Total/NA	Analysis	8270E		1	1 mL	1 mL	91960	02/28/23 12:54	LPL	EET HOU
Total/NA	Prep	TX_1005_S_Prep			12.897 g	10 mL	92434	03/02/23 13:48	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			92394	03/02/23 20:48	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			91932	03/01/23 12:41	DD	EET HOU
Total/NA	Prep	3051A			.56 g	50 mL	91834	02/27/23 11:47	PB	EET HOU
Total/NA	Analysis	6010D		1			91979	02/27/23 18:26	JDM	EET HOU
Soluble	Leach	DI Leach			20.11 g	20 mL	92439	03/02/23 14:08	TL	EET HOU
Soluble	Analysis	9045D		1	20.11 g	20 mL	92457	03/02/23 15:34	TL	EET HOU
Total/NA	Analysis	Moisture		1			92051	02/28/23 11:16	JM	EET HOU

Client Sample ID: SS5 (1.5-4)
Lab Sample ID: 860-43843-5
Date Collected: 02/24/23 14:15
Matrix: Solid
Date Received: 02/24/23 16:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			6.54 g	5 mL	91908	02/24/23 19:08	KLV	EET HOU
Total/NA	Analysis	8260C		1	5 mL	5 mL	91817	02/27/23 21:53	MTMG	EET HOU
Total/NA	Prep	3550C			30.06 g	1 mL	91856	02/27/23 13:15	JN	EET HOU
Total/NA	Analysis	8270E		1	1 mL	1 mL	91960	02/28/23 19:09	LPL	EET HOU
Total/NA	Prep	TX_1005_S_Prep			12.516 g	10 mL	92434	03/02/23 13:48	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			92398	03/03/23 00:39	SAR	EET HOU
Total/NA	Analysis	TX 1005		1			91932	03/01/23 12:41	DD	EET HOU
Total/NA	Prep	3051A			.52 g	50 mL	91834	02/27/23 11:47	PB	EET HOU
Total/NA	Analysis	6010D		1			91979	02/27/23 18:29	JDM	EET HOU
Soluble	Leach	DI Leach			20.06 g	20 mL	92439	03/02/23 14:08	TL	EET HOU
Soluble	Analysis	9045D		1	20.06 g	20 mL	92457	03/02/23 15:34	TL	EET HOU
Total/NA	Analysis	Moisture		1			92051	02/28/23 11:16	JM	EET HOU

Laboratory References:
EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Accreditation/Certification Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Laboratory: Eurofins Houston

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704215-22-48	06-30-23

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
8260C	5035	Solid	Cyclohexane
8270E	3550C	Solid	3 & 4 Methylphenol
9045D		Solid	Corrosivity
9045D		Solid	Temperature
Moisture		Solid	Percent Solids

Method Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	EET HOU
8270E	Semivolatile Organic Compounds (GC/MS)	SW846	EET HOU
TX 1005	Texas - Total Petroleum Hydrocarbon (GC)	TCEQ	EET HOU
6010D	Metals (ICP)	SW846	EET HOU
9045D	pH	SW846	EET HOU
Moisture	Percent Moisture	EPA	EET HOU
3051A	Preparation, Metals, Microwave Assisted	SW846	EET HOU
3550C	Ultrasonic Extraction	SW846	EET HOU
5035	Closed System Purge and Trap	SW846	EET HOU
DI Leach	Deionized Water Leaching Procedure	ASTM	EET HOU
TX_1005_S_Prep	Extraction - Texas Total petroleum Hyrdocarbons	TCEQ	EET HOU

Protocol References:

ASTM = ASTM International
EPA = US Environmental Protection Agency
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.
TCEQ = Texas Commission of Environmental Quality

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: HDR Inc
Job ID: 860-43843-1
Project/Site: City of Friendswood Blackhawk Blvd.

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
860-43843-1	SS1 (6-8)	Solid	02/24/23 09:45	02/24/23 16:25
860-43843-2	SS2 (2-4)	Solid	02/24/23 10:40	02/24/23 16:25
860-43843-3	SS3 (2-4)	Solid	02/24/23 12:55	02/24/23 16:25
860-43843-4	SS4 (2-4)	Solid	02/24/23 13:20	02/24/23 16:25
860-43843-5	SS5 (1.5-4)	Solid	02/24/23 14:15	02/24/23 16:25

Eurofins Houston
4145 Greenbriar Dr
Stafford TX 77477
Phone: 281-240-4200

Chain of Custody Record

eurofins

Client Information	Sampler: Michael Bell & Angie Q. Torres	Lab PM: Maingot, Lindy	Carrier Tracking No(s):	COC No: 860-1 410-5939 1
Client Contact: Kelsea Hiebert	Phone: 713-561-1673	E-Mail: Lindy.Maingot@et.eurofinsus.com	State of Origi	Page: Page 1 of 1
Company: HDR Inc	PWSID:			Job #:

Address: 555 N Carancahua Suite 1600	Due Date Requested:	Analysis Requested
City: Corpus Christi	TAT Requested (days):	
State, Zip: TX, 78401	Compliance Project: Δ Yes Δ No	
Phone: 361-696-3301(Tel)	PO #: Purchase Order Requested	
Email: kelsea.hiebert@hdrinc.com	WO #:	
Project Name: City of Friendswood Blackhawk Blvd	Project #: 86004783	
Site: Blackhawk Blvd	SSOW#:	

Preservation Codes:
A HCL, B NaOH, C Zn Acetate, D Nitric Acid, E NaHSO4, F MeOH, G Amchlor, H Ascorbic Acid, I Ice, DI Water, EDTA, EDA, Other
M Hexane, N None, O AsNaO2, P Na2O4S, Q Na2SO3, R Na2S2O3, S H2SO4, T TSP Dodecahydrate, U Acetone, V MCAA, W pH 4-, Y Trizma, Z other (specify)

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260C 8260 Volatiles	8270E 8270 Semi-Volatiles	TX_1005 TX1005 TPH	6010D, 9045D, Moisture	9040C 9040 pH	6010D 6010 Metals	8260C, TX_1005	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	N	D	A		
SS 1 (6-8)	2/24/23	0945	G	Solid			X	X	X	X	X	X	X		
SS 2 (2-4)		1040	G	Solid											
SS 3 (2-4)		1255	G	Solid											
SS 4 (2-4)		1320	G	Solid											
SS 5 (1.5-4)		1415	C	Solid											
				Solid											
				Solid											
				Solid											
				Water											
				Water											

860-43843 Chain of Custody

Temp: 9.7 IR ID HOU-344
C/F: -0.2
Corrected Temp: 9.5

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I II III IV Other (specify)

Special Instructions/QC Requirements.

Empty Kit Relinquished by: Angie K Quiroga Torres Date: ~~2/23~~ 2/24/23 Time: 16 25 Method of Shipment: Door off-

Relinquished by: Angie K Quiroga Torres	Date/Time: 2/24/23 16 25	Company: HDR	Received by: CRS	Date/Time: 2/24/23 1625	Company: E
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by	Date/Time:	Company	Received by:	Date/Time	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.

Cooler Temperature(s) °C and Other Remarks

ver 06/08/

Page 55 of 56

3/10/2023

Login Sample Receipt Checklist

Client: HDR Inc

Job Number: 860-43843-1

Login Number: 43843
List Number: 1
Creator: Canadilla, Surelis

List Source: Eurofins Houston

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

APPENDIX D

MATERIAL MANAGEMENT PLAN

Materials Management Plan

Blackhawk Boulevard Reconstruction Phase II Repackage C Project

Harris County, Texas

Prepared for:
City of Friendswood
15355 Blackhawk Boulevard
Friendswood, TX 77546

June 2024

Prepared by:
HDR, Inc.
4828 Loop Central Drive, Suite 700
Houston, TX 77081

Purpose

The purpose of this Materials Management Plan (MMP) is to describe the materials management procedures that will be required during all intrusive activities involving the handling of soil and/or fill material at the **Blackhawk Boulevard Reconstruction Phase II Repackage C Project** (Project).

Project Description

The Project consists of a 0.55-mile, non-contiguous section of Blackhawk Boulevard including a four-lane divided street with raised, vegetated medians, and concrete middle turning lanes at regular intervals. The Project is split into two road reconstruction zones, which are described below:

- The northern Project zone is proposed to reconstruct Blackhawk from the intersection with farm-to-market (FM) 2351 to the Geneva Drive intersection (0.39-mile).
- The southern Project zone is proposed to reconstruct Blackhawk from FM 528 to the southern boundary of Thursa Lane (0.16-mile).

Reconstruction of Repackage C includes installation of storm sewer (24-inch to 42-inch reinforced concrete pipe and 5 by 3 feet reinforced concrete box culverts) and 2-inch to 12-inch water lines ranging from approximately 5 to 10 feet depths below ground surface. This Project also includes the installation of a 24-inch transmission water line extending from FM 2351 to Edenvale Street. Installation of the proposed water line will consist of trenchless and open cut excavations ranging from approximately 8 to 18 feet depths below ground surface.

The Project is bound to the north by FM 2351, city parks, commercial facilities, multi and single-family residential homes; to the east by single-family residential homes; to the south by FM 528, commercial facilities, and maintained land; and to the west by single-family residential homes.

The Project was largely undeveloped until Blackhawk Boulevard, commercial properties including dry cleaners and gas stations, and the surrounding residential neighborhoods were constructed in the 1970s. Groundwater Contamination Cases (GCC), Underground Storage Tanks (USTs), and Leaking Petroleum Storage Tanks (LPSTs) were identified as Recognized Environmental Conditions (RECs) in previous Phase I Environmental Site Assessments (ESAs) performed at the Project Corridor. RECs identified in the most up to date Phase I ESA are summarized in **Figure 1** and in **Table 1** below.

Figure 1. Recognized Environmental Conditions within the Project Work Zones

Table 1. Summary of Phase I ESA Recognized Environmental Conditions (RECs)

ESA DATE /REVIEW AREA	IDENTIFIED RECs
Phase I ESA dated February 2023 Review Area: 0.55-mile, non-contiguous section of Blackhawk Boulevard.	Randolph Park / Frankie Carter Randolph (5100 FM 2351) is considered to be a REC based on the active LPST cleanup, and groundwater impacted. A Final Site Closure report was provided to the Texas Commission on Environmental Quality (TCEQ) on December 19, 2022. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.
	1.49 Jet Cleaners (3670 FM 528) is considered to be a REC based on the active GCC and associated VCP for remediation of TPH, SVOCS, chlorinated solvents, and metals.
	Circle K 2741409 / Valero Energy Station and Corner Store (5091 FM 2351) is considered to be a REC based on the age, high capacity of gasoline and diesel, and proximity to the Project Corridor of the three active USTs.
	Corner Food Mart (3698 FM 528) is considered to be a REC based on the age, high capacity of gasoline and diesel, and proximity to the Project Corridor of the three active USTs.
	Speedy Food Mart (3702 FM 528) is considered to be a REC based on the site history of a LPST and completed cleanup with final concurrence issued on February 15, 2017. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.
	Smart Stop Food Mart 5103 (5103 FM 2351) is considered to be a REC based on the site history of an LPST and completed cleanup with final concurrence issued on June 28, 2017. While the site is considered closed, the TCEQ recognizes that residual contaminants may be present at the site.

Due to presence of RECs in the in the vicinity of the Project work zones, a Phase II ESA investigation was performed in March 2023 to further review potential for soil contaminants on site. Results from the soil investigation determined that concentration levels for Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs) / Polycyclic aromatic hydrocarbons (PAH), Total Petroleum Hydrocarbon (TPH), Resource Conservation and Recovery Act (RCRA) 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), and Polychlorinated Biphenyls (PCBs) were below residential action levels, and no Texas Commission on Environmental Quality (TCEQ) notification or reporting was required.

Management of On-Site Material

During the normal course of construction minimal fill material or soil is required to be removed from the Project work zones. The majority of soil or fill material at the Project site will be leveled to allow for the installation of storm sewers, water lines, and reconstruction of Blackhawk Boulevard Repackage C.

As a general matter, material excavated during construction activities may be utilized as fill or grading material on site, unless the material is unsuitable for that purpose. Material includes

soil, rock, concrete and other materials that may be encountered during construction or excavation activities. This plan identifies the procedures that shall be utilized to determine if the material is unsuitable for reuse on site, and what actions must be taken to properly manage excavated materials during future site redevelopment activities.

Excavation of Soils

Based on the use of engineering controls to eliminate future routes of exposure and a demonstration of attainment for impacted soils under the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) Tier 1 Protective Concentration Levels (PCLs) Summary Table (TCEQ, 2024[1]) (**Attachment A**), impacted material may be reused on site in accordance, as long as the material is not deemed unsuitable. Materials that are deemed "unsuitable," and cannot be reused on site include:

- Sludge;
- Flowable Product;
- Soil/fill saturated with separate phase liquids (e.g. oil, grease); and
- Storage tank or pipe remains containing flowable product and/or separate phase liquids.

If during construction unsuitable materials are encountered, as described in this MMP, the following management procedures should be employed:

Health and Safety

The appropriate Health and Safety procedures shall be employed by contractors on site that will be managing impacted materials to properly address worker health and safety. Contractors that will be managing impacted materials will be required to develop and maintain on site Health and Safety plans following applicable regulations for potential contaminants of concern on the Project work zones.

Stockpiling of Unsuitable Materials

Unsuitable materials will be stockpiled on and covered with polysheeting or within a covered dumpster until arrangements can be made for off-site disposal to an acceptable/approved location or facility. Temporary fencing will be established around the stockpile area to discourage

[1] Texas Commission on Environmental Quality (TCEQ). 2024. TCEQ Regulatory Guidance RG-366/TRRP-23: Tier 1 PCL Tables. <https://www.tceq.texas.gov/downloads/remediation/trrp/march-2023-pcl-tables.pdf.>.Accessed on May 29, 2024.

trespassers. The stockpile will be placed in a location on site and suitable for project redevelopment that minimizes runoff from stormwater. If stormwater drains are in the vicinity of the stockpile, protection devices should be established prior to material disturbance.

If stockpiled soils require disposal, samples of the media to be disposed of will require chemical analysis. The accepting landfill may require analysis of the materials using the Toxicity Characteristic Leaching Procedure (TCLP) extraction methods for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Other requirements of the receiving landfill may include the analysis of polychlorinated biphenyls (PCBs), ignitability, reactivity and corrosivity. The receiving landfill should be contacted prior to disposal and determine what analytical requirements are required and waste manifesting requirements, if any.

Engineering Controls

If required, engineering controls will be established and employed for the Project work zones to eliminate routes of exposure associated with impacted soil or materials and will include capping of residual contaminants. The engineering controls at the Project work zones will consist of placement of an impervious cap consisting of at least two feet of clean fill, or topsoil and seeded grass in areas slated for landscaping. These engineering controls must be maintained to ensure compliance with the TCEQ requirements.

Regrading Surface Materials

Project development activities may require grading to meet specific use requirements. If contamination is encountered during grading activities, the materials should be stockpiled as described above.

Road Reconstruction

Road reconstruction will require the excavation of soils for the installation of subgrade, concrete paving, utility lines, and drainage infrastructure. Removed soils should be managed in accordance with the procedures outlined above. Suitable materials may be stockpiled within the Project work zone limits for future use as grading and/or fill material within the confines of the Project. If excess suitable material is generated that cannot be used as fill and/or grading material on the Project work zones, those materials can be transported on site to be stored, designated and with the approval of the owner of that property, or it can be removed off-site for appropriate disposal following all applicable Federal, state, and local laws.

Installing or Removing Utilities

Activities such as installing or removing utilities will expose soils along narrow corridors. Suitable soil or fill materials that are excavated to install or replace utilities or roadways should be reused in the excavation to the greatest extent possible. The removal of an existing engineering control (such as concrete or asphalt) will need to be replaced to ensure access to contaminated material continues to be maintained. The construction of a new roadway will establish a new engineering control. Management of the soils/fill under the engineering control should be managed in accordance with the procedures outlined above.

Normal construction procedures should be followed, including Occupational Safety and Health Act (OSHA) regulations for protection of construction workers. If unsuitable materials are encountered during construction activities, those materials will need to be managed in accordance with the procedures described above.

Landscaping

Landscaping activities such as installation of watering systems for irrigation or excavation for the construction of fences should not exceed 2 feet below ground surface and should follow normal construction procedures. For deeper excavations, OSHA regulations for protection of construction workers may be required. If unsuitable materials are encountered during future landscaping activities, those materials will need to be managed in accordance with the procedures described above.

Use of Fill Materials

Future property owners will be required to use fill in accordance with applicable laws, regulations and TCEQ policies. Fill materials from off-site sources must meet current TCEQ policy for clean fill materials.

Attachment A

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Acenaphthene	83-32-9	–	3.0E+03	–	3.0E+03
Acenaphthylene	208-96-8	–	3.8E+03	–	3.8E+03
Acetaldehyde	75-07-0	1.7E+02	1.4E+02	8.7E+01	7.3E+01
Acetate, 2-ethoxyethanol	111-15-9	–	3.5E+03	–	2.3E+03
Acetate, isoamyl	123-92-2	–	5.9E+03	–	5.9E+03
Acetate, isobutyl	110-19-0	–	3.9E+03	–	3.9E+03
Acetate, sec-butyl	105-46-4	–	3.9E+03	–	3.9E+03
Acetic acid*	64-19-7	–	–	–	–
Acetone (2-propanone)	67-64-1	–	6.6E+04	–	5.9E+04
Acetone cyanohydrin	75-86-5	–	1.9E+02	–	1.8E+02
Acetonitrile	75-05-8	–	8.7E+02	–	5.3E+02
Acetophenone	98-86-2	–	6.7E+03	–	6.7E+03
Acetylaminofluorene, 2-	53-96-3	1.2E+00	–	1.1E+00	–
Acifluorfen, sodium	62476-59-9	–	8.7E+02	–	8.7E+02
Acridine	260-94-6	–	2.0E+02	–	2.0E+02
Acrolein	107-02-8	–	3.2E+01	–	2.7E+01
Acrylamide	79-06-1	7.0E+00	1.1E+02	5.7E+00	9.8E+01
Acrylic acid	79-10-7	–	1.2E+02	–	6.2E+01
Acrylonitrile	107-13-1	3.6E+00	2.2E+01	2.2E+00	1.3E+01
Adipic acid (hexanedioic acid)	124-04-9	–	1.3E+05	–	1.3E+05
Alachlor	15972-60-8	5.9E+01	6.7E+02	5.9E+01	6.7E+02
Aldicarb	116-06-3	–	6.7E+01	–	6.7E+01
Aldicarb sulfone	1646-88-4	–	6.7E+01	–	6.7E+01
Aldrin	309-00-2	5.0E-02	5.9E-01	5.0E-02	5.9E-01
Allyl alcohol	107-18-6	–	5.6E+00	–	2.9E+00
Allyl chloride	107-05-1	–	1.5E+01	–	7.8E+00
Aluminum	7429-90-5	–	6.5E+04	–	6.4E+04
Ametryn	834-12-8	–	6.0E+02	–	6.0E+02
Amino-2,6-dinitrotoluene, 4-	19406-51-0	1.6E+02	3.3E+01	1.6E+02	3.3E+01
Amino-4,6-dinitrotoluene, 2-	35572-78-2	1.6E+02	3.3E+01	1.6E+02	3.3E+01
Aminobiphenyl, 4- (1,1-biphenyl-4-amine)	92-67-1	7.7E-01	–	7.7E-01	–
Aminopyridine, 4-	504-24-5	–	1.3E+00	–	1.3E+00
Ammonia	7664-41-7	–	4.9E+03	–	2.5E+03
Ammonium polyphosphate*	6833-79-9	–	–	–	–
Ammonium salts*	AMMONIUM	–	–	–	–
Aniline	62-53-3	8.2E+02	1.0E+02	8.2E+02	5.9E+01
Anthracene	120-12-7	–	1.8E+04	–	1.8E+04
Anthraquinone, 9,10-	84-65-1	1.2E+02	1.3E+03	1.2E+02	1.3E+03
Antimony	7440-36-0	–	1.5E+01	–	1.5E+01
Aramite	140-57-8	1.1E+02	2.4E+03	1.1E+02	2.4E+03
Arsenic	7440-38-2	3.4E+01	2.4E+01	3.4E+01	2.4E+01

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Arsine	7784-42-1	–	7.7E-01	–	3.9E-01
Atrazine	1912-24-9	2.1E+01	2.3E+03	2.1E+01	2.3E+03
Azinphos-methyl (guthion)	86-50-0	–	1.0E+02	–	1.0E+02
Azobenzene	103-33-3	3.7E+01	–	3.6E+01	–
Barium	7440-39-3	–	8.1E+03	–	8.1E+03
Bayleton	43121-43-3	–	2.0E+03	–	2.0E+03
Benefin (benfluralin)	1861-40-1	–	1.9E+04	–	1.9E+04
Benomyl	17804-35-2	–	3.3E+03	–	3.3E+03
Benz-a-anthracene	56-55-3	4.1E+01	–	4.1E+01	–
Benzaldehyde	100-52-7	–	8.2E+03	–	8.2E+03
Benzene	71-43-2	1.2E+02	3.0E+02	6.9E+01	2.9E+02
Benzenedicarbonitrile, 1,3-	626-17-5	–	4.0E+02	–	4.0E+02
Benzenedicarboxylic acid, 1,2-disodecyl ester	26761-40-0	–	2.7E+03	–	2.6E+03
Benzenethiol	108-98-5	–	8.2E+01	–	8.2E+01
Benzidine	92-87-5	1.5E-02	2.0E+02	1.3E-02	2.0E+02
Benzo-a-pyrene	50-32-8	4.1E+00	1.4E+01	4.1E+00	1.2E+01
Benzo-b-fluoranthene	205-99-2	4.2E+01	–	4.1E+01	–
Benzo-e-pyrene	192-97-2	–	1.8E+03	–	1.8E+03
Benzo-g,h,i-perylene	191-24-2	–	1.8E+03	–	1.8E+03
Benzoic acid	65-85-0	–	2.7E+05	–	2.7E+05
Benzo-j-fluoranthene	205-82-3	3.9E+01	–	3.9E+01	–
Benzo-k-fluoranthene	207-08-9	4.2E+02	–	4.2E+02	–
Benzophenone	119-61-9	–	4.5E+02	–	4.5E+02
Benzotrichloride	98-07-7	3.6E-01	–	3.6E-01	–
Benzoyl peroxide	94-36-0	–	3.3E+03	–	3.3E+03
Benzyl alcohol	100-51-6	–	6.7E+03	–	6.7E+03
Benzyl chloride	100-44-7	3.6E+01	2.6E+01	3.6E+01	1.4E+01
Benzyl dichloride	98-87-3	2.8E+01	3.9E+01	2.8E+01	2.3E+01
Beryllium	7440-41-7	9.4E+03	3.8E+01	4.8E+03	3.8E+01
Biphenyl, 1,1-	92-52-4	–	1.2E+04	–	1.2E+04
Biphenyl, 1,1'-, 2-phenoxy-	6738-04-1	–	3.2E+03	–	3.2E+03
Biquinoline, 2,2'-	119-91-5	–	1.8E+02	–	1.8E+02
Bis (2-chloroethoxy) methane	111-91-1	3.1E+00	2.0E+02	2.5E+00	2.0E+02
Bis (2-chloroethyl) ether	111-44-4	2.2E+00	–	1.4E+00	–
Bis (2-chloro-1-methylethyl) ether	108-60-1	5.1E+01	2.7E+03	4.1E+01	2.7E+03
Bis (2-chloromethyl) ether	542-88-1	4.8E-03	–	2.7E-03	–
Bis (2-ethyl-hexyl) phthalate	117-81-7	4.3E+01	2.7E+02	4.3E+01	2.7E+02
Bismuth	7440-69-9	–	3.7E+04	–	3.7E+04
Bisphenol A	80-05-7	–	3.3E+03	–	3.3E+03
Boron	7440-42-8	–	1.6E+04	–	1.6E+04
Bromacil	314-40-9	–	6.7E+03	–	6.7E+03

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Bromo-2-chloroethane, 1-	107-04-0	–	3.3E+03	–	3.3E+03
Bromobenzene	108-86-1	–	3.9E+02	–	2.8E+02
Bromodichloromethane	75-27-4	9.8E+01	6.6E+02	9.8E+01	6.6E+02
Bromoform	75-25-2	4.0E+02	1.6E+03	2.8E+02	1.6E+03
Bromomethane	74-83-9	–	3.9E+01	–	2.4E+01
Bromophenyl phenylether, 4-	101-55-3	2.8E-01	–	2.7E-01	–
Butadiene, 1,3-	106-99-0	7.2E+02	5.1E+02	3.7E+02	2.6E+02
Butadiene, 2-methyl-1,3- (isoprene)	78-79-5	–	4.8E+03	–	4.7E+03
Butanal (butyraldehyde)	123-72-8	–	1.2E+03	–	6.8E+02
Butane, 2,3-dimethyl-	79-29-8	–	4.8E+03	–	4.7E+03
Butanoic acid (butyric acid)	107-92-6	–	1.3E+02	–	6.6E+01
Butanol, 2-	78-92-2	–	1.5E+05	–	1.3E+05
Butanol, 2-methyl-1-	137-32-6	–	8.2E+02	–	8.2E+02
Butanol, 2-methyl-2-	75-85-4	–	8.2E+02	–	8.2E+02
Butanol, n-	71-36-3	–	8.2E+03	–	8.2E+03
Butene, 1-	106-98-9	–	4.6E+03	–	4.4E+03
Butene, cis-2-	590-18-1	–	4.1E+03	–	3.5E+03
Butene, trans-2-	624-64-6	–	4.1E+03	–	3.5E+03
Butoxy ethanol, 2- (Ethylene glycol monobutyl ether; EGBE)	111-76-2	–	6.5E+03	–	6.4E+03
Butyl acetate	123-86-4	–	1.0E+04	–	9.1E+03
Butyl acrylate	141-32-2	–	7.4E+02	–	7.4E+02
Butyl benzyl phthalate	85-68-7	1.6E+03	1.0E+04	1.6E+03	1.0E+04
Butyl ether, n- (dibutyl ether)	142-96-1	–	8.2E+03	–	8.2E+03
Butyl methacrylate	97-88-1	–	3.4E+03	–	3.4E+03
Butylate	2008-41-5	–	3.3E+03	–	3.3E+03
Butylbenzene, n-	104-51-8	–	3.3E+03	–	3.3E+03
Butylbenzene, sec-	135-98-8	–	3.3E+03	–	3.3E+03
Butylbenzene, tert-	98-06-6	–	3.3E+03	–	3.3E+03
Cacodylic acid	75-60-5	–	2.0E+02	–	2.0E+02
Cadmium	7440-43-9	4.6E+04	5.2E+01	2.4E+04	5.1E+01
Calcium*	7440-70-2	–	–	–	–
Caprolactam	105-60-2	–	3.3E+04	–	3.3E+04
Captan	133-06-2	1.3E+03	8.7E+03	1.3E+03	8.7E+03
Carbaryl	63-25-2	–	6.7E+03	–	6.7E+03
Carbazole	86-74-8	2.3E+02	–	2.3E+02	–
Carbofuran	1563-66-2	–	3.3E+02	–	3.3E+02
Carbon disulfide	75-15-0	–	4.6E+03	–	3.3E+03
Carbon tetrachloride	56-23-5	3.5E+01	2.7E+02	2.3E+01	2.3E+02
Carbophenothion	786-19-6	–	8.2E+02	–	8.2E+02
Carbosulfan	55285-14-8	–	4.3E+02	–	4.3E+02
Carboxin	5234-68-4	–	6.7E+03	–	6.7E+03

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Chloral	75-87-6	–	8.2E+03	–	8.2E+03
Chloral hydrate (1,1-ethanediol, 2,2,2-trichloro-)	302-17-0	–	6.7E+03	–	6.7E+03
Chloramben (amiben; 3-amino-2,5-dichlorobenzoic acid)	133-90-4	–	1.0E+03	–	1.0E+03
Chlordane (technical)	12789-03-6	6.0E+00	2.0E+01	5.9E+00	2.0E+01
Chlordane, cis- (alpha chlordane)	5103-71-9	1.3E+01	3.2E+01	1.3E+01	3.2E+01
Chlordane, trans- (gamma chordane)	5103-74-2	7.4E+00	2.3E+01	7.3E+00	2.3E+01
Chlorfenvinphos	470-90-6	–	1.4E+01	–	9.6E+00
Chloride*	16887-00-6	–	–	–	–
Chlorine	7782-50-5	–	1.3E+02	–	6.8E+01
Chloro-1,3-butadiene, 2-	126-99-8	1.2E+00	3.1E+02	6.1E-01	1.6E+02
Chloro-2-propanol, 1-	127-00-4	–	1.6E+03	–	1.6E+03
Chloro-3-methylphenol, 4-	59-50-7	–	3.3E+02	–	3.3E+02
Chloroaniline, p-	106-47-8	2.3E+01	2.7E+02	2.3E+01	2.7E+02
Chlorobenzene	108-90-7	–	5.2E+02	–	3.2E+02
Chlorobenzilate	510-15-6	1.7E+01	1.3E+03	1.6E+01	1.3E+03
Chlorobromomethane (bromochloromethane)	74-97-5	–	3.3E+03	–	3.3E+03
Chlorodifluoromethane	75-45-6	–	7.7E+05	–	3.9E+05
Chloroethane (ethyl chloride)	75-00-3	–	2.7E+04	–	2.3E+04
Chloroethanol, 2-	107-07-3	–	1.6E+03	–	1.6E+03
Chloroethoxy ethene, 2- (2-chloroethylvinylether)	110-75-8	5.5E+00	4.5E+00	5.5E+00	2.3E+00
Chloroform	67-66-3	1.6E+01	5.3E+02	8.0E+00	4.0E+02
Chlorohexane, 1-	544-10-5	–	2.7E+03	–	2.3E+03
Chloromethane (methyl chloride)	74-87-3	1.4E+02	2.4E+02	8.4E+01	2.1E+02
Chloronaphthalene, 1- (Chloronaphthalene, alpha-)	90-13-1	–	4.6E+03	–	4.6E+03
Chloronaphthalene, 2- (chloronaphthalene, beta)	91-58-7	–	5.0E+03	–	5.0E+03
Chloronitrobenzene, p- (1-chloro-4-nitrobenzene)	100-00-5	7.5E+02	3.2E+01	7.5E+02	2.2E+01
Chlorophenol, 2-	95-57-8	–	4.1E+02	–	4.1E+02
Chlorophenol, 3-	108-43-0	–	3.3E+02	–	3.3E+02
Chlorophenol, 4-	106-48-9	–	3.3E+02	–	3.3E+02
Chlorophenyl phenylether, 4-	7005-72-3	1.6E-01	–	1.5E-01	–
Chloropropane, 2-	75-29-6	–	9.4E+02	–	6.0E+02
Chlorothalonil	1897-45-6	4.3E+02	1.0E+03	4.3E+02	1.0E+03
Chlorotoluene, o- (2-chlorotoluene)	95-49-8	–	1.2E+03	–	1.1E+03
Chlorotoluene, p- (4-chlorotoluene)	106-43-4	–	1.6E+03	–	1.6E+03
Chlorpyrifos	2921-88-2	–	1.3E+02	–	1.3E+02
Chromium (III)	16065-83-1	–	3.3E+04	–	2.7E+04
Chromium (total)	7440-47-3	–	3.3E+04	–	2.7E+04
Chromium (VI)	18540-29-9	9.8E+03	1.2E+02	5.1E+03	1.2E+02
Chrysene	218-01-9	4.1E+03	–	4.1E+03	–
Cobalt	7440-48-4	3.8E+03	6.8E+02	1.9E+03	6.8E+02
Copolymer acrylamide	69418-26-4	–	1.3E+01	–	1.3E+01

Table 4
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Last Revised: March 6, 2023

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		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Copper	7440-50-8	–	1.3E+03	–	1.3E+03
Coronene	191-07-1	–	1.3E+02	–	1.3E+02
Coumaphos	56-72-4	–	4.3E+02	–	4.3E+02
Cresol	1319-77-3	–	3.3E+03	–	3.3E+03
Cresol, m- (3-methylphenol)	108-39-4	–	3.3E+03	–	3.3E+03
Cresol, o- (2-methylphenol)	95-48-7	–	3.3E+03	–	3.3E+03
Cresol, p- (4-methylphenol)	106-44-5	–	3.3E+02	–	3.3E+02
Crotonaldehyde	123-73-9	3.2E+00	8.2E+01	3.2E+00	8.2E+01
Cumene (isopropylbenzene)	98-82-8	–	4.3E+03	–	3.0E+03
Cyanazine	21725-46-2	5.6E+00	1.3E+02	5.6E+00	1.3E+02
Cyanide	57-12-5	–	4.5E+01	–	4.3E+01
Cyanogen	460-19-5	–	1.1E+01	–	5.9E+00
Cycloate	1134-23-2	–	3.7E+03	–	3.7E+03
Cyclohexane	110-82-7	–	7.5E+04	–	4.2E+04
Cyclohexanol	108-93-0	–	3.3E+05	–	3.3E+05
Cyclohexanone	108-94-1	–	3.2E+04	–	1.7E+04
Cyclohexene, 1-methanol-3-	1679-51-2	–	1.3E+03	–	1.3E+03
Cyclohexene, 4-vinyl-1-	100-40-3	–	1.3E+03	–	1.1E+03
Cyclopentane	287-92-3	–	4.8E+03	–	4.8E+03
Cyclopentane, methyl-	96-37-7	–	5.3E+03	–	4.0E+03
Cyclopentene	142-29-0	–	4.1E+05	–	4.1E+05
Cyclotetramethylenetetranitramine (HMX)	2691-41-0	–	1.6E+03	–	1.6E+03
Cyclotrimethylenetrinitramine (RDX)	121-82-4	5.9E+01	2.7E+02	5.9E+01	2.7E+02
Cymene (isopropyltoluene)	99-87-6	–	8.2E+03	–	8.2E+03
Cymoxanil	57966-95-7	–	8.7E+02	–	8.7E+02
Dacthal (DCPA)	1861-32-1	–	6.2E+02	–	6.2E+02
Dalapon, sodium salt (2,2-dichloropropanoic acid)	75-99-0	–	2.0E+03	–	2.0E+03
DDD	72-54-8	1.4E+01	–	1.4E+01	–
DDE	72-55-9	1.0E+01	–	1.0E+01	–
DDT	50-29-3	5.4E+00	1.9E+01	5.4E+00	1.9E+01
Demeton	8065-48-3	–	2.7E+00	–	2.7E+00
Desethylatrazine	6190-65-4	–	2.3E+03	–	2.3E+03
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	123-42-2	–	2.7E+03	–	2.7E+03
Diallate	2303-16-4	3.8E+01	–	3.8E+01	–
Diazinon	333-41-5	–	3.1E+01	–	2.1E+01
Dibenz(a,h)acridine	226-36-8	3.7E+00	–	3.7E+00	–
Dibenz(a,j)acridine	224-42-0	5.8E+00	–	5.8E+00	–
Dibenz-a,h-anthracene	53-70-3	4.0E+00	–	4.0E+00	–
Dibenzo(a,e)pyrene	192-65-4	6.1E-01	–	6.1E-01	–
Dibenzo(a,h)pyrene	189-64-0	6.1E-02	–	6.1E-02	–
Dibenzo(a,i)pyrene	189-55-9	6.1E-02	–	6.1E-02	–

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Dibenzofuran	132-64-9	–	2.7E+02	–	2.7E+02
Dibenzothiophene	132-65-0	–	1.9E+02	–	1.9E+02
Dibromo-3-chloropropane, 1,2-	96-12-8	1.5E-01	5.0E+00	8.0E-02	3.2E+00
Dibromochloromethane (chlorodibromomethane)	124-48-1	7.2E+01	1.6E+03	7.2E+01	1.6E+03
Dibromofluoromethane	1868-53-7	–	1.6E+04	–	1.6E+04
Dicamba	1918-00-9	–	2.0E+03	–	2.0E+03
Dichlormid	37764-25-3	–	1.7E+03	–	1.7E+03
Dichloro-2-butene, 1,4-	764-41-0	2.0E-01	–	1.0E-01	–
Dichloro-2-butene, 1,4- trans	110-57-6	2.0E-01	–	1.1E-01	–
Dichlorobenzene, 1,2-	95-50-1	–	7.2E+02	–	3.9E+02
Dichlorobenzene, 1,3-	541-73-1	–	1.2E+02	–	6.2E+01
Dichlorobenzene, 1,4-	106-46-7	2.5E+02	1.2E+04	2.5E+02	6.1E+03
Dichlorobenzidine, 3,3-	91-94-1	1.0E+01	–	1.0E+01	–
Dichlorobutane, 2,3-	7581-97-7	–	9.5E+01	–	5.2E+01
Dichlorodifluoromethane	75-71-8	–	1.4E+03	–	7.5E+02
Dichloroethane, 1,1-	75-34-3	–	1.1E+04	–	8.8E+03
Dichloroethane, 1,2-	107-06-2	4.1E+01	6.1E+02	3.0E+01	3.3E+02
Dichloroethylene, 1,1-	75-35-4	–	2.3E+03	–	1.6E+03
Dichloroethylene, cis-1,2-	156-59-2	–	1.4E+02	–	1.2E+02
Dichloroethylene, trans-1,2	156-60-5	–	5.9E+02	–	3.7E+02
Dichlorofluoromethane	75-43-4	–	1.6E+04	–	1.6E+04
Dichlorophenol, 2,3-	576-24-9	–	2.0E+02	–	2.0E+02
Dichlorophenol, 2,4-	120-83-2	–	2.0E+02	–	2.0E+02
Dichlorophenol, 2,5-	583-78-8	–	2.0E+02	–	2.0E+02
Dichlorophenol, 2,6-	87-65-0	–	6.7E+01	–	6.7E+01
Dichlorophenol, 3,4-	95-77-2	–	2.0E+02	–	2.0E+02
Dichlorophenol, 3,5-	591-35-5	–	2.0E+02	–	2.0E+02
Dichlorophenoxy, 2,4- butyric acid, 4- (2,4-DB)	94-82-6	–	5.3E+02	–	5.3E+02
Dichlorophenoxyacetic acid, 2,4- (2,4-D)	94-75-7	–	1.5E+04	–	1.5E+04
Dichloroprop (2-(2,4-dichlorophenoxy) propanoic acid)	120-36-5	–	6.7E+02	–	6.7E+02
Dichloropropane, 1,2-	78-87-5	1.2E+02	6.1E+01	9.0E+01	3.1E+01
Dichloropropane, 1,3-	142-28-9	3.6E+01	2.6E+02	2.6E+01	1.4E+02
Dichloropropane, 2,2-	594-20-7	8.9E+01	6.1E+01	8.9E+01	3.1E+01
Dichloropropanol, 2,3-	616-23-9	–	2.0E+02	–	2.0E+02
Dichloropropene, 1,1-	563-58-6	3.6E+01	2.7E+02	2.6E+01	1.5E+02
Dichloropropene, 1,3- (mixed isomers)	542-75-6	3.6E+01	2.7E+02	2.6E+01	1.5E+02
Dichloropropene, cis 1,3-	10061-01-5	1.1E+01	8.0E+00	1.1E+01	7.8E+00
Dichloropropene, trans 1,3-	10061-02-6	3.6E+01	2.7E+02	2.6E+01	1.5E+02
Dichlorvos	62-73-7	1.6E+01	3.3E+01	1.6E+01	3.3E+01
Dicrotophos (bidrin)	141-66-2	–	6.7E+00	–	6.7E+00
Dicyclopentadiene	77-73-6	–	6.6E+03	–	6.6E+03

Table 4
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Dieldrin	60-57-1	1.5E-01	2.2E+00	1.5E-01	2.2E+00
Diethanolamine	111-42-2	–	3.3E+01	–	3.3E+01
Diethyldithiocarbamate, sodium salt	148-18-5	2.2E+01	2.5E+03	2.2E+01	2.5E+03
Diethyl phthalate	84-66-2	–	5.3E+04	–	5.3E+04
Diethylene glycol	111-46-6	–	1.3E+05	–	1.3E+05
Diethylene glycol monobutyl ether	112-34-5	–	2.0E+01	–	1.0E+01
Diethylhexyl adipate	103-23-1	3.9E+03	4.0E+04	3.9E+03	4.0E+04
Diethylstilbestrol	56-53-1	7.1E-04	–	7.1E-04	–
Diisobutylene (trimethyl-1-pentene, 2,4,4-)	107-39-1	–	1.9E+03	–	1.2E+03
Diisopropylbenzene, p-	100-18-5	–	6.7E+02	–	6.7E+02
Diisopropyl ether (2,2'-oxybis-propane)	108-20-3	–	4.6E+03	–	3.3E+03
Dimethenamid	87674-68-8	–	1.0E+03	–	1.0E+03
Dimethoate	60-51-5	–	1.3E+01	–	1.3E+01
Dimethoxybenzidine, 3,3'-	119-90-4	3.4E+02	–	3.4E+02	–
Dimethyl-2-nitrobenzene, 1,3-	81-20-9	–	1.3E+02	–	1.2E+02
Dimethyl-3-nitrobenzene, 1,2-	83-41-0	–	1.3E+02	–	1.2E+02
Dimethyl-4-nitrobenzene, 1-2-	99-51-4	–	1.3E+02	–	1.2E+02
Dimethyl-5-nitrobenzene, 1,3-	99-12-7	–	1.3E+02	–	1.2E+02
Dimethylphenethylamine, alpha, alpha-	122-09-8	–	1.3E+02	–	1.3E+02
Dimethyl phenol, 2,4-	105-67-9	–	1.3E+03	–	1.3E+03
Dimethylaminoazobenzene, p-	60-11-7	–	6.4E-01	–	6.4E-01
Dimethylbenz-a-anthracene, 7,12-	57-97-6	1.7E-02	–	1.7E-02	–
Dimethylbenzidine, 3,3'-	119-93-7	4.3E-01	–	4.3E-01	–
Dimethylformamide, N,N-	68-12-2	–	2.3E+03	–	1.4E+03
Dimethylnaphthalene, 1,3-	575-41-7	–	2.3E+03	–	2.3E+03
Dimethylphthalate	131-11-3	–	5.3E+04	–	5.3E+04
Di-n-butyl phthalate	84-74-2	–	6.2E+03	–	6.2E+03
Dinitro-2-methylphenol, 4,6- (dinitro-o-cresol, 4, 6-)	534-52-1	–	6.7E+00	–	6.7E+00
Dinitrobenzene, 1,3- (dinitrobenzene, 2,4-)	99-65-0	–	6.7E+00	–	6.7E+00
Dinitrobenzene, 1,4-	100-25-4	–	6.7E+00	–	6.7E+00
Dinitrophenol, 2,4-	51-28-5	–	1.3E+02	–	1.3E+02
Dinitrophenol, 2,5-	329-71-5	–	1.3E+02	–	1.3E+02
Dinitrotoluene, 2,4-	121-14-2	6.9E+00	1.3E+02	6.9E+00	1.3E+02
Dinitrotoluene, 2,6-	606-20-2	6.9E+00	6.7E+01	6.9E+00	6.7E+01
Di-n-octyl phthalate	117-84-0	–	6.4E+02	–	6.4E+02
Dinoseb	88-85-7	–	6.7E+01	–	6.7E+01
Dioxane 1,4-	123-91-1	4.5E+01	1.6E+03	3.7E+01	1.2E+03
Dioxin (as 2,3,7,8-TCDD toxicity equivalent quotients (TEQs))	1746-01-6	–	–	–	–
Diphenyl ether	101-84-8	–	3.8E+02	–	3.8E+02
Diphenylamine	122-39-4	–	1.7E+03	–	1.7E+03
Diphenylhydrazine, 1,2-	122-66-7	5.6E+00	–	5.4E+00	–

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Dipropylene glycol	110-98-5	–	8.0E+03	–	8.0E+03
Diquat	85-00-7	–	1.5E+02	–	1.5E+02
Disodium iminodiacetate (iminodiacetic acid, disodium salt)	142-73-4	–	6.7E+02	–	6.7E+02
Disulfoton	298-04-4	–	2.7E+00	–	2.7E+00
Diuron	330-54-1	–	1.3E+02	–	1.3E+02
Dodecylphenol, 4-	104-43-8	–	3.3E+03	–	3.3E+03
Endosulfan	115-29-7	–	4.0E+02	–	4.0E+02
Endosulfan I	959-98-8	–	9.1E+01	–	9.1E+01
Endosulfan II	33213-65-9	–	2.7E+02	–	2.7E+02
Endosulfan sulfate	1031-07-8	–	3.8E+02	–	3.8E+02
Endothall	145-73-3	–	1.3E+03	–	1.3E+03
Endrin	72-20-8	–	9.0E+00	–	9.0E+00
Endrin aldehyde	7421-93-4	–	1.9E+01	–	1.9E+01
Endrin ketone	53494-70-5	–	1.9E+01	–	1.9E+01
Epichlorohydrin	106-89-8	2.8E+02	2.5E+01	1.8E+02	1.3E+01
EPN (o-ethyl o-(4-nitrophenyl)phenylphosphonothioate)	2104-64-5	–	6.7E-01	–	6.7E-01
Esfenvalerate	66230-04-4	–	7.4E+01	–	7.4E+01
Ethalfluralin (sonolan)	55283-68-6	4.7E+01	2.5E+03	4.7E+01	2.5E+03
Ethanol	64-17-5	–	1.0E+06	–	1.0E+06
Ethanol, 2-amino-	141-43-5	–	1.1E+02	–	1.1E+02
Ethanol, 2-(2-aminoethoxy)-	929-06-6	–	3.3E+01	–	3.3E+01
Ethanol, 2-(2-ethoxyethoxy)-	111-90-0	–	1.3E+05	–	1.3E+05
Ethanol, 2-(methylamino)-	109-83-1	–	9.1E+02	–	8.1E+02
Ethion	563-12-2	–	2.7E+01	–	2.7E+01
Ethoprop	13194-48-4	1.7E+02	6.7E+00	1.7E+02	6.7E+00
Ethoxy ethanol, 2-	110-80-5	–	5.7E+03	–	4.7E+03
Ethyl acetate	141-78-6	–	3.5E+03	–	1.8E+03
Ethyl acrylate	140-88-5	1.3E+02	1.5E+02	1.3E+02	9.6E+01
Ethyl benzene	100-41-4	–	6.4E+03	–	5.3E+03
Ethyl dipropylthiocarbamate, S-	759-94-4	–	1.7E+03	–	1.7E+03
Ethyl ether	60-29-7	–	1.6E+04	–	1.6E+04
Ethyl methacrylate	97-63-2	–	3.6E+03	–	2.4E+03
Ethyl methanesulfonate	62-50-0	3.4E+01	–	2.7E+01	–
Ethyl tert-butyl ether (2-ethyl-2-ethoxypropane)	637-92-3	–	8.0E+01	–	7.9E+01
Ethyl-1-hexanol, 2-	104-76-7	–	1.0E+04	–	1.0E+04
Ethyl-2-hexenal, 2-	645-62-5	–	1.2E+04	–	1.2E+04
Ethyl-2-methyl benzene, 1-	611-14-3	–	2.8E+03	–	2.1E+03
Ethyl-4-methyl benzene, 1-	622-96-8	–	2.6E+03	–	1.9E+03
Ethylene*	74-85-1	–	–	–	–
Ethylene dibromide (dibromoethane, 1,2-)	106-93-4	2.5E+00	5.1E+02	2.1E+00	4.0E+02
Ethylene glycol	107-21-1	–	1.3E+05	–	1.3E+05

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Ethylene oxide	75-21-8	5.8E+00	–	5.7E+00	–
Ethylene thiourea	96-45-7	4.3E+01	5.3E+00	4.3E+01	5.3E+00
Ethylenediamine	107-15-3	–	7.4E+03	–	7.4E+03
Ethylenimine	151-56-4	5.5E-02	–	3.9E-02	–
Ethylhexyl acrylate, 2-	103-11-7	9.8E+01	–	9.8E+01	–
Famphur	52-85-7	–	2.0E+00	–	2.0E+00
Fensulfothion	115-90-2	–	6.7E+01	–	6.7E+01
Fenthion	55-38-9	–	4.7E+00	–	4.7E+00
Fenuron	101-42-8	–	4.7E+03	–	4.7E+03
Fluoranthene	206-44-0	–	2.3E+03	–	2.3E+03
Fluorene	86-73-7	–	2.3E+03	–	2.3E+03
Fluorine (soluble fluoride)	7782-41-4	–	4.8E+03	–	4.8E+03
Fluorochloridone	61213-25-0	–	5.0E+02	–	5.0E+02
Fonofos	944-22-9	–	1.3E+02	–	1.3E+02
Formaldehyde	50-00-0	–	9.3E+02	–	4.9E+02
Formic acid	64-18-6	–	2.1E+02	–	1.1E+02
Furan	110-00-9	–	8.2E+01	–	8.2E+01
Furfural	98-01-1	–	2.5E+02	–	2.5E+02
Glycidylaldehyde	765-34-4	–	2.7E+01	–	2.3E+01
Glyphosate	1071-83-6	–	6.7E+04	–	6.7E+04
Heptachlor	76-44-8	1.3E-01	7.1E+00	1.3E-01	7.1E+00
Heptachlor epoxide	1024-57-3	2.4E-01	5.4E-01	2.4E-01	5.4E-01
Heptane, n-	142-82-5	–	4.7E+03	–	4.6E+03
Heptanoic acid, n-	111-14-8	–	1.2E+02	–	6.3E+01
Hexachlorobenzene	118-74-1	1.1E+00	2.9E+01	1.0E+00	2.9E+01
Hexachlorobutadiene	87-68-3	2.0E+01	6.7E+01	1.2E+01	6.7E+01
Hexachlorocyclohexane, alpha (alpha-BHC)	319-84-6	2.6E-01	2.7E+02	2.5E-01	2.7E+02
Hexachlorocyclohexane, beta (beta-BHC)	319-85-7	9.3E-01	–	9.2E-01	–
Hexachlorocyclohexane, delta (delta-BHC)	319-86-8	2.9E+00	2.2E+01	2.9E+00	2.2E+01
Hexachlorocyclohexane, gamma (lindane; gamma-BHC)	58-89-9	1.1E+00	9.2E+00	1.1E+00	9.2E+00
Hexachlorocyclohexane, techn (technical-BHC)	608-73-1	1.3E+00	–	1.3E+00	–
Hexachlorocyclopentadiene	77-47-4	–	1.4E+01	–	7.2E+00
Hexachloroethane	67-72-1	1.2E+02	4.6E+01	1.2E+02	4.6E+01
Hexachlorophene	70-30-4	–	2.0E+01	–	2.0E+01
Hexachloropropylene	1888-71-7	1.2E+02	4.6E+01	1.2E+02	4.6E+01
Hexanal, 2-ethyl-	123-05-7	–	1.0E+04	–	1.0E+04
Hexane, n-	110-54-3	–	3.3E+03	–	2.5E+03
Hexanediamine, 1,6-	124-09-4	–	3.3E+02	–	3.3E+02
Hexanedinitrile	111-69-3	–	8.5E+01	–	7.9E+01
Hexanediol, 1,6-	629-11-8	–	3.0E+05	–	2.8E+05
Hexanoic acid	142-62-1	–	1.3E+02	–	6.9E+01

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Hexanone, 2-	591-78-6	–	6.9E+02	–	3.8E+02
Hexazinone	51235-04-2	–	2.2E+03	–	2.2E+03
Hexene, 1-	592-41-6	–	1.6E+03	–	8.4E+02
Hexene, cis-2-	7688-21-3	–	1.6E+03	–	8.4E+02
Hexylene glycol (2-methyl-2,4-pentanediol)	107-41-5	–	2.0E+04	–	2.0E+04
Hydrazine	302-01-2	3.8E-01	2.9E+00	2.1E-01	1.5E+00
Hydrocaproic acid, 6- (6-hydroxyhexanoic acid)	1191-25-9	–	1.6E+02	–	8.1E+01
Hydrogen chloride (hydrochloric acid)*	7647-01-0	–	–	–	–
Hydroquinone	123-31-9	7.8E+01	2.7E+03	7.8E+01	2.7E+03
Indene	95-13-6	–	1.0E+02	–	5.6E+01
Indeno-1,2,3-cd-pyrene	193-39-5	4.2E+01	–	4.2E+01	–
Iron*	7439-89-6	–	–	–	–
Isoamyl alcohol	123-51-3	–	4.1E+02	–	4.1E+02
Isobutyl alcohol	78-83-1	–	2.5E+04	–	2.5E+04
Isobutylene (2-methyl-1-propene)	115-11-7	–	3.0E+02	–	3.0E+02
Isobutyric acid (2-methylpropanoic acid)	79-31-2	–	3.3E+04	–	3.3E+04
Isodecanol	25339-17-7	–	7.1E+01	–	7.1E+01
Isodrin	465-73-6	2.7E-02	2.0E-01	2.7E-02	2.0E-01
Isopentane	78-78-4	–	4.8E+03	–	4.8E+03
Isophorone	78-59-1	4.9E+03	1.3E+04	4.9E+03	1.3E+04
Isopropyl acetate	108-21-4	–	5.7E+03	–	5.7E+03
Isopropyl alcohol	67-63-0	–	9.1E+03	–	4.8E+03
Isosafrole	120-58-1	1.7E+01	–	1.5E+01	–
Kelthane (dicofol)	115-32-2	–	2.7E+02	–	2.7E+02
Kepone (chlordecone)	143-50-0	3.6E-01	1.7E+01	3.5E-01	1.7E+01
Lead (inorganic)	7439-92-1	–	–	–	–
Leptophos	21609-90-5	–	1.6E-01	–	1.6E-01
Limonene, d-*	5989-27-5	–	–	–	–
Lithium	7439-93-2	–	4.4E+02	–	4.4E+02
Magnesium*	7439-95-4	–	–	–	–
Malathion	121-75-5	–	1.7E+02	–	9.6E+01
Maleic anhydride	108-31-6	–	6.7E+03	–	6.7E+03
Maleic hydrazide	123-33-1	–	3.3E+04	–	3.3E+04
Malononitrile	109-77-3	–	6.7E+00	–	6.7E+00
Mancozeb	8018-01-7	–	2.0E+03	–	2.0E+03
Manganese	7439-96-5	–	3.9E+03	–	3.9E+03
MCPA (4-(chloro-2-methylphenoxy) acetic acid)	94-74-6	–	3.3E+01	–	3.3E+01
MCPP (2-(4-chloro-2-methylphenoxy) propanoic acid)	93-65-2	–	6.7E+01	–	6.7E+01
Mercury (pH = 4.9)[1]	7439-97-6	–	3.6E+00	–	2.1E+00
Mercury (pH=6.8)[1]	7439-97-6	–	8.3E+00	–	5.5E+00
Merphos	150-50-5	–	2.0E+00	–	2.0E+00

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Methacrylic acid (2-methyl-2-propenoic acid)	79-41-4	–	8.2E+02	–	8.2E+02
Methacrylonitrile	126-98-7	–	5.1E+02	–	2.8E+02
Methanol	67-56-1	–	1.1E+05	–	8.3E+04
Methapyrilene	91-80-5	1.0E+00	–	1.0E+00	–
Methomyl	16752-77-5	–	1.7E+03	–	1.7E+03
Methoxychlor	72-43-5	–	2.7E+02	–	2.7E+02
Methoxyethanol, 2-	109-86-4	–	2.7E+02	–	1.5E+02
Methyl acetate (acetic acid, methyl ester)	79-20-9	–	8.2E+04	–	8.2E+04
Methyl acrylate	96-33-3	–	1.1E+02	–	8.0E+01
Methyl amyl ketone (2-heptanone)	110-43-0	–	3.9E+03	–	3.8E+03
Methyl chrysene, 1-	3351-28-8	5.8E+02	–	5.8E+02	–
Methyl chrysene, 2-	3351-32-4	5.8E+02	–	5.8E+02	–
Methyl chrysene, 6-	1705-85-7	5.7E+01	–	5.7E+01	–
Methyl cyclohexane	108-87-2	–	4.1E+04	–	2.2E+04
Methyl ethyl ketone (2-butanone)	78-93-3	–	4.0E+04	–	3.3E+04
Methyl iodide (iodomethane)	74-88-4	–	1.1E+02	–	1.1E+02
Methyl isobutyl ketone (4-methyl-2-pentanone)	108-10-1	–	5.9E+03	–	5.4E+03
Methyl mercury	22967-92-6	–	8.0E+00	–	8.0E+00
Methyl methacrylate	80-62-6	–	9.8E+03	–	5.3E+03
Methyl methanesulfonate	66-27-3	3.3E+01	–	2.6E+01	–
Methyl parathion	298-00-0	–	1.7E+01	–	1.7E+01
Methyl-1-butene, 2-	563-46-2	–	4.8E+03	–	4.7E+03
Methyl-1-propanal, 2- (isobutyraldehyde)	78-84-2	–	3.3E+03	–	3.3E+03
Methyl-2-butene, 2-	513-35-9	–	4.8E+03	–	4.7E+03
Methyl-2-pentenal, 2-	623-36-9	3.2E+00	–	3.2E+00	–
Methylcholanthrene, 3-	56-49-5	1.9E-01	–	1.9E-01	–
Methylene bromide (dibromomethane)	74-95-3	8.1E+02	8.1E+01	8.1E+02	4.2E+01
Methylene chloride (dichloromethane)	75-09-2	1.1E+04	1.6E+03	5.9E+03	1.5E+03
Methylene-bis (2-chloroaniline) 4,4'-	101-14-4	4.6E+01	1.3E+02	4.5E+01	1.3E+02
Methylmecury hydroxide	1184-57-2	–	6.7E+00	–	6.7E+00
Methylnaphthalene, 1-	90-12-0	1.5E+02	4.4E+03	1.5E+02	4.4E+03
Methylnaphthalene, 2-	91-57-6	–	2.5E+02	–	2.5E+02
Methylpyrrolidone, N-	872-50-4	–	1.3E+03	–	1.3E+03
Methylstyrene, alpha-	98-83-9	–	2.8E+02	–	1.8E+02
Methyltetrahydrofuran, 2-	96-47-9	1.5E+02	1.6E+04	8.6E+01	1.6E+04
Methyltetrahydropyran, 2-	10141-72-7	1.7E+02	1.6E+04	9.8E+01	1.6E+04
Metolachlor	51218-45-2	–	1.0E+04	–	1.0E+04
Metribuzin	21087-64-9	–	1.7E+03	–	1.7E+03
Mirex	2385-85-5	–	1.3E+01	–	1.3E+01
Molinate	2212-67-1	–	1.3E+02	–	1.3E+02
Molybdenum	7439-98-7	–	1.6E+02	–	1.6E+02

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

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		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Monocrotophos	2157-98-4	–	4.0E+01	–	4.0E+01
Morpholine	110-91-8	–	1.0E+06	–	1.0E+06
Morpholine, N-butyl-	1005-67-0	–	1.5E+02	–	1.5E+02
MTBE (methyl tert-butyl ether)	1634-04-4	9.8E+02	8.0E+02	5.9E+02	7.9E+02
Naled	300-76-5	–	1.3E+02	–	1.3E+02
Naphthalene	91-20-3	–	2.2E+02	–	1.2E+02
Naphthoquinone, 1,4-	130-15-4	–	4.7E+02	–	4.7E+02
Naphthylamine, 1-	134-32-7	–	1.3E+03	–	1.3E+03
Naphthylamine, 2-	91-59-8	2.6E+00	–	2.6E+00	–
Napropamide	15299-99-7	–	6.7E+03	–	6.7E+03
Neopentyl glycol	126-30-7	–	2.0E+04	–	2.0E+04
Nickel and compounds	7440-02-0	1.3E+05	8.4E+02	6.8E+04	8.4E+02
Nitrate-N	14797-55-8	–	1.3E+05	–	1.3E+05
Nitrite-N	14797-65-0	–	8.0E+03	–	8.0E+03
Nitroaniline, 2-	88-74-4	–	1.4E+01	–	1.1E+01
Nitroaniline, 3-	99-09-2	1.2E+02	1.5E+01	1.2E+02	1.2E+01
Nitroaniline, 4-	100-01-6	2.3E+02	2.2E+02	2.3E+02	1.9E+02
Nitrobenzene	98-95-3	6.6E+01	1.2E+02	3.4E+01	1.1E+02
Nitroglycerin	55-63-0	2.8E+02	6.7E+00	2.8E+02	6.7E+00
Nitrophenol, 2-	88-75-5	–	1.3E+02	–	1.3E+02
Nitrophenol, 3-	554-84-7	–	1.3E+02	–	1.3E+02
Nitrophenol, 4-	100-02-7	–	1.3E+02	–	1.3E+02
Nitropropane, 2-	79-46-9	6.2E-01	1.1E+01	3.2E-01	1.1E+01
Nitroquinoline-N-oxide, 4-	56-57-5	4.0E-01	–	3.3E-01	–
Nitrosodiethanolamine	1116-54-7	1.7E+00	–	1.7E+00	–
Nitrosodiethylamine, n-	55-18-5	2.5E-02	–	1.8E-02	–
Nitrosodimethylamine, n-	62-75-9	7.4E-02	5.8E-01	5.5E-02	5.2E-01
Nitrosodi-n-butylamine, n-	924-16-3	4.7E-01	–	3.3E-01	–
Nitrosodi-n-propylamine, n-	621-64-7	4.0E-01	–	4.0E-01	–
Nitrosodiphenylamine	86-30-6	5.7E+02	–	5.7E+02	–
Nitroso-methyl-ethyl-amine, n-	10595-95-6	2.8E-01	–	2.8E-01	–
Nitrosomorpholine, N-	59-89-2	5.0E-01	–	3.9E-01	–
Nitroso-n-ethylurea, n-	759-73-9	3.4E-02	–	3.4E-02	–
Nitrosopiperidine, N-	100-75-4	3.6E-01	–	2.9E-01	–
Nitrosopyrrolidine, n-	930-55-2	1.6E+00	–	1.3E+00	–
Nitrotoluene, m-	99-08-1	–	6.7E+02	–	6.7E+02
Nitrotoluene, o-	88-72-2	2.1E+01	6.0E+01	2.1E+01	6.0E+01
Nitrotoluene, p-	99-99-0	2.9E+02	2.7E+02	2.9E+02	2.7E+02
Nonachlor, cis-	5103-73-1	5.6E+00	1.9E+01	5.6E+00	1.9E+01
Nonachlor, trans-	39765-80-5	5.6E+00	1.9E+01	5.6E+00	1.9E+01
Nonanal	124-19-6	–	1.3E+04	–	1.3E+04

Table 4
Tier 1 Residential Total Soil Combined PCLs
Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Nonene, 1-n	124-11-8	–	8.2E+03	–	8.2E+03
Nonylphenol, 4-n-	104-40-5	–	6.5E+03	–	6.5E+03
Nonylphenol ethoxylate	9016-45-9	–	6.5E+03	–	6.5E+03
Octamethylpyrophosphoramide	152-16-9	–	1.3E+02	–	1.3E+02
Octanone	106-68-3	–	4.9E+03	–	4.9E+03
Oxamyl	23135-22-0	–	1.7E+03	–	1.7E+03
Oxychlordane	27304-13-8	5.6E+00	1.9E+01	5.6E+00	1.9E+01
Paraquat	1910-42-5	–	3.0E+02	–	3.0E+02
Parathion (ethyl parathion)	56-38-2	–	4.0E+02	–	4.0E+02
Pebulate	1114-71-2	–	3.3E+03	–	3.3E+03
Pendimethalin	40487-42-1	–	2.5E+03	–	2.5E+03
Pentachlorobenzene	608-93-5	–	5.3E+01	–	5.3E+01
Pentachloroethane	76-01-7	3.9E+01	2.5E+03	2.8E+01	2.5E+03
Pentachloronitrobenzene	82-68-8	1.0E+01	1.4E+02	1.0E+01	1.4E+02
Pentachlorophenol	87-86-5	7.3E-01	3.6E+01	7.3E-01	3.6E+01
Pentadiene, 1,3-cis-	1574-41-0	–	4.8E+03	–	4.7E+03
Pentadiene, 1,3-trans-	2004-70-8	–	4.8E+03	–	4.7E+03
Pentaerythritol tetranitrate (PETN)	78-11-5	–	1.3E+02	–	1.3E+02
Pentane	109-66-0	–	4.8E+03	–	4.8E+03
Pentane, 2-methyl-	107-83-5	–	4.8E+03	–	4.7E+03
Pentane, 3-methyl-	96-14-0	–	4.8E+03	–	4.7E+03
Pentanediol, 1,5-	111-29-5	–	3.0E+05	–	2.7E+05
Pentanol, 1-	71-41-0	–	2.7E+03	–	2.7E+03
Pentanol, 4-methyl-2-	108-11-2	–	2.1E+03	–	2.1E+03
Pentanone, 2-	107-87-9	–	3.3E+03	–	3.3E+03
Pentene, 2-	109-68-2	–	4.8E+03	–	4.7E+03
Pentyne, 1-	627-19-0	–	4.8E+03	–	4.7E+03
Perchlorate	14797-73-0	–	5.1E+01	–	5.1E+01
Perfluorooctane sulfonic acid (1-Octanesulfonic acid, heptadecafluoro-1-) [PFOS]	1763-23-1	–	1.5E+00	–	1.5E+00
Perfluoroundecanoic acid (Undecanoic acid, uncosafluoro-) [PFUnDa]	2058-94-8	–	8.0E-01	–	8.0E-01
Perfluoropentanoic acid (Pentanoic acid, nonafluoro-) [PFPeA]	2706-90-3	–	3.3E+01	–	3.3E+01
Perfluorohexanoic acid (Hexanoic acid, undecafluoro-) [PFHxA]	307-24-4	–	3.3E+01	–	3.3E+01
Perfluorododecanoic acid (Dodecanoic acid, tricosafluoro-) [PFDoA]	307-55-1	–	7.9E-01	–	7.8E-01
Perfluorooctanoic acid (Octanoic acid, pentadecafluoro-) [PFOA]	335-67-1	–	6.0E-01	–	4.9E-01
Perfluorodecanoic acid (Decanoic acid, nonadecafluoro-) [PFDA]	335-76-2	–	9.9E-01	–	9.8E-01
Perfluorodecane sulfonic acid (1-Decanesulfonic acid, heneicosafluoro-) [PFDS]	335-77-3	–	8.0E-01	–	8.0E-01
Perfluorohexane sulfonic acid (1-Hexanesulfonic acid, triddecafluoro-) [PFHxS]	355-46-4	–	2.5E-01	–	2.4E-01

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Perfluorobutyric acid (Butanoic acid, heptafluoro-) [PFBA]	375-22-4	–	6.1E+01	–	5.6E+01
Perfluorobutane sulfonic acid (1-Butanesulfonic acid, nonafluoro-) [PFBS]	375-73-5	–	8.6E+01	–	8.0E+01
Perfluoroheptanoic acid (Heptanoic acid, tridecafluoro-) [PFHpA]	375-85-9	–	1.5E+00	–	1.5E+00
Perfluorononanoic acid (Nonanoic acid, heptadecafluoro-) [PFNA]	375-95-1	–	7.6E-01	–	7.3E-01
Perfluorotetradecanoic acid (Tetradecanoic acid, heptacosafluoro-) [PFTeDA]	376-06-7	–	5.1E-01	–	5.1E-01
Perfluorotridecanoic acid (Tridecanoic acid, pentacosafluoro-) [PFTrDA]	72629-94-8	–	6.1E-01	–	6.1E-01
Perfluorooctane sulfonamide (1-Octanesulfonamide, heptadecafluoro-) [PFOSA]	754-91-6	–	5.8E-02	–	3.1E-02
Perylene	198-55-0	–	1.3E+03	–	1.3E+03
Phenacetin	62-44-2	1.8E+03	–	1.5E+03	–
Phenanthrene	85-01-8	–	1.7E+03	–	1.7E+03
Phenanthridine	229-87-8	–	2.0E+02	–	2.0E+02
Phenol	108-95-2	–	1.8E+03	–	9.5E+02
Phenol, 4-tert-butyl-	98-54-4	–	8.0E+03	–	8.0E+03
Phenothiazine	92-84-2	–	6.3E+01	–	6.3E+01
Phenyl mercuric acetate	62-38-4	–	5.3E+00	–	5.3E+00
Phenylene diamine, m-	108-45-2	–	4.0E+02	–	4.0E+02
Phenylene diamine, p-	106-50-3	–	1.3E+04	–	1.3E+04
Phorate	298-02-2	–	1.3E+01	–	1.3E+01
Phosalone	2310-17-0	–	1.3E+02	–	1.3E+02
Phosdrin (mevinphos)	7786-34-7	–	1.7E+00	–	1.7E+00
Phosmet	732-11-6	–	1.3E+03	–	1.3E+03
Phosphine	7803-51-2	–	3.8E+00	–	2.1E+00
Phosphorotrithioic acid, S,S,S-tributyl ester	78-48-8	5.2E+01	3.2E+01	5.2E+01	3.2E+01
Phosphorus, total*	7723-14-0	–	–	–	–
Phosphorus, white	7723-14-0	–	1.5E+00	–	1.5E+00
Phthalic anhydride	85-44-9	–	3.6E+04	–	2.1E+04
Picloram	1918-02-1	–	4.7E+03	–	4.7E+03
Picoline, 2- (2-methylpyridine)	109-06-8	–	7.4E+02	–	7.4E+02
Polybrominated biphenyls (PBBs)	67774-32-7	9.7E-03	1.6E-02	9.7E-03	1.6E-02
Polychlorinated biphenyls (PCBs)	1336-36-3	1.8E+00	1.1E+00	1.7E+00	1.1E+00
Potassium*	7440-09-7	–	–	–	–
Primene	68955-53-3	–	3.6E+02	–	3.6E+02
Prometon (pramitol)	1610-18-0	–	1.0E+03	–	1.0E+03
Prometryn	7287-19-6	–	2.7E+03	–	2.7E+03
Pronamide	23950-58-5	–	5.0E+03	–	5.0E+03
Propanal (propionaldehyde)	123-38-6	–	1.0E+02	–	5.8E+01
Propane, 1-bromo-	106-94-5	–	2.9E+03	–	2.9E+03
Propanil	709-98-8	–	3.3E+02	–	3.3E+02

Table 4
Tier 1 Residential Total Soil Combined PCLs
Last Revised: March 6, 2023

Chemical of Concern	CAS	$^{Tot}Soil_{Comb}$ (includes inhalation, ingestion, dermal, and vegetable consumption pathways)			
		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Propanoic acid (propionic acid)	79-09-4	–	4.1E+04	–	4.1E+04
Propanol, 1-	71-23-8	–	1.6E+05	–	1.6E+05
Propargite	2312-35-8	–	1.3E+03	–	1.3E+03
Propargyl alcohol	107-19-7	–	1.6E+02	–	1.6E+02
Propazine	139-40-2	1.1E+02	1.3E+03	1.1E+02	1.3E+03
Propham	122-42-9	–	1.3E+03	–	1.3E+03
Propionitrile (propane nitrile)	107-12-0	–	3.3E+01	–	3.3E+01
Propyl acetate, n-	109-60-4	–	7.4E+03	–	7.4E+03
Propylbenzene, n-	103-65-1	–	2.2E+03	–	1.6E+03
Propylene glycol	57-55-6	–	3.7E+02	–	1.9E+02
Propylene glycol monomethyl ether	107-98-2	–	4.6E+04	–	3.9E+04
Propylene oxide	75-56-9	2.0E+01	4.6E+02	1.7E+01	2.4E+02
Propylene tetramer	6842-15-5	–	4.6E+03	–	3.6E+03
Prothiofos (Tokuthion)	34643-46-4	–	6.6E+00	–	6.6E+00
Pyrene	129-00-0	–	1.7E+03	–	1.7E+03
Pyridine	110-86-1	–	8.2E+01	–	8.2E+01
Quinoline	91-22-5	1.6E+00	–	1.6E+00	–
Ronnel	299-84-3	–	2.3E+03	–	2.3E+03
Safrole	94-59-7	1.6E+01	–	1.3E+01	–
Selenium	7782-49-2	–	3.1E+02	–	3.1E+02
Selenourea	630-10-4	–	4.1E+02	–	4.1E+02
Silver	7440-22-4	–	9.7E+01	–	9.7E+01
Simazine	122-34-9	3.9E+01	3.3E+02	3.9E+01	3.3E+02
Sodium*	7440-23-5	–	–	–	–
Sodium hypochlorite	7681-52-9	–	1.5E+04	–	1.4E+04
Sodium polyacrylate	9003-04-7	–	1.2E+02	–	6.2E+01
Strontium	7440-24-6	–	4.4E+04	–	4.4E+04
Strychnine	57-24-9	–	2.0E+01	–	2.0E+01
Styrene	100-42-5	–	6.7E+03	–	4.3E+03
Sulfate*	14808-79-8	–	–	–	–
Sulfide*	18496-25-8	–	–	–	–
Sulfolane	126-33-0	–	4.3E+02	–	2.9E+02
Sulfur*	7704-34-9	–	–	–	–
Sulprofos (Bolstar)	35400-43-2	–	2.0E+02	–	2.0E+02
Tebuconazole	107534-96-3	–	2.0E+03	–	2.0E+03
Tebuthiuron	34014-18-1	–	4.7E+03	–	4.7E+03
Terbufos	13071-79-9	–	1.7E+00	–	1.7E+00
Tert-amyl ethyl ether (TAEE)	919-94-8	–	3.3E+03	–	3.3E+03

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		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Tert-amyl-methyl ether (TAME)	994-05-8	–	3.3E+03	–	3.3E+03
Tert-butyl alcohol (2-methyl-2-propanol)	75-65-0	–	7.4E+03	–	7.4E+03
Tetrachlorobenzene, 1,2,3,4-	634-66-2	–	2.0E+01	–	2.0E+01
Tetrachlorobenzene, 1,2,3,5-	634-90-2	–	1.3E+01	–	1.3E+01
Tetrachlorobenzene, 1,2,4,5-	95-94-3	–	2.0E+01	–	2.0E+01
Tetrachloroethane, 1,1,1,2-	630-20-6	6.5E+01	2.5E+03	3.9E+01	2.5E+03
Tetrachloroethane, 1,1,2,2-	79-34-5	3.0E+01	1.6E+03	3.0E+01	1.6E+03
Tetrachloroethylene [PCE]	127-18-4	7.1E+02	1.3E+03	4.2E+02	1.1E+03
Tetrachlorophenol, 2,3,4,5-	4901-51-3	–	4.0E+02	–	4.0E+02
Tetrachlorophenol, 2,3,4,6-	58-90-2	–	1.8E+02	–	1.8E+02
Tetrachlorophenol, 2,3,5,6-	935-95-5	–	2.3E+01	–	2.3E+01
Tetrachlorvinphos (Stirophos)	22248-79-9	–	2.6E+03	–	2.6E+03
Tetradifon	116-29-0	–	1.0E+03	–	1.0E+03
Tetraethyl dithiopyrophosphate (sulfotep)	3689-24-5	–	3.3E+01	–	3.3E+01
Tetraethyl lead	78-00-2	–	6.7E-03	–	6.7E-03
Tetraethyl pyrophosphate (TEPP)	107-49-3	–	7.3E-01	–	7.3E-01
Tetraethylene glycol	112-60-7	–	2.2E+04	–	2.2E+04
Tetrahydrofuran	109-99-9	1.5E+02	2.2E+04	8.6E+01	1.3E+04
Tetrahydropyran	142-68-7	1.6E+02	1.6E+04	9.2E+01	1.6E+04
Tetraoxadodecane, 2,5,8,11-	112-49-2	–	1.7E+03	–	1.7E+03
Thallium	7440-28-0	–	5.3E+00	–	5.3E+00
Thiofanox	39196-18-4	–	2.0E+01	–	2.0E+01
Thionazin	297-97-2	–	4.7E+00	–	4.7E+00
Thiophanate-methyl	23564-05-8	–	5.3E+03	–	5.3E+03
Thiram	137-26-8	–	3.3E+02	–	3.3E+02
Tin	7440-31-5	–	3.5E+04	–	3.5E+04
Titanium	7440-32-6	–	2.2E+05	–	2.2E+05
Toluene	108-88-3	–	5.9E+03	–	5.4E+03
Toluene diisocyanate, 2,4/2,6-	26471-62-5	–	1.5E+02	–	7.5E+01
Toluenediamine, 2,4-	95-80-7	1.5E+00	–	1.5E+00	–
Toluenediamine, 2,6-	823-40-5	–	2.0E+03	–	2.0E+03
Toluidine, o-	95-53-4	4.7E+01	–	3.5E+01	–
Toluidine, p-	106-49-0	7.1E+01	–	7.1E+01	–
Toxaphene	8001-35-2	1.2E+00	9.0E+00	1.2E+00	9.0E+00
TPH, TX1005, C6-C12	TPH-1005-1	–	1.6E+03	–	1.1E+03
TPH, TX1005, >C12-C28	TPH-1005-2	–	2.3E+03	–	2.0E+03
TPH, TX1005, >C12-C35	TPH-1005-3	–	2.3E+03	–	2.0E+03
TPH, TX1005, >C28-C35	TPH-1005-4	–	2.3E+03	–	2.0E+03

Table 4
Tier 1 Residential Total Soil Combined PCLs

Last Revised: March 6, 2023

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		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
TP Silvex, 2,4,5-	93-72-1	–	5.3E+02	–	5.3E+02
Triademenol	55219-65-3	–	2.0E+03	–	2.0E+03
Triallate	2303-17-5	–	3.2E+02	–	3.2E+02
Triaminotrinitrobenzene (TATB)	3058-38-6	–	2.0E+02	–	2.0E+02
Tributyltin oxide	56-35-9	–	2.0E+01	–	2.0E+01
Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	–	7.4E+04	–	3.9E+04
Trichlorobenzene, 1,2,3-	87-61-6	–	1.2E+02	–	8.7E+01
Trichlorobenzene, 1,2,4-	120-82-1	1.6E+02	1.2E+02	1.6E+02	7.0E+01
Trichlorobenzene, 1,3,5-	108-70-3	–	7.8E+01	–	4.9E+01
Trichloroethane, 1,1,1-	71-55-6	–	5.3E+04	–	3.2E+04
Trichloroethane, 1,1,2-	79-00-5	1.8E+01	3.3E+02	1.0E+01	3.3E+02
Trichloroethylene [TCE]	79-01-6	5.3E+01	1.8E+01	3.4E+01	1.1E+01
Trichlorofluoromethane	75-69-4	–	2.5E+04	–	2.5E+04
Trichloronate	327-98-0	–	1.4E+02	–	1.4E+02
Trichlorophenol, 2,3,4-	15950-66-0	–	6.7E+03	–	6.7E+03
Trichlorophenol, 2,3,5-	933-78-8	–	6.7E+03	–	6.7E+03
Trichlorophenol, 2,3,6-	933-75-5	–	5.3E+02	–	5.3E+02
Trichlorophenol, 2,4,5-	95-95-4	–	6.7E+03	–	6.7E+03
Trichlorophenol, 2,4,6-	88-06-2	3.5E+02	6.7E+01	3.0E+02	6.7E+01
Trichlorophenol, 3,4,5-	609-19-8	–	6.7E+03	–	6.7E+03
Trichlorophenoxyacetic acid, 2,4,5-	93-76-5	–	6.7E+02	–	6.7E+02
Trichloropropane, 1,1,2-	598-77-6	–	4.6E+00	–	2.4E+00
Trichloropropane, 1,2,3-	96-18-4	2.0E-01	1.3E+01	2.0E-01	7.0E+00
Triethanolamine	102-71-6	–	3.0E+03	–	1.7E+03
Triethylamine	121-44-8	–	1.1E+02	–	5.5E+01
Triethylene glycol	112-27-6	–	1.3E+05	–	1.3E+05
Triethylphosphorothioate, O, O, O-	126-68-1	–	5.5E-01	–	5.5E-01
Trifluralin	1582-09-8	2.7E+02	3.0E+02	2.7E+02	3.0E+02
Trimethylamine	75-50-3	–	1.5E+02	–	7.6E+01
Trimethylbenzene, 1,2,3-	526-73-8	–	1.6E+03	–	1.1E+03
Trimethylbenzene, 1,2,4-	95-63-6	–	1.6E+03	–	1.2E+03
Trimethylbenzene, 1,3,5-	108-67-8	–	1.5E+03	–	1.1E+03
Trinitrobenzene, 1,3,5-	99-35-4	–	2.0E+03	–	2.0E+03
Trinitrophenylmethylnitramine (tetryl; nitramine)	479-45-8	–	1.5E+02	–	1.5E+02
Trinitrotoluene, 2,4,6-	118-96-7	1.6E+02	3.3E+01	1.6E+02	3.3E+01
Tungsten (as sodium tungstate dihydride)	7440-33-7	–	7.3E+01	–	7.3E+01
Uranium (soluble salts)	7440-61-1	–	2.2E+02	–	2.2E+02
Valeric acid (pentanoic acid)	109-52-4	–	1.3E+02	–	6.8E+01

Table 4
Tier 1 Residential Total Soil Combined PCLs

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		0.5 acre source area Carcinogenic (mg/kg)	0.5 acre source area Noncarcinogenic (mg/kg)	30 acre source area Carcinogenic (mg/kg)	30 acre source area Noncarcinogenic (mg/kg)
Vanadium	7440-62-2	–	7.6E+01	–	7.5E+01
Vernam	1929-77-7	–	6.7E+01	–	6.7E+01
Vinyl acetate	108-05-4	–	3.0E+03	–	1.5E+03
Vinyl chloride	75-01-4	3.7E+00	1.9E+02	3.4E+00	1.6E+02
Vinylcyclohexane	695-12-5	–	4.1E+04	–	4.1E+04
Warfarin	81-81-2	–	2.0E+01	–	2.0E+01
Xylene, m-	108-38-3	–	8.9E+03	–	4.7E+03
Xylene, o-	95-47-6	–	4.8E+04	–	2.9E+04
Xylene, p-	106-42-3	–	8.9E+03	–	4.7E+03
Xylenes	1330-20-7	–	6.0E+03	–	3.7E+03
Zinc	7440-66-6	–	9.9E+03	–	9.9E+03
6 C aliphatics (TPH) (>53% n-hexane content)	NA	–	3.3E+03	–	2.5E+03
6 C aliphatics (TPH) (<53% n-hexane content)	NA	–	4.8E+03	–	4.8E+03
>6-8 C aliphatics (TPH) (>53% n-hexane content)	NA	–	3.3E+03	–	2.5E+03
>6-8 C aliphatics (TPH) (<53% n-hexane content)	NA	–	4.8E+03	–	4.8E+03
>8-10 C aliphatics (TPH)	NA	–	4.0E+03	–	2.7E+03
>10-12 C aliphatics (TPH)	NA	–	3.6E+03	–	2.5E+03
>12-16 C aliphatics (TPH)	NA	–	4.3E+03	–	3.2E+03
>16-21 C aliphatics (TPH)	NA	–	1.3E+05	–	1.3E+05
>16-21 C aliphatics (TPH) (for transformer mineral oil releases only)	NA	–	1.1E+05	–	1.1E+05
>21-35 C aliphatics (TPH)	NA	–	1.3E+05	–	1.3E+05
>21-35 C aliphatics (TPH) (for transformer mineral oil releases only)	NA	–	1.1E+05	–	1.1E+05
>7-8 C aromatics (TPH)	NA	–	6.4E+03	–	5.3E+03
>8-10 C aromatics (TPH)	NA	–	1.6E+03	–	1.1E+03
>10-12 C aromatics (TPH)	NA	–	1.9E+03	–	1.5E+03
>12-16 C aromatics (TPH)	NA	–	2.3E+03	–	2.0E+03
>16-21 C aromatics (TPH)	NA	–	2.0E+03	–	2.0E+03
>21-35 C aromatics (TPH)	NA	–	2.0E+03	–	2.0E+03

Footnotes

1 Site-specific PCLs for mercury may vary based on the pH-dependent Kd value (see Figure:30 TAC §350.73(f)(1)(C)).

***** These compounds are not necessarily of concern from a human health standpoint, therefore calculation of human health-based values is not required. However, aesthetics and ecological criteria would still apply. See table entitled "Compounds for which Calculation of a Human Health PCL is Not Required" available on the TCEQ website at http://www.tceq.state.tx.us/remediation/trrp/trrp.html.

NA = not applicable

All values capped at 1E+06

This table shows the total soil combined protective concentration levels for residential land with both carcinogenic and non-carcinogenic values depicted.

end of worksheet

APPENDIX E
OFF-SITE TRANSPORTATION AND DISPOSAL

Section 02120

OFF-SITE TRANSPORTATION AND DISPOSAL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Off-site disposal of non-hazardous and hazardous solid, liquid and resinous waste.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

1. Payment for transportation and disposal of Class II Soil at approved facility is on a cubic yard basis.

2. Payment for transportation and disposal of Class I Soil at approved facility is on a cubic yard basis.

3. No separate payment will be made for soil reused as backfill material.

4. Payment for transportation and disposal of contaminated groundwater at approved facility is on a per gallon basis.

5. No separate payment for ground water discharged into a sanitary sewer. This cost should be included in lump sum amount.

6. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. CFR, Title 29, Section 1910.120.- Occupational Safety and Health Administration, Department of Labor.

B. Texas Administrative Code (TAC), Title 30, Chapter 335.- Industrial Solid Waste & Municipal Hazardous Waste.

C. TAC, Title 30, Chapter 334.- Underground and Aboveground Storage Tanks.

D. TAC, Title 30, Chapter 106.533.- Exemptions from Permitting, Subchapter X, Waste Processes and Remediation.
E. U.S. Environmental Protection Agency (EPA), (SW-846) Test Methods for Evaluating Solid Waste, Office of Solid Waste and Emergency Response, Washington, D.C. (P1388-239223, November 1986).
F. 49 CFR Pars 100-185.

PART 2 P R O D U C T S (Not Used)

PART 3 E X E C U T I O N

3.01 HANDLING CATEGORY I AND II SOILS

A. Do not place Category II Soil back into excavation. Properly dispose of Category II Soil at the facility listed in Environmental Work Plan. The Contractor's Environmental Work Plan will provide information on investigation, handling, monitoring, reuse, and disposal of Category I and Category II Wastes. Category I Soil consistent with classification as Class II PST Waste as defined by Texas Commission on Environmental Quality (TCEQ) in their interoffice memo dated 4/12/94, and not Category II Soil (as demonstrated through laboratory testing) can be reused as backfill material, provided;

1. Soil is reused in the same area from which it originated at depths greater than 30 inches below top of pavement, finished grade or ditch flowline, whichever is lower.

2. Soil has suitable engineering properties for backfill material as specified in Section 02140 - Utility Backfill Materials.

3. Does not have indications of impact by contaminants other than petroleum.

B. Do not spread Category I or II Soil on ground surface.

C. Place Category I or II Soil in covered roll-off box with a minimum 20-mil plastic liner or in a stockpile at temporary storage area, pending receipt of analytical results and receipt of authorization from TCEQ and the disposal site for final disposal; or, in trucks for transport directly to the disposal facility.

1. Do not commingle Category I or II Soil from different locations or with different sources.

2. Temporary storage area to meet following criteria:

a. Within 2 miles of project site, to allow access by City personnel, unless otherwise approved by Project Manager.

b. Outside the 100-year floodplain.

c. Outside of, and not adjacent to, an area known or suspected to be a wetland.

d. Acceptable to Project Manager.

e. Contractor will be responsible for required transportation permits and permissions.

3. Secure using temporary fencing or other means of controlling access.

4. Place stockpiled soils on an impervious membrane. Surround with a berm to prevent migration of soils or moisture either into or out of the stockpile, other than evaporation.

5. Protect and cover the stockpile with minimum 20-mil plastic or other approved waterproof membrane covering. Replace damaged covers.

6. Do not place soil over monitoring wells or piezometers, utility line manholes, or any other potential route for water to migrate to subsurface.

7. Handle runoff from the temporary storage area in accordance with paragraph 3.06, Handling Water.

8. Do not stockpile soil for greater than 30 days.

9. Remove remaining material, including excavated soil from construction site, from temporary storage area prior to completion of Work.

D. Remove, handle, transport, stockpile, and dispose of Category II Soil under direction of Corrective Action Project Manager. Dispose waste classified (i.e., meets characteristics or other definitions of) a hazardous waste consistent with Resource Conservation and Recovery Act (RCRA) and 30 TAC Chapter 335.

E. Transport Category I or II Soil in accordance with Department of Transportation (DOT) and TCEQ rules and regulations.

F. Dispose Category I Soil, not reused as backfill, under direction of Corrective Action Project Manager, at a properly licensed facility with prior approval of Project Manager.

G. Obtain signed manifests from the receiving facility and provide originals to Project Manager.

H. Decontaminate large equipment to prevent cross-contamination with clean material. Steam clean or pressure wash dump trucks, bulldozers, backhoes, and other large equipment prior to use in uncontaminated areas after being used in PPCA/SCA.

3.02 HANDLING WATER

A. Prior to discharging petroleum or solvent contaminated groundwater, obtain an Industrial Wastewater Discharge Permit (no cost) from the City for disposal directly to a sanitary sewer which discharges to a City-owned wastewater treatment plant.
1. Groundwater is not anticipated; however, the presence of a perched groundwater zone cannot be ruled out.
2. The Contractor will be required to manage groundwater, if encountered.

B. Procedures.

1. Provide equipment sized to handle flows anticipated by dewatering operations.
2. Include commercially available oil/water separator unit as part of the treatment system for dewatering operation discharging to sanitary sewer.

3. Do not exceed limits listed in Table 01160-2, Potentially Contaminated Groundwater Discharge Limits for groundwater discharged to the sanitary sewer. Provide additional treatment systems as needed prior to discharge to sanitary sewers where groundwater contamination levels exceed those noted in Table 01160-2. Approval by Project Manager shall be obtained for proposed treatment system prior to initiation of treatment and discharge.

4. Comply with all applicable requirements of 30 TAC, Chapter 106.533, including submitting a PI-7 form to the TCEQ for a standard exemption of oil/water separator unit, and any additional treatment systems. Submit copy of PI-7 form to Project Manager.

5. Do not discharge treated water into sanitary sewer if water level is within one foot of the top of sanitary sewer manhole or would cause an overflow situation.

6. Recover free product collected in treatment equipment (30 TAC 327). Recycle for beneficial reuse or dispose of recovered contaminants in a manner acceptable to Project Manager and TCEQ.

7. Transport potentially contaminated groundwater and free product in accordance with DOT and TCEQ rules and regulations for flammable products. Use DOT-licensed carrier for transport.

8. Obtain signed manifests for potentially contaminated groundwater and free product from the receiving facility and provide originals to Project Manager.

9. Furnish laboratory reports to Project Manager within one week of sample date.

C. Install and operate groundwater control systems, as described in Section 01040 - Control of Groundwater and Surface Water. Design and operate groundwater control systems so water from PPCA is handled in a system separated and isolated from groundwater control systems outside PPCA.

D. Handle, test, treat, and discharge potentially contaminated groundwater to the sanitary sewer in accordance with City of Friendswood requirements, or have water evacuated and hauled for off-site treatment and disposal at a TCEQ-permitted facility. Perform discharge under direction of Corrective Action Project Manager.

3.03 AIR MONITORING REQUIREMENTS

A. Ensure health and safety of workers at the construction site. Maintain air quality within the construction zone to conform to exposure limits specified in Code of Federal Regulations (CFR) Title 29, Section 1910.120 enforceable by OSHA.

B. Provide adequate shoring and sufficient escape ladders in accordance with applicable trench safety regulatory requirements.

C. In the trench, continuously operate a combustible gas indicator (CGI) with LEL/O_2 meter to monitor vapor and oxygen levels. Properly calibrate CGI and provide an alarm that sounds if greater than or equal to 20 percent Lower Explosive Limit (LEL), less than or equal to 19.5 percent oxygen, or greater than or equal to 25 percent oxygen is reached. Record monitoring data from CGI every 15 minutes to ensure safe work conditions.

D. Take appropriate measures during construction to keep LEL levels below 20 percent in the trench. If vapor concentrations exceed 20 percent of LEL stop

construction work, turn off equipment, and have workers immediately vacate the PPCA in an upwind direction.

E. Take readings with PID/FID 50 feet downwind of area during excavation or work in contaminated excavation areas and until one hour after cessation of such work. Take readings within breathing zone at approximately 4 feet above ground level. Record readings, date, time, initials of person taking reading, PID/FID serial number and last calibration date of PID/FID in bound field book.

F. Contractor will be required to determine if the excavation is permit or non-permit required confined space and provide all materials permits and equipment to provides services to complete the excavation (29 CFR 1910.146).

3.04 DISPOSAL OF MATERIAL

A. Non-categorized Material. Dispose of excess or unsuitable excavated materials, not Category I or II Soil, off-site in accordance with Section 01576 - Waste Material Disposal.

B. Category I or II Soil. Dispose of excess or unsuitable excavated materials off-site at a state registered Treatment, Storage, or Disposal (TSD) facility. Obtain signed manifests from the receiving facility and provide originals to Project Manager.

TABLE 01160-1

SOIL CRITERIA

Contaminant	**Maximum[a] Concentration (mg/kg)**	**Method**
TPH	1500	EPA 418.1/TX 1005
Total BTEX [b]	150	EPA 8020/8021
Total Lead [c]	250	EPA 6000/6010/7000
Tetrachloroethylene	710	EPA 8260
Trichlorethylene	18	EPA 8260

Notes: [a] If any parameters exceed the maximum concentrations, then the soil shall be considered Category II Soil and a Special Waste-PST as defined by the TCEQ in their interoffice memo dated 4/12/94.
[b] If benzene is greater than 5.0 mg/kg then analyze TCLP benzene which should be <0.3 mg/l.
[c] If total lead is greater than 30 mg/kg then analyze TCLP lead which should be <1.5 mg/l.

Definitions: TCLP - toxicity characteristic leachate procedure (40 CFR 261, Appendix II)
BTEX - benzene, toluene, ethyl benzene, and total xylenes
TPH - total petroleum hydrocarbons
mg/kg - milligrams per kilogram
mg/l - milligrams per liter

TABLE 01160-2
POTENTIALLY CONTAMINATED GROUNDWATER DISCHARGE LIMITS

Parameter	Discharge to Sanitary Sewer	
	Limit	**Method**
TPH (mg/l)	30.0	EPA 418.1/TX 1005
Total BTEX (mg/l)	1.0	EPA 602/8020/8021
Lower Explosive Limit (%)	10	EPA 1010
Tetrachlorethylene (µg/L)	5	EPA 8260
Trichlorethylene (µg/L)	5	EPA 8260

Notes: See definitions above.

END OF SECTION

APPENDIX F
CHEMICAL SAMPLING AND ANALYSIS

Section 02105

CHEMICAL SAMPLING AND ANALYSIS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Preparatory work related to site remediation and excavation in a Potentially Petroleum Contaminated Area (PPCA), or Potentially Solvent Contaminated Area (SCA) (dry cleaning).

B. Sampling and analysis of site material.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

1. Preparatory work is paid on a lump sum basis. Item includes hiring environmental consultants, preparing Environmental Health and Safety Plan, preparing Environmental Work Plan, training personnel, and obtaining permits and additional insurance.

2. Underground Utility Construction in PPCA/SCA.

a. Underground utility construction and appurtenances in areas identified within PPCA/SCA limits is on a linear foot basis, each basis, or lump sum basis, as shown in Document 00145 – Unit Price Bid Form.

b. Payment includes compensation for labor, equipment, and supervision for mobilization, environmental monitoring and field screening, handling, sampling, and testing of contaminated soil and groundwater. Contaminated soil may be Category I or II as defined in 30 TAC 335. Contaminated groundwater will be that encountered during excavation for underground utilities and flowing at a rate not greater than 20 gallons per minute. Included in this pay item is incremental cost for upgraded piping, gaskets, and appurtenant materials.

c. Limits of measurement under this section are noted on Drawings as ‘Limits of PPCA/SCA for preparatory work for Sampling and Analysis’ and other areas determined by Project Manager during the course of the work.

3. Refer to Section 01270 - Measurement and Payment for unit price procedures.

1.03 REFERENCE STANDARDS

A. ASTM D 5092 - Practice for Design and Installation of Groundwater Monitoring Wells in Aquifers.

B. Code of Federal Regulation (CFR), Title 40, Section 261.24. - Protection of the Environment.

C. CFR, Title 29, Section 1910.120. - Occupational Safety and Health Administration, Department of Labor.

D. CFR, Title 29, Section 1926. - Occupational Safety and Health Administration, Department of Labor.

E. CFR, Title 40, Section 261, Appendix II. - Protection of the Environment.

F. Texas Administrative Code (TAC), Title 30, Chapter 335. - Industrial Solid Waste & Municipal Hazardous Waste.

G. TAC, Title 30, Chapter 334. - Underground and Aboveground Storage Tanks.

H. TAC, Title 30, Chapter 106.533. - Exemptions from Permitting, Subchapter X. Waste Processes and Remediation.

I. TAC, Title 30, Chapter 327. Spill Prevention and Control.

J. TAC, Title 30, Chapter 335. Industrial Solid Waste and Municipal Hazardous Waste

K. U.S. Environmental Protection Agency (EPA), (SW-846) Test Methods for Evaluating Solid Waste, Office of Solid Waste and Emergency Response, Washington, D.C. (P1388-239223, November 1986).

L. Texas Commission on Environmental Quality (TCEQ) Interoffice Memo, dated 4/12/94, by Chris Chandler, RPR Section, PST Division, regarding ‘Revised’ Procedures for Classifying and Assigning Waste Codes for Underground and Aboveground Petroleum Storage Tank Wastes’ (text attached following this section).

M. CFR, Title 49, Parts 100 – 185. Department of Transportation.

1.04 DEFINITIONS

A. Petroleum: Crude oil, natural gas, natural gas liquids, liquefied natural gas, and synthetic gas usable for fuel, as well as distillates of crude oil including gasoline, kerosene, diesel oil, motor oil, waste oil, jet fuels, and fuel oil.

B. Potentially Petroleum Contaminated Area (PPCA): An area within station-to-station locations identified on Drawings where petroleum contamination has been detected in the soil or groundwater. PPCA also includes areas where contamination is suspected or encountered during utility installation outside areas identified on Drawings, and such contamination has been verified by Project Manager.

C. Solvent Contaminated Area (SCA): An area within station-to-station locations identified on Drawings where dry cleaning has been suspected. Solvents may be present in groundwater, soils or vapor. Solvent Contaminated Areas also includes areas where contamination is suspected or encountered during utility installation outside areas identified on Drawings, and such contamination has been verified by Project Manager.

D. Category I Soil: Soil containing visual or physical evidence of contamination, as described in paragraph 3.01, and that is not Category II Soil.

E. Category II Soil: Soil that contains petroleum contamination in excess of levels identified in paragraph 3.04, and is consistent with a classification as Special Waste-PST as defined by TCEQ in their interoffice memo dated 4/12/94, or soil that contains visible free product or is impacted with non-petroleum compounds detected above Risk Reduction Standard Number 2 levels as defined in Texas Administrative Code, Title 30, Chapter 335.

F. Potentially Contaminated Groundwater: Water recovered in a groundwater control system located in PPCA/SCA or groundwater that contains visual or physical evidence of contamination, as described in paragraph 3.01, and such contamination has been verified by Project Manager.

1.05 SUBMITTALS

A. Conform to requirements of Section 01000 - Submittal Procedures.

B. Submit an Environmental Work Plan within 30 days after issuance of Notice to Proceed.

1. The Environmental Work Plan shall be prepared by a Corrective Action Project Manager licensed in Texas, who has completed 40-hours of

Health and Safety Training and the required annual refresher training, and in the employment of a registered Corrective Action Specialist firm.

2. The Contractor's Environmental Work Plan shall include the following items. Compile and arrange in a format that can be reviewed by TCEQ. Groundwater is not suspected; however, this does not rule out the potential to encounter perched water, and discussion should be included in the Environmental Work Plan. Contractor should review Materials Management Plan written by HDR dated June 2024 included herein as supporting documentation.

    a. Proposed sequence of construction through PPCA/SCA;

    b. Procedures for screening soil in PPCA/SCA, identifying Category I or II Soil;

    c. Procedures for handling material from PPCA/SCA;

    d. Proposed location of stockpile areas;

    e. Proposed reuse of Category I Soil as trench backfill below depths of 30 inches;

    f. Proposed methods for disposal or recycling of Category I or II Soil, in excess of soil reused in section e (above);

    g. Proposed carriers of Category I or II Soil or potentially contaminated groundwater with verification each is properly licensed;

    h. Proposed recycle/disposal sites for Category I or II Soil or potentially contaminated groundwater with verification that each is properly licensed;

    i. Copy of permit and permit requirements for discharge of potentially contaminated groundwater in sanitary sewer system, if to be disposed in sanitary sewer;

    j. Name and qualifications of TCEQ Corrective Action Project Manager and professional environmental consultants for health, environmental, and safety issues regarding operations within PPCA; and,

    k. Proposed analytical laboratory with verification it is accredited by A2LA or other recognized association, or it is a participant in the EPAs Performance Evaluation Program.

3. Do not commence work in PPCA/SCA until Environmental Work Plan has been reviewed and accepted by TCEQ and the City Project Manager.

C. Submit Environmental Health and Safety Plan within 30 days after issuance of Notice to Proceed.

1. The Health and Safety Plan shall be prepared by a Corrective Action Project Manager licensed in Texas, who has completed 40 hours of health and safety training, and required annual refresher training, or a Certified Industrial Hygienist.

2. Include methods and procedures for assuring work, which will be conducted under conditions expected in the field, is safe.

D. As work proceeds, submit field screening, monitoring and analytical laboratory test results on a weekly basis for soil and daily for groundwater. Summarize test results in tables together with applicable regulatory criteria.

E. Submit copies of correspondence, reports, permits and other documents provided to, or received from, regulatory agencies.

1.06 PERSONNEL REQUIREMENTS

A. Provide trained personnel who have completed minimum health and safety programs specified by the Occupational Safety and Health Administration in 29 CFR 1910.120. Before beginning work at the site, each employee that will work in PPCA is required to have completed 40 hours health and safety training and the required annual refresher training.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Do not use polyvinyl chloride or other plastic material, unless approved by Project Manager.

B. Water Line Pipe Material.

1. Furnish ductile-iron pipe or steel pipe material within station-to-station locations identified as PPCA/SCA on Drawings.

2. Provide restrained joints for ductile-iron pipe or welded joints for steel pipe.

3. Provide pipe material conforming to Section 02215 - Ductile-Iron Pipe and Fittings or Section 02250 - Steel Pipe and Fittings and 02255 Steel Pipe and Fittings for Large Diameter Water Lines.

C. Sanitary Sewer Pipe Material.

1. Furnish ductile-iron pipe, centrifugally cast fiberglass pipe, or equivalent protective materials approved by Project Manager.

2. Provide pipe material conforming to Section 02215 - Ductile-Iron Pipe and Fittings. Use pipe with a minimum pressure rating of 150 psi.

D. Use Viton (FKM) type gaskets, or other material as recommended by the pipe manufacturer, for water lines, sanitary and storm sewer pipe, and appurtenances requiring gaskets.

PART 3 E X E C U T I O N

3.01 POTENTIALLY PETROLEUM/SOLVENT CONTAMINATED AREAS

A. Conduct operations in PPCA in accordance with the accepted Environmental Work Plan and Health and Safety Plan and to minimize the spread of contamination. In other areas which are either detected or suspected to be potentially petroleum contaminated areas, immediately notify Project Manager and proceed with work in accordance with this Section, unless otherwise directed by Project Manager.

B. Immediately notify Project Manager and TCEQ's Region 12 Field Office whenever Category I or II Soil or potentially contaminated groundwater are encountered (30 TAC327).

1. Provide location, depth, type (soil or groundwater), source (if known), and evidence of suspected contamination.

2. Determine if Category I Soil or potentially contaminated groundwater is present by visual or physical evidence of contamination. Visual or physical evidence includes:

a. Petroleum or chemical odor. Solvents have a sharp, sweet odor (similar to chloroform).

b. Indication of levels of contamination by air monitoring devices employed as part of the Health and Safety Plan.

c. Soil or groundwater discoloration.

d. Material oozing/dripping into excavation.

e. Liquid or oily sheen floating on groundwater.

f. Buried containers or refuse.

g. Field screening 'head-space' results in excess of a 25 ppm reading on a photoionization detector (PID) or flame ionization detector (FID).

C. Install piping and gasket materials and appurtenances in conformance with appropriate section, except as modified in this Section.

D. Construct trench dams within a utility trench at each boundary of PPCA/SCA and laterals to minimize potential for contaminant transport within pipe bedding material. A trench dam shall consist of at least 24 inches of cement stabilized sand with 10 percent bentonite clay added, extending from 6 inches below bottom of trench to within 12 inches of limits of topsoil or pavement.

3.02 ENVIRONMENTAL MONITORING

A. An environmental consultant shall monitor conditions in PPCA/SCA, as specified in the Health and Safety Plan. Maintain safe working conditions in accordance with OSHA requirements (29 CFR 1926).

3.03 SCREENING PPCA SOILS

A. An environmental consultant shall perform field screening of soil removed from excavation or tunneling in PPCA/SCA.

B. Screening Procedures.

1. Place samples in a sealed plastic bag and place in a warm location for 15 minutes prior to screening.

2. Properly calibrate the PID/FID using a calibration gas. For PID use 100 ppm isobutylene and for FID use 100 ppm methane.

3. Open bag just enough to insert instrument probe and take maximum headspace reading.

4. Screen at least twice per hour while removing soils in open cut areas or shafts.

5. During tunneling, screen once for each pipe length in pipe jacked tunnels or each advance of tunnel shield in primary-lined tunnels. Screen at least once per shift when excavating.

3.04 SAMPLING AND TESTING

A. Frequency.

1. Sample soil in PPCA/SCA at a rate of not less than one composite sample for every 20 cubic yards of excavation or volume corresponding to every 50 linear feet of installed underground utility, whichever is more frequent.

2. Sample water from PPCA/SCA to be discharged to a sanitary sewer one week prior to initiation of discharge, and at a rate of one grab sample once per day during discharge to sanitary sewer.

B. Analyze soil samples for parameters listed in Section 02120 – Off-Site Transportation and Disposal, Table 02120-1, Soil Criteria - Petroleum Only, and in accordance with SW-846. Handle as a Category II Soil if analytical results indicate any one, or more, parameters exceed allowable Maximum Concentration listed in Table 02120-1. If benzene or tetrachloroethene concentration from sample is greater than 5 milligrams per kilogram (mg/kg) or lead concentration is greater than 30 mg/kg, perform Toxicity Characteristic Leaching Procedure (TCLP) analysis of appropriate compound for that sample to determine if a more stringent disposal classification is warranted. If contaminants other than petroleum are suspected, immediately notify Project Manager who will determine the list of parameters to be analyzed. If such are encountered, compensation will be made under the Allowance for PPCA/SCA Handling. Use a 4-part representative composite sample for analysis of parameters, except when inconsistent with SW-846. Samples for VOC analyses will be grab samples.

C. Analyze groundwater samples for discharge to sanitary sewers. Analyze samples for BTEX by EPA Method 602, 8020, or 8021; VOCs (solvents) by EPA Method 602, 6020, or 8260; TPH by EPA Method 418.1 or Method TX 1005; and Lower Explosive Limit (LEL) in accordance with EPA Method 1010.

D. Conduct analyses by proposed analytical testing laboratory listed in Environmental Work Plan.

3.05 AIR MONITORING REQUIREMENTS

A. Ensure health and safety of workers at the construction site. Maintain air quality within the construction zone to conform to exposure limits specified in Code of Federal Regulations (CFR) Title 29, Section 1910.120 enforceable by OSHA.

B. Provide adequate shoring and sufficient escape ladders in accordance with applicable trench safety regulatory requirements.

C. In the trench, continuously operate a combustible gas indicator (CGI) with LEL/O2 meter to monitor vapor and oxygen levels. Properly calibrate CGI and provide an alarm that sounds if greater than or equal to 20 percent Lower Explosive Limit (LEL), less than or equal to 19.5 percent oxygen, or greater than or equal to 25 percent oxygen is reached. Record monitoring data from CGI every 15 minutes to ensure safe work conditions.

D. Take appropriate measures during construction to keep LEL levels below 20 percent in the trench. If vapor concentrations exceed 20 percent of LEL stop construction work, turn off equipment, and have workers immediately vacate the PPCA in an upwind direction.

E. Take readings with PID/FID 50 feet downwind of area during excavation or work in contaminated excavation areas and until one hour after cessation of such work. Take readings within breathing zone at approximately 4 feet above ground level. Record readings, date, time, initials of person taking reading, PID/FID serial number and last calibration date of PID/FID in bound field book.

END OF SECTION

Attachment to Section 02105

PETROLEUM CONTAMINATION

Following, for informational purposes only, is the text of the 4/12/94 Interoffice Memo from Chris Chandler of the Texas Commission on Environmental Quality (TCEQ), RPR Section, PST Division, regarding Revised Procedures for Classifying and Assigning Waste Codes for Underground and Aboveground Petroleum Storage Tank Wastes:

This document is a revision of the waste classification memo dated July 18, 1991 which revised the original March 11, 1991 document. The main difference between the first two documents was the elimination of the distinction between industrial and nonindustrial petroleum substance wastes. This latest version has been revised to reflect changes in the rules and in the agency itself. Significant changes are denoted by underlines. Please discard the previous document.

An appropriate response to any leaking petroleum storage tank incident must always include the proper handling and disposal of all generated wastes. In the majority of cases these wastes include contaminated soils and/or wastewater. Before a disposal destination can be determined for a particular waste, the waste must be classified based on the concentrations of contaminants. The procedures for classification of petroleum contaminated wastes are detailed in the attached Guidance Document for the proper Management of Wastes Associated With Underground and Aboveground Petroleum Storage Tanks. The waste first must be analyzed by a laboratory and then, based upon the results of the analysis, a classification can be assigned to the waste with its corresponding waste code number. The waste code is a predesignated number based upon both the waste's classification and the type of contaminants.

Many disposal facilities are now requiring the generator of any petroleum substance waste to obtain a waste classification from TCEQ that assigns a waste code number to that particular waste before the facility will accept it (even though this is not a regulatory requirement for nonhazardous PST wastes). In order to receive this waste code, the generator first must submit laboratory reports and other information providing the results of analysis for the waste. This information should be attached to a completed copy of TCEQ Form No. 0197. Only after receipt of this documentation should the waste code assignment be made. Waste code numbers should never be issued based upon analytical results unsupported by laboratory documentation.

Laboratory reports should include a description of the analytical procedures utilized, the condition in which the sample was received, and the signature of the laboratory personnel. Also, reports must be accompanied by a description of the sample collection and handling procedures. If the procedures described are not in accordance with EPA-approved and/or TCEQ-accepted procedures, the results should be rejected as invalid.

Soil samples should be collected at the rate of one sample for every fifty cubic yards of material, and each sample should be a composite which is representative of the fifty cubic yard unit. Water samples from inside storage vessels should be collected from

the top of the water column in order to identify the highest contaminant level. Water should be sampled at the rate of one sample per 3000 gallons of water, or a minimum of one sample per container if there is more than one container.

When a waste is categorized as Class II PST or Special Waste-PST, the generator must document the volume, means of transportation, and ultimate destination for the waste. Once all of the proper information has been received by the PST of FO Division in writing, the waste classification and code number can be verbally issued to the generator. The number should be written on the submitted Form No. 0197 in the space marked TCEQ Use Only, and a copy of the form mailed or faxed to the Responsible Party (not the contractor or consultant). Also include the date, the person issuing the code number and the Regional Office number on the form. A copy of the completed form and all submitted information should be sent to the Central Office (or regional office as appropriate).

Regional Field Inspectors as well as PST Division Coordinators should issue waste classifications and code numbers for only Class II PST and Special Wastes-PST on cases they are responsible for coordinating.

Additionally, for all waste classification requests which are not associated with LPST sites (such as for disposal of water used to clean tanks or for disposal of soil/backfill material not associated with a confirmed release), the I&HW Division or the appropriate Regional Office should oversee the waste classification. All hazardous and industrial Class I waste must be manifested in accordance with the Industrial Solid Waste Rules, Chapter 335, Texas Administrative Code. Generators of any hazardous wastes or industrial Class I waste should be referred to the Waste Evaluation Section of the TCEQ Industrial and Hazardous Waste Division at (512) 239-6832.

Following are the waste classification and code numbers for typical nonhazardous wastes generated at leaking underground and aboveground petroleum storage tank sites involving the release of petroleum substances only (i.e., gasoline, diesel, kerosene, jet fuel, etc.).

CONTAMINATED SOILS

Contaminant Level	Classification	Waste Code Number
If greater than 150 ppm BTEX **OR** 600 ppm TPH	Special Waste PST	PSTW4891
If less than 150 ppm BTEX **AND** 600 ppm TPH	Class II PST Waste	PSTW4892

Note Soils saturated ('drippy') with gasoline are likely to be ignitable. Contaminated soils analyzed as ignitable are classified as hazardous waste and therefore can only be transported by a registered hazardous waste hauler and only disposed of at a permitted facility authorized to receive hazardous wastes.

CONTAMINATED WATER

Contaminant Level	Classification	Waste Code Number
Any concentration of dissolved contamination with no phase-separated product	Class II PST Waste	PSTW1021

As routinely requested in TCEQ's letters, documentation of the handling and disposition of all wastes generated in a LPST response action must be provided to TCEQ. It is essential that we track PST wastes through signed receipts and, when required, manifests to prevent their illegal dumping.

Should you have any questions or comments, please contact me at 512/239-2245 or the Waste Evaluation Section at 512/239-6832.

(Signed) Chris Chandler

END OF ATTACHMENT