

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 DESIGN 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

MEASUREMENT AND PAYMENT

PART I: 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.

END OF SECTION

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 than 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/ft³ (600kN-m/m³).
- 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

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/ft³ (600 kN-m/m³)).
 - 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

01050-1

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.

PART III: 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 Sign 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 than 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 and 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 bond 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 BUILDING 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” (CWZTCDD).

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

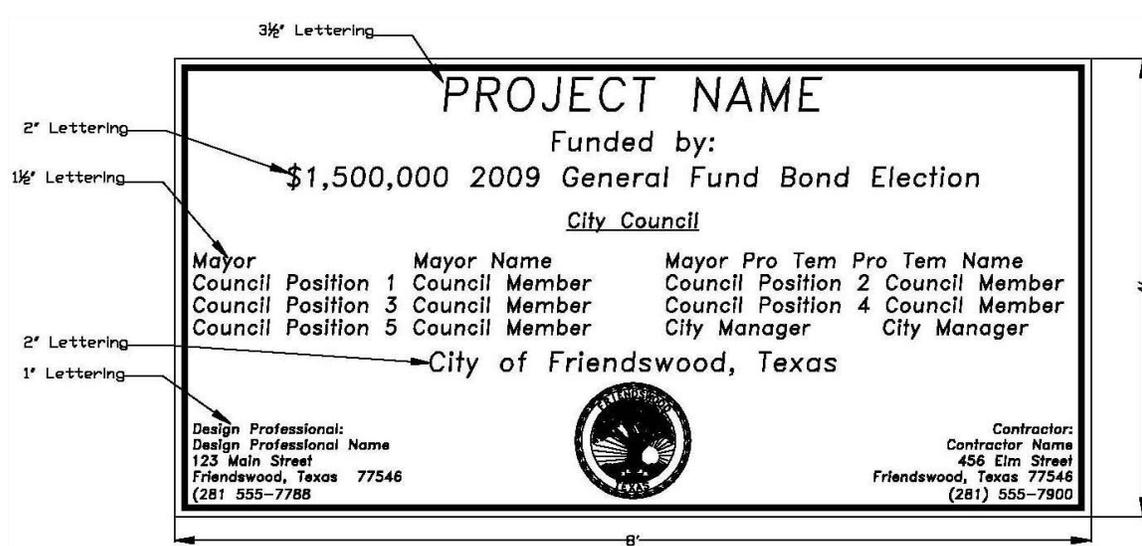
- A. project sign posts shall be set a minimum of three (3) feet in depth in a twelve (12) inch diameter hole filled with either sand or natural ground which shall be compacted to ninety-five (95) percent density.
- B. Project signs shall be mounted so that the top of the sign does not exceed eight (8) 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



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

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/IES – 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 ($\pm 3\%$).
 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 ($\pm 3\%$).
- 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 ($\pm 3\%$), 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 ($\pm 1\%$).

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 ($\pm 1\%$) 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 length 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 be 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 than two days (2 D) and no 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 ($\pm 3\%$).
 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 than 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 reinstated 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 recompact 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

01080-14

- 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 TEMPERATURE¹	
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.	

4.6 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

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: {INSERT PROJECT NAME}

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

SYSTEM STARTUPS AND OPERATION AND MAINTENANCE MANUALS

PART I: GENERAL

1.1 GENERAL REQUIREMENTS

- A. Submittal requirements for equipment and facility Operations and Maintenance (O&M) Manuals.
- B. System startup with demonstration and instructions.
- C. Testing, adjusting and balancing.

1.2 OPERATION AND MAINTENANCE MANUALS

- A. Furnish manufacturers' O&M Manuals for all equipment. Manuals must contain, as a minimum, the following:
 - 1. Equipment functions, normal operating characteristics, and limiting conditions.
 - 2. Assembly, Installation, alignment, adjustment, and checking instructions.
 - 3. Operating instructions for start-up, normal operation, regulation and control, normal shutdown, and emergency shutdown.
 - 4. Detailed drawings showing the location of each maintainable part and lubrication point with detailed instructions on disassembly and reassembly of the equipment.
 - 5. Troubleshooting guide.
 - 6. Spare parts list, predicted life of parts subject to wear, lists of spare parts recommended to be on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability.
 - 7. Outline, cross-section, and assembly drawings with engineering data and wiring diagrams.
 - 8. Test data and performance curves.
- B. Furnish parts manuals for all equipment, prepared by the equipment manufacturer, which contain, as a minimum, the following:
 - 1. Detailed drawings giving the location of each maintainable part.
 - 2. Spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory and local or nearest source of spare parts availability.

PART II: PRODUCTS – Not Used.

PART III: EXECUTION

3.1 PREPARATION

- A. Coordinate schedule for start-up of various equipment and systems.

- B. Notify the Project Manager seven (7) days prior to startup of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other damage-causing conditions.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision in accordance with manufacturer's instructions.
- G. When specified in individual Technical Specification sections, require manufacturer to provide an authorized representative to be present at the site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit written report indicating that equipment or system has been properly installed and is functioning correctly.

3.2 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to the Project Manager two (2) weeks prior to Date of Substantial Completion.
- B. Utilize O&M Manuals as the basis for instruction. Review contents of manual with the Project Manager in detail to explain aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at the equipment location.
- D. Prepare and insert additional data in O&M Manuals when the need for additional data becomes apparent during instruction.
- E. At a minimum, the Contractor will demonstrate the following:
 - 1. Products and procedures to be used in maintaining various surfaces, e.g., counter tops, toilet partitions, tile floors and carpeting;
 - 2. procedures to set and maintain landscape irrigation system;
 - 3. procedures to set and maintain security and fire alarm systems; and
 - 4. procedures to set and maintain HVAC systems.

3.3 TESTING, ADJUSTING AND BALANCING

- A. The Contractor shall appoint, employ and pay for the services of an independent firm to perform testing, adjusting and balancing.
- B. Submit reports by the independent firm to the Project Manager describing observations and results of tests and signifying compliance or non-compliance with specified requirements and requirements of the Contract.

END OF SECTION

01100-2

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

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 Conshohocken, 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