

## **SECTION 01500**

### **MOBILIZATION**

#### **PART I: GENERAL**

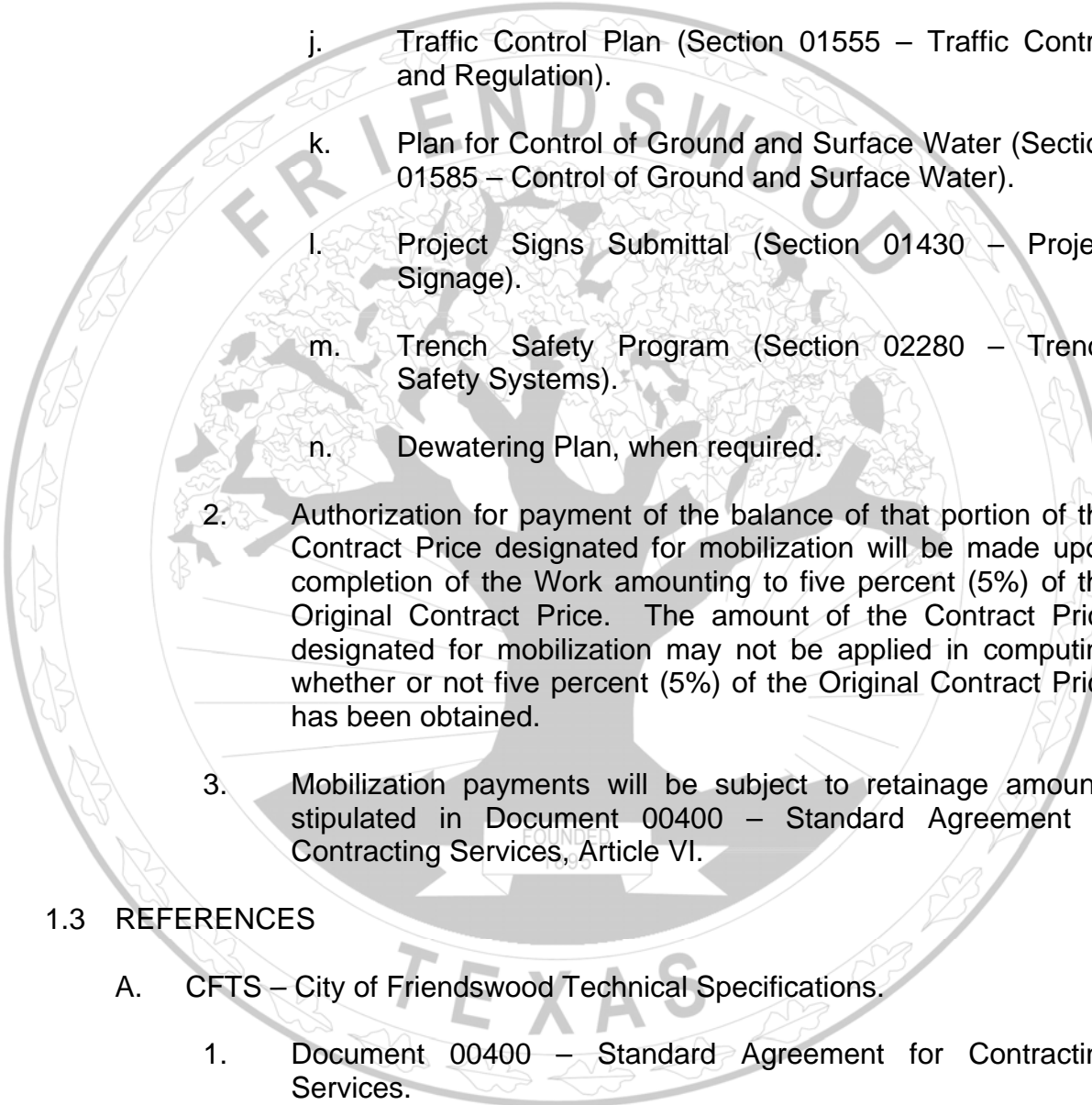
##### **1.1 GENERAL REQUIREMENTS**

- A. Mobilization of construction equipment and facilities onto the site.

##### **1.2 MEASUREMENT AND PAYMENT**

- A. Unit Price Contracts: If Contract is Unit Price Contract, measurement for mobilization is on a lump sum basis.
- B. Total Stipulated Price (Lump Sum) Contract: If Contract is Total Stipulated Price Contract, payment for the Work in this Section is included in Total Stipulated Price.
- C. Mobilization payments will be included in monthly payment estimates upon written application by the Contractor subject to the following provisions:
  - 1. Authorization for payment of fifty percent (50%) of that portion of the Contract Price designated for mobilization will be made upon receipt and approval by the Project Manager of the following items, as applicable:
    - a. Safety Program (Section 00500 – General Conditions).
    - b. Schedule of Values (Section 01295 – Schedule of Values).
    - c. Initial Construction Photographs (Section 01320 – Construction Photographs).
    - d. Construction Schedule (Section 01325 – Construction Schedule).
    - f. Submittal Schedule (Section 01330 – Submittal Procedures).
    - g. Site specific Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) along with storm water application fee (Section 01410 – TPDES Requirements).

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- h. Contractor's Quality Control Plan (Section 01450 – Contractor's Quality Control).
  - i. Establishment of a Field Office for the Project Manager meeting requirements of Section 01520 – Temporary Field Office, when an office is required by the Contract.
  - j. Traffic Control Plan (Section 01555 – Traffic Control and Regulation).
  - k. Plan for Control of Ground and Surface Water (Section 01585 – Control of Ground and Surface Water).
  - l. Project Signs Submittal (Section 01430 – Project Signage).
  - m. Trench Safety Program (Section 02280 – Trench Safety Systems).
  - n. Dewatering Plan, when required.
2. Authorization for payment of the balance of that portion of the Contract Price designated for mobilization will be made upon completion of the Work amounting to five percent (5%) of the Original Contract Price. The amount of the Contract Price designated for mobilization may not be applied in computing whether or not five percent (5%) of the Original Contract Price has been obtained.
  3. Mobilization payments will be subject to retainage amounts stipulated in Document 00400 – Standard Agreement of Contracting Services, Article VI.

### 1.3 REFERENCES

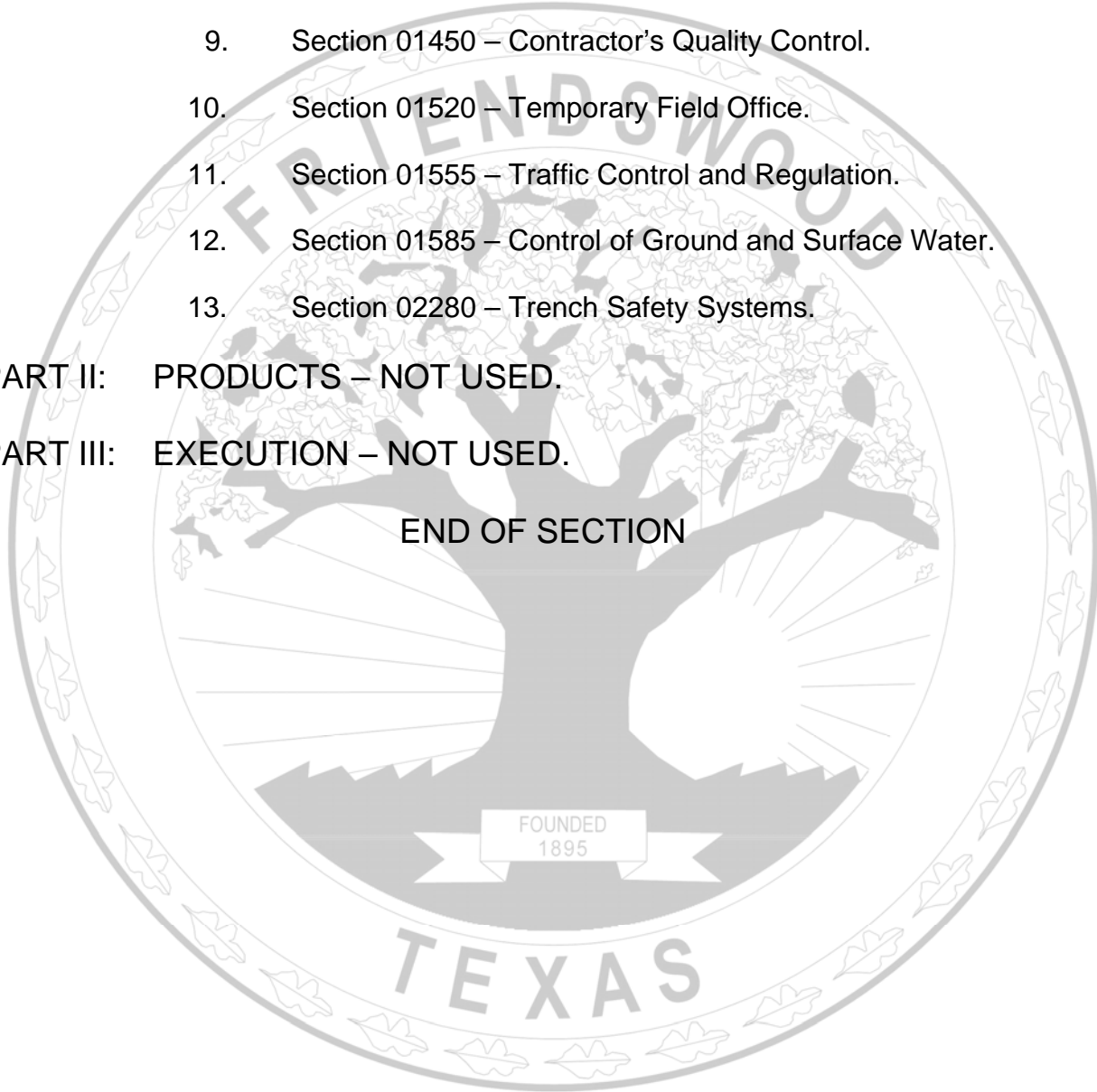
- A. CFTS – City of Friendswood Technical Specifications.
  1. Document 00400 – Standard Agreement for Contracting Services.
  2. Section 00500 – General Conditions.
  3. Section 01295 – Schedule of Values.
  4. Section 01320 – Construction Photographs.

5. Section 01325 – Construction Schedule.
6. Section 01330 – Submittal Procedures.
7. Section 01410 – TPDES Requirements.
8. Section 01430 – Project Signage.
9. Section 01450 – Contractor’s Quality Control.
10. Section 01520 – Temporary Field Office.
11. Section 01555 – Traffic Control and Regulation.
12. Section 01585 – Control of Ground and Surface Water.
13. Section 02280 – Trench Safety Systems.

**PART II: PRODUCTS – NOT USED.**

**PART III: EXECUTION – NOT USED.**

**END OF SECTION**



## **SECTION 01505**

### **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.

C. CFTS – City of Friendswood Technical Specifications.

1. Section 00500 – General Conditions.
2. Section 01140 – Work Restrictions.
3. Section 01410 – TPDES Requirements.
4. Section 01555 – Traffic Control and Regulation.
5. Section 02280 – Trench Safety Systems.

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 operations of the City 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**



## **SECTION 01510**

### **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. Conform to requirements of Section 01330 – Submittal Procedures.
- B. 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.
  - 1. Chapter 54, Article IV.
- B. CFTS – City of Friendswood Technical Specifications.
  - 1. Section 01330 – Submittal Procedures.
- 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**

## **SECTION 01520**

### **TEMPORARY FIELD OFFICE**

#### **PART I: GENERAL**

##### **1.1 GENERAL REQUIREMENTS**

- A. Temporary field office building and associated parking area.

##### **1.2 FACILITY DESCRIPTION**

- A. Temporary field office to be utilized by authorized representatives of the City to coordinate and monitor daily construction activities performed by the Contractor.
- B. Field office shall be a non-smoking facility.

##### **1.3 REFERENCES**

- A. CFTS – City of Friendswood Technical Specifications.
  - 1. Section 01770 – Closeout Procedures.

#### **PART II: PRODUCTS**

##### **2.1 FIELD OFFICE**

- A. General:
  - 1. Locate office in vicinity of the Work at a location approved by the Project Manager or where indicated on the Drawings.
  - 2. Furnish, install and maintain field office for exclusive use of authorized representatives of the City. Provide sufficient room for Project meetings and Project Manager's office.
  - 3. Provide office within ten days (10 D) of Date of Commencement of the Work.
  - 4. Construct two (2) all-weather, hard surfaced parking spaces for exclusive use of authorized representatives of the City. Provide all-weather surfaced walk between parking spaces and field office.

**B. Minimum Construction:**

1. Structurally sound foundation and superstructure.
2. Weather tight with insulated roof, walls and seven foot (7 Ft) ceiling (minimum).
3. Stairs or walkway with handrail and covered entrance platform [minimum four feet by four feet (4 Ft x 4 Ft)] with mud scraper at door.
4. Resilient floor covering.
5. Screened windows with area equal to approximately ten percent (10%) of floor area sufficient for light, view of the site, and ventilation. Provide each window with operable sash and burglar bars.
6. Secure exterior doors with dead-bolt cylinder locks and burglar bars.

**C. Minimum Services:**

1. Exterior entrance light.
2. Interior lighting of seventy-five foot-candles (75 fc) minimum at desktop height.
3. Automatic heating to maintain sixty-five degrees Fahrenheit (65° F) in winter.
4. Automatic cooling to maintain seventy-five degrees Fahrenheit (75° F) in summer.
5. Electric power service.
6. Two (2) telephone service lines one (1) for voice, one (1) for data/fax, for exclusive use of authorized representatives of the City.
7. Sanitary facilities in field office with one (1) water closet, one (1) lavatory, and one (1) medicine cabinet for exclusive use of authorized representatives of the City.

**D. Minimum Furnishings:**

1. One (1) – five (5) drawer desk.

2. Two (2) swivel desk chairs with casters.
  3. One (1) plan table.
  4. One (1) drawing plan rack.
  5. One (1) – four (4) drawer legal file cabinet complete with fifty (50) legal-size hanging folders and two (2) full-sized carriers.
  6. One (1) marker board with cleaner and markers.
  7. Two (2) waste baskets.
  8. One (1) thirty inch by thirty-six (30 In x 36 In) tack board.
  9. One (1) all-purpose fire extinguisher.
  10. Six (6) protective helmets (hard hats) with ratchet adjustment for exclusive use of authorized representatives of the City.
  11. Conference table and chairs to accommodate ten (10) persons.
  12. Telephone instrument.
- E. Provide adequate space for one (1) set of Contract Documents for ready reference.

### **PART III: EXECUTION**

#### **3.1 MAINTENANCE**

- A. Maintain all-weather surface driveway and parking areas, buildings, walkways, stairs and required furnishings and equipment for duration of the Contract.
- B. Provide janitorial services for duration of the Contract consisting of twice weekly sweeping and mopping floors, trash removal, weekly restroom cleaning, and weekly dusting of furniture and equipment.
- C. Provide soap, paper towels, toilet paper, cleansers and other necessary consumables.
- D. Immediately repair damage, leaks or defective service.

#### **3.2 PROJECT CLOSEOUT**

- A. Remove temporary field office and signs and restore site as specified in Section 01770 – Closeout Procedures.

**END OF SECTION**



## **SECTION 01555**

### **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. CFTS – City of Friendswood Technical Specifications.

1. Section 01110 – Summary of Work.

2. Section 01270 – Measurement and Payment.

3. Section 01330 – Submittal Procedures.

B. TCCP – Texas Code of Criminal Procedure.

1. Article 2.12, Texas Code of Criminal Procedure.

C. TMUTCD – Texas Manual on Uniform Traffic Control Devices.

D. 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. Conform to requirements of Section 01330 - Submittal Procedures.

B. 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 for Rough Carpenter under the City's Wage Scale for Engineering Construction.
- D. Certified Flagmen must wear a distinctive uniform, bright-colored vest, and be equipped with appropriate flagging and communication devices while at the Work site. They must also have in their possession while on duty, a proof of training identification card issued by the appropriate training institute.

## **PART II: PRODUCTS**

### **2.1 SIGNS, SIGNALS, AND DEVICES**

- A. Comply with TMUTCD requirements.
- B. Traffic cones and drums, flares and lights: Conform to local jurisdictions' requirements.

### **2.2 PORTABLE LOW PROFILE CONCRETE BARRIERS**

- A. The low profile concrete barrier is a patented design. Information concerning this barrier may be obtained from Texas Transportation Institute, Texas A&M University System, College Station, Texas 77843-3135, (409) 845-1712.

## **PART III: EXECUTION**

### **3.1 PUBLIC ROADS**

- A. Submit requests forms for lane closure and sidewalk closure to the City's Community Development Department at least three working days (3 wD) prior to need for blocking vehicular lanes or sidewalks. Do not block lanes or sidewalks without approved permits.
- B. Follow laws and regulations of governing jurisdictions when using public roads. Pay for and obtain permits from jurisdiction before impeding traffic or closing lanes. Coordinate activities with the Project Manager.
- C. Give the Project Manager one week (1 Wk) notice before implementing approved traffic control phases. Inform local businesses of impending traffic control activities.
- D. Notify police department, fire department, local schools, churches,

and businesses in writing a minimum of five working days (5 wD) prior to beginning work.

- E. Maintain ten foot (10 Ft) wide all-weather lanes adjacent to the Work for emergency vehicle use. Keep all-weather lanes free of construction equipment and debris.
- F. Do not obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Project Manager.
- G. Maintain local driveway access to residential and commercial properties adjacent to work areas at all times. Use all-weather materials approved by the Project Manager to maintain temporary driveway access to commercial and residential driveways.
- H. Keep streets entering and leaving job site free of excavated material, debris, and foreign material resulting from construction operations in compliance with applicable ordinances.
- I. Remove existing signage and striping that conflict with construction activities or that may cause driver confusion.
- J. Provide safe access for pedestrians along major cross streets.
- K. Alternate closures of cross streets so that two (2) adjacent cross streets are not closed simultaneously.
- L. Do not close more than two (2) consecutive esplanade openings at a time without prior approval from the Project Manager.

### 3.2 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and the City's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

### 3.3 FLARES AND LIGHTS

- A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

### 3.4 HAUL ROUTES

- A. Utilize haul routes designated by authorities or shown on the Drawings for construction traffic.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

### 3.5 TRAFFIC SIGNS AND SIGNALS

- A. Construct necessary traffic control devices for temporary signals required to complete the Work including loop detectors, traffic signal conduits, traffic signal wiring and crosswalk signals.
- B. Install and operate traffic control signals to direct and maintain orderly traffic flow in areas under the Contractor's control affected by the Contractor's operations. Post notices, signs and traffic controls before moving into next phase of traffic control.
- C. Relocate traffic signs and signals as the Work progresses to maintain effective traffic control.
- D. Unless otherwise approved by the Project Manager, provide driveway signs with name of business that can be accessed from each crossover. Use two (2) signs for each crossover.
- E. Replace existing traffic control devices in the work area.
- F. The Project Manager may direct the Contractor to make minor adjustments to traffic control signage to eliminate driver confusion and maintain orderly traffic flow during construction at no additional cost to the City.

### 3.6 BRIDGING TRENCHES AND EXCAVATIONS

- A. When necessary, construct bridges over trenches and excavation to permit an unobstructed flow of traffic across construction areas and major drives. Use steel plates of sufficient thickness to support H-20 loading and install to operate with minimum noise.
- B. Shore trench or excavation to support bridge and traffic.
- C. Secure bridging against displacement with adjustable cleats, angles, bolts or other devices when:

1. bridging is placed over existing bus routes,
2. more than five percent (5%) of daily traffic is comprised of commercial or truck traffic,
3. more than two (2) separate plates are used for bridging, and
4. when bridge is to be used for more than five (5) consecutive days.

- D. Extend steel plates used for bridging a minimum of one foot (1 Ft) beyond edges of trench or excavation. Use temporary paving materials such as premix to feather edges of plates to minimize wheel impact on secured bridging.

### 3.7 REMOVAL

- A. Remove equipment and devices when no longer required.
- B. Repair damage caused by installation.
- C. Remove post settings to a depth of two feet (2 Ft).

### 3.8 TRAFFIC CONTROL, REGULATION AND DIRECTION

- A. Use Flagmen to control, regulate and direct an even flow and movement of vehicular and pedestrian traffic, for periods of time as may be required to provide for public safety and convenience, where:
1. multi-lane vehicular traffic must be diverted into single lane vehicular traffic,
  2. vehicular traffic must change lanes abruptly,
  3. construction equipment must enter or cross vehicular traffic lanes and walks,
  4. construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks,
  5. traffic regulation is needed due to rerouting of vehicular traffic around the work site, and
  6. where construction activities might affect public safety and convenience.

- B. Use of Flagmen to assist in the regulation of traffic flow and movement does not relieve the Contractor of responsibility to take other means necessary to protect the Work and the public.
- C. Flagmen shall use stop/slow signs to regulate traffic around construction areas. Flags shall not be allowed, unless flagmen are trained in the proper use and techniques.

### 3.9 INSTALLATION STANDARDS

- A. Place temporary pavement for single lane closures, in accordance with TMUTCD.
- B. Reinstall temporary and permanent pavement markings as approved by the Project Manager. When weather conditions do not allow application according to manufacturer's requirements, alternate markings may be considered. Submit proposed alternate to the Project Manager for approval prior to installation. No additional payment will be made for use of alternate markings.

### 3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL

- A. Submit name, address and telephone number of individual designated to be responsible for maintenance of traffic handling at construction site to the Project Manager. Individual must be accessible at all times to immediately correct deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or pavement markings.
- B. Inspect signs, barricades, drums, lamps and temporary pavement markings daily to verify that they are visible, in good working order, and conform with traffic handling plans as approved by the Project Manager. Immediately repair, clean, relocate, realign, or replace equipment or materials that are not in compliance.
- C. Keep equipment and materials, signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.
- D. Obtain approval of the Project Manager to reuse damaged or vandalized signs, drums, and barricades.

**END OF SECTION**

## **SECTION 01560**

### **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 SUBMITTAL**

- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit name and experience of qualified Arborist, proposed for use on the Work, to the Project Manager.

##### **1.3 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.

#### 1.4 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.

#### 1.5 REFERENCES

- A. CFTS – City of Friendswood Technical Specifications.
  - 1. Section 01330 – Submittal Procedures.
  - 2. Section 01565 – Authorized Tree List
- B. ISA – International Society of Arboriculture.

### PART II: PRODUCTS

#### 2.1 MATERIALS

- A. Asphalt Paint: Emulsified asphalt or other adhesive, elastic, antiseptic coating formulated for horticultural use on cut or injured plant tissue, free from kerosene and coal creosote.
- B. Burlap: Suitable for use as tree wrapping.
- C. Fertilizer: Liquid containing twenty percent (20%) nitrogen, ten percent (10%) phosphorus and five percent (5%) potash.
- D. 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.
    - f. Paint exposed, living tissue of cuts over three-quarters inch (3/4 In) in diameter with tree paint.
  - 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.

#### 3.4 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**

**01560-5**

## **SECTION 01565**

### **AUTHORIZED TREE LIST**

#### **PART I: GENERAL**

##### **1.1 GENERAL REQUIREMENTS**

- A. Provide quality and sustainable trees in the City.

##### **1.2 MEASUREMENT AND PAYMENT**

- A. Unless otherwise stated, there shall be no separate payment for installation of trees, shrubs or bushes.

##### **1.3 REFERENCES**

- A. CFDCM – City of Friendswood Design Criteria Manual.
  - 1. Appendix D – Qualified Tree List
- B. CFCO – City of Friendswood Code of Ordinances.
  - 1. Appendix C – Zoning.
- C. CFTS – City of Friendswood Technical Specifications.
  - 1. Section 01270 – Measurement and Payment.
  - 2. Section 01330 – Submittal Procedures.
  - 3. Section 02920 – Tree Planting.

##### **1.4 SUBMITTALS**

- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit certification from supplier that each type of tree conforms to these specification requirements.
- C. The Design Criteria Manual shall be the final authority of the approved tree list. Substitutions may be submitted as specified in Section 01330 – Submittal Procedures, only after approved by either a Landscape Engineer or Urban Forester and as approved by the Director of Community Development.

## **PART II: PRODUCTS**

### **2.1 GENERAL**

- A. Trees are divided into four (4) classes. Class I and Class II trees are considered the most valuable in enhancing the environment and are most likely to prosper in the City and surrounding area. Therefore, only Class I and Class II trees shall be approved as new plantings for:

1. City Parks and property, and
2. parking lots, and
3. streets and other public rights-of-way.

There shall be no exceptions unless approved by the Director of Community Development on the advice of an Urban Forester.

- B. Species that are identified as shade trees shall reach a height and size that will conflict with overhead powerlines or permanent structures; or the canopy will exceed the limits of a confined space.
- C. Species that are identified as small trees will not provide the protection or have the aesthetic impact as the large shade tree, yet they are suitable for planting beneath powerlines and are good alternatives for areas of limited space.

### **2.2 TREE CLASSIFICATIONS**

- A. Class I trees are mostly native to the area, and do very well in Friendswood and surrounding area. They have few disease or pest problems and are easy to find in local nurseries with exceptions (those being the larger size trees).
- B. Class II trees are mostly native, yet still do well in Friendswood and the surrounding area. They have little pest or disease problems, but are harder to find in the nurseries. They are more varied in size and many are more suitable for wildlife. These trees tend to either have larger and messier fruit and/or are thornier than Class I trees. Some of these trees are also prone to some decay at maturity and might do as well in urbanized areas.
- C. Class III trees are more introduced than native species. These trees may or may not do as well in Friendswood and surrounding area. They require more maintenance and care. Natives might be harder to find in a nursery while the introduced species may be more readily available. In some cases this Class of trees are more prone to decay, disease and

pest problems.

- D. Class IV trees are exclusively introduced to the Friendswood and the surrounding area. If they do grow well, they have the potential to become an invasive species and cause problems for local ecosystems. These trees are more prone to decay, disease and pest problems.

1. THESE TREES ARE NOT RECOMMENDED FOR PLANTINGS.

### 2.3 CHARACTERISTICS

A. Location Designations:

1. N – NATIVE: Trees that are common to the local region, that grow naturally.
2. I – INTRODUCED: Trees that are not common to the area and thrive in other regions or areas.

B. Site:

1. 1 – Xerophytic – requires very little or little water.
2. 2 – Mesic – requires moderate water with good drainage.
3. 3 – Aquatic – tolerates poor drainage after established for three years (3 Yrs).

C. Light:

1. Very intolerant to shade.
2. Intolerant to shade.
3. Moderately intolerant to shade.

D. Size:

1. 1 – Sixty feet (60 Ft) and greater in ultimate height (large shade tree).
2. 2 – Thirty feet (30 Ft) to Sixty feet (60 Ft) in ultimate height (Medium tree).
3. 3 – Thirty feet (30 Ft) and less in ultimate height (small tree).

E. Foliage:

1. D – DECIDUOUS (sheds leaves annually). If placed on south and west walls, will reduce indoor temperatures in summer by shading the roof and the walls. In winter, these trees allow sunlight through to help heat the house.
2. E – EVERGREEN (having green leaves or needles throughout the year). Can create a windbreak if placed on the Northwest side of the building.
3. SE – SEMI-EVERGREEN.

2.4 TREE CODING

- A. Populating the different Class Tables found in PART IV of this Section, and using the above categories for evaluation of trees and allows the understanding of the tree's parameters. The Live Oak code of 1/N/2/1/1/SE, indicates that it is a Class I Tree (1/N/2/1/1/SE) it is native to this area (1/N/2/1/1/SE), it requires moderate water with good drainage (1/N/2/1/1/SE), it demands full sun (1/N/2/1/1/SE), will ultimately grow sixty (60) foot or taller (1/N/2/1/1/SE) and is a Semi-Evergreen type of tree (1/N/2/1/1/SE). As a shade tree the Live Oak will provide protection and have aesthetic impact but the tree is not suitable for planting beneath powerlines, within confined spaces, in streets or other public rights-of-way.

PART III: EXECUTION – NOT USED.

PART IV: TABLES

4.1 CLASS I TREE LIST

Common Name	Botanical Name	Class	N/I	Site	Light	Size	E/D
Bald Cypress	Taxodium distichum	1	N	2,3	2	1	D
Bur Oak	Quercus macrocarpa	1	N	2	1	1	D
Cedar Elm	Ulmus crassifolia	1	N	2	1	2	D
Drummond Red Maple	Acer rubrum var. drummondii	1	N	2	1	2	D
Eastern Redbud	Cercis Canadensis	1	N	2	2	2	D
Live Oak	Quercus virginiana	1	N	2	1	1	SE
Overcup Oak	Quercus lyrata	1	N	2,3	1	1	D
Pecan	Carya illinoensis	1	N	2	1	1	D
Possumhaw Holly	Ilex decidua	1	N	2	1,2	3	D
Shumard Red Oak	Quercus shumardii	1	N	2	1	1	D
Southern Magnolia	Magnolia grandiflora	1	N	2,3	1	1	E
Swamp Chestnut Oak	Quercus michauxii	1	N	2,3	1	1	D
Sweet-Bay Magnolia	Magnolia virginiana	1	N	2	2	2	E
Wax Myrtle	Myrica cerifera	1	N	2,3	1	3	E

**4.2 CLASS II TREE LIST**

<b>Common Name</b>	<b>Botanical Name</b>	<b>Class</b>	<b>N/I</b>	<b>Site</b>	<b>Light</b>	<b>Size</b>	<b>E/D</b>
American Elm	Ulmus Americana	2	N	2	1	1	D
American Sycamore	Plantus occidentalis	2	N	2	1	1	D
Anacua/Sandpaper Tree	Ehretia anacua	2	N	2	1	2	E
Arrow-wood Viburnum	Vibirnum dentatum	2	N	2	2	3	D
Black Hickory	Carya texana	2	N	2	1,2	2	D
Black Walnut	Juglans nigra	2	N	2	1,2	1	D
Blackgum	Nyssa sylvatica	2	N	2,3	1,2	3	D
Callery Pear/Bradford	Pyrus calleryana	2	I	2	1	3	D
Carolina buckthorn	Rhamnus caroliniana	2	N	2	1,2	3	D
Chalk Maple	Acer leucoderme	2	N	2	2	2	D
Cherry Laurel	Prunus caroliniana	2	N	2	2	2	E
Chinese Elm	Ulmus parvifolia	2	I	2	1	2	D
Chinquapin Oak	Quercus muhlenbergii	2	N	2	1	1	D
Common Crapemyrtle	Lagerstroemia infica	2	I	2	1	3	D
Common Fig	Ficus carica	2	I	2	1	3	D
Common Persimmon	Diospyros virginiana	2	N	2	1	2	D
Eastern Red Cedar	Juniperus virginiana	2	N	2	1,2	2	E
Eve's Necklace	Sophora affinis	2	N	1	1	3	D
Green Ash	Fraxinus pennsylvanica	2	N	2,3	1,2	1	D
Huisache	Acacia farnesiana	2	N	1	1	3	D
Loblolly Pine	Pinus taeda	2	N	2	1	1	E
Mexican Plum	Prunus Mexicana	2	N	1	1	3	D
Nuttall Oak	Quercus nuttallii	2	N	2,3	1	1	D
Ornamental Holly	Ilex spp.	2	I	2	1,2	3	E
Paloverde	Parkinsonia aculeate	2	N	1	1	2	D
Parsley Hawthorn	Crataegus marshallii	2	N	2	2	3	D
Post Oak	Quercus stellata	2	N	2	2	1	D
Red Bay	Persea borbonia	2	N	2	2	2	E
River Birch	Betula nigra	2	N	2,3	2	2	D
Rough-leaf Dogwood	Cornus drummondii	2	N	1,2	3	3	D
Rusty Blackhaw Viburnum	Viburnum rufidulum	2	N	2	2	3	D
Sassafras	Sassafras albidium	2	N	2	2	2	D
Scarlet (Red) Buckeye	Aesculus pavia	2	N	2	2	3	D
Shagbark Hickory	Carya ovata	2	N	2	1	1	D
Slash Pine	Pinus elloittii	2	I	2	1	1	E
Snowbell	Styrax Americana	2	N	2	1,2	3	D
Southern Red Oak	Quercus falcate var. pagoda	2	N	2	2	1	D
Sweetgum	Liquidambar styraciflua	2	N	2	1	1	D
Texas Mountain-Laurel	Sophora secundiflora	2	N	1	1	3	E
Texas Persimmon	Diospyros virginiana (male)	2	N	1	1	3	D
Texas Pistache	Pistacia texana	2	N	1	1	3	D
Texas Redbud	Cercis Canadensis texensis	2	N	1,2	2	3	D
Water Hickory	Carya aquatica	2	N	2,3	1	2	D
Water Oak	Quercus nigra	2	N	2,3	1	1	D
Western Soapberry	Sapindus Drummondii	2	N	2	1	2	D
White Ash	Fraxinus Americana	2	N	2	1	1	D
White Oak	Quercus alba	2	N	2	1	1	D
Willow Oak	Quercus phellos	2	N	2,3	1	1	D
Winged Elm	Ulmus alata	2	N	2	1	2	D
Woolybucket Bumelia	Bumelia lanuginose	2	N	2	2	2	D
Wright Acacia	Acacua wrightii	2	N	1	1	3	D
Yaupon Holly	Ilex vomitoria	2	N	2	1,2	3	E



**4.3 CLASS III TREE LIST**

Common Name	Botanical Name	Class	N/I	Site	Light	Size	E/D
American Elderberry	Sambucus Canadensis	3	N	2	2	3	D
American Holly	Ilex opaca	3	N	2	2	2	E
American Hornbeam	Carpinus caroliniana	3	N	2	2	2	D
Black Locust	Robinia pseudocacia	3	N	2,3	1	2	D
Black Willow	Salix nigra	3	N	3	1	2	D
Box-Elder Maple	Acer negundo	3	N	2	2	2	D
Camphor Tree	Cinnamomum camphora	3	I	2	1	2	E
Catalpa	Catalpa bignonioides	3	N	2	1	2	D
Common Pear	Pyrus communis	3	N	2	1	2	D
Eastern Cottonwood	Populus deltoides (male)	3	N	2	1	1	D
Flowering Crabapple	Malus spp.	3	I	2	1	3	D
Hercules-Club Prickly-Ash	Zanthoxylum clava-herculis	3	N	1	1	3	D
Honey-Locust	Gleditsia triacanthos	3	N	2,3	1	2	D
Japanese Yew	Podocarpus macrophyllus	3	I	2	1	2	E
Japanese Maple	Acer palmatum	3	I	2	2	2	D
Loquat	Eriobotrya japonica	3	I	2	2	3	E
Mesquite	Prosopis glandulosa	3	N	1	1	2	D
Mexican Buckeye	Ungnadia speciosa	3	N	1	1	3	D
Red Mulberry	Morus rubra	3	N	2	1	2	D
Sugar Hackberry	Celtis laevigata	3	N	2	1,2	2	D
Vitex	Vitex agnus-castus	3	I	1	1	3	D
Water Tupelo	Nysa aquatica	3	N	3	2	1	D
Weeping Willow	Salix babylonica	3	I	3	1	2	D

**4.4 CLASS IV TREE LIST**

Common Name	Botanical Name	Class	N/I	Site	Light	Size	E/D
Arborvitae	Thuja spp.	4	I	2	1,2	2	E
Arizona Ash	Fraxinus velutina	4	I	1	1	2	D
Berlandier Ash	Fraxinus berlandieriana	4	I	1	1	2	D
Chinaberry	Melia azedarach	4	I	2	1	2	SE
Chinese Pistache	Pistacia chinensis	4	I	2	1	2	D
Chinese Tallow	Sapium sebiferum	4	I	2	1,2	3	D
Eucalyptus	Eucalyptus spp.	4	I	2,3	1	3	E
Golden-Raintree	Koelreuteria paniculata	4	I	2	1	2	D
Japanese Black Pine	Pinus thunbergi	4	I	2	1	2	E
Mimosa (Silktree)	Albizia julibrissin	4	I	1,2	1,2	2	D
Mulberry	Morus alba	4	I	2	1	2	D
Siberian Elm	Ulmus pumila	4	I	1,2	1,2	1	D
Silver Maple	Acer saccharinum	4	I	1,2	1	3	D
Tulip-Tree	Liriodendron tulipifera	4	I	2	1	1	D

**END OF SECTION**

## **SECTION 01570**

### **STORM WATER POLLUTION CONTROL**

#### **PART I: GENERAL**

##### **1.1 GENERAL REQUIREMENTS**

- A. Implementation of Storm Water Pollution Prevention Plans (SW3P) described in Section 01410 -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 MEASUREMENT AND PAYMENT**

###### **A. UNIT PRICES.**

- 1. Payment for filter fabric fence is on a linear foot basis measured between limits of beginning and ending of stakes.
- 2. Payment for reinforced filter fabric fence is on a linear foot basis measured between limits of beginning and ending of stakes.
- 3. Payment for drop inlet baskets is on a unit price basis for each drop inlet basket.
- 4. Payment for storm inlet sediment traps is on a unit price basis for each storm inlet sediment trap.
- 5. Payment for storm-water-pollution-prevention structures is on a lump sum basis for the project. Earthen structures with outlet

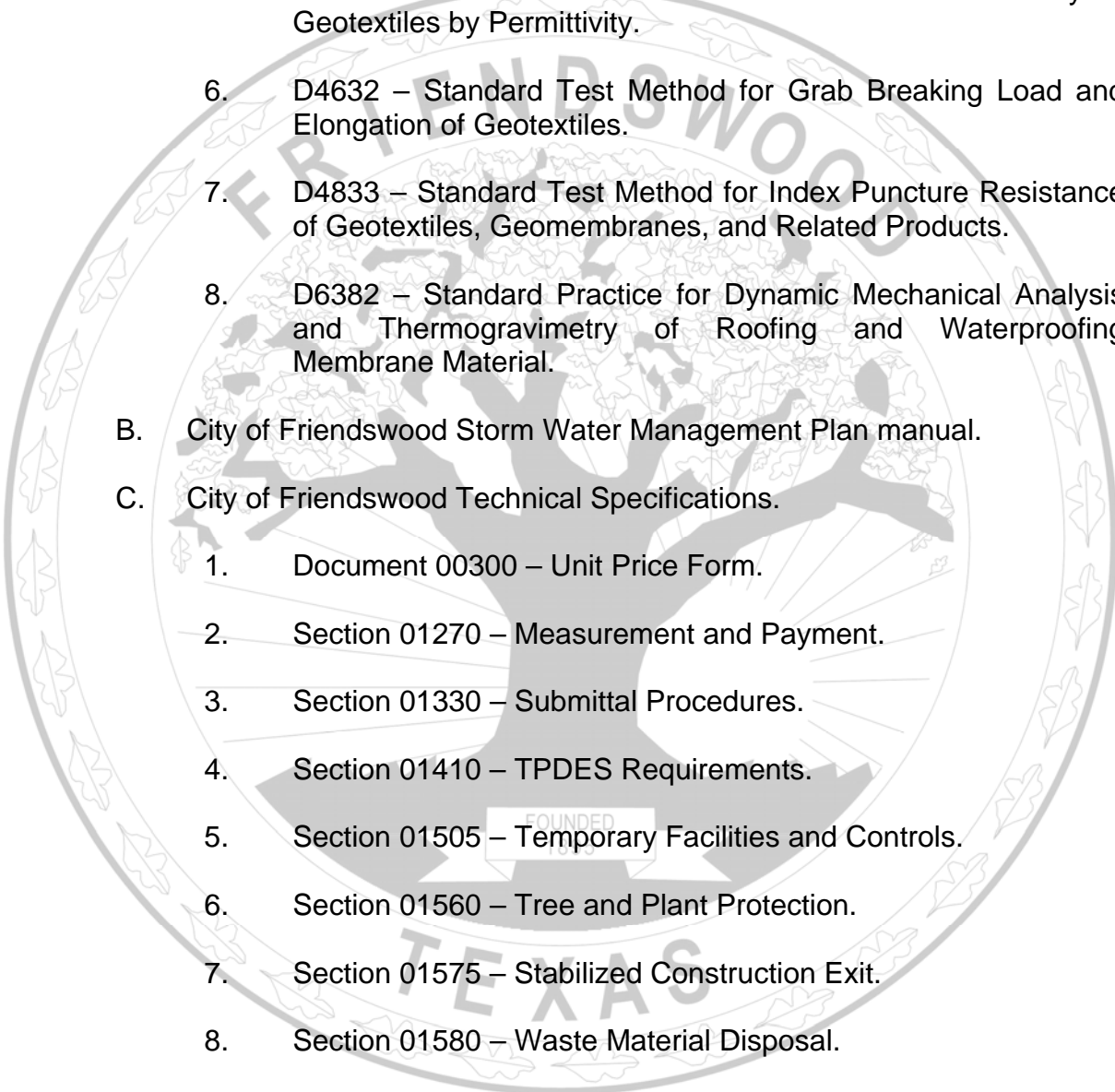
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and piping includes diversion dikes, interceptor dikes, diversion swales, interceptor swales, and excavated earth-outlet sediment trap, embankment earth-outlet sediment trap, down spout extenders, pipe slope drains, paved flumes, stone outlet sediment trap, and level spreaders.

6. Payment for straw bale barrier, if included in Document 00300 – Unit Price Form, is on a linear foot of accepted bale barriers, if not include in cost of storm water pollution prevention structures.
  7. Payment for brush berm, if included in Document 00300 – Unit Price Form, is on a linear foot of accepted brush berm, if not include in cost of storm water pollution prevention structures.
  8. Payment for sandbag barrier, if included in Document 00300 – Unit Price Form, is on a linear foot basis measured between limits of beginning and ending of sandbags, if not include in cost of storm water pollution prevention structures.
  9. Payment for sediment basin with pipe outlet or stone outlet, if included in Document 00300 – Unit Price Form, is on a square yard basis, if not include in cost of storm water pollution prevention structures.
  10. Payment for inlet protection barriers, if included in Document 00300 – Unit Price Form, is on a linear foot basis measured along outside face of inlet protection barrier, if not include in cost of storm water pollution prevention structures.
  11. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum) Contract. If Contract is Stipulated Price Contract, payment for Work in this Section is included in Total Stipulated Price.

### 1.3 REFERENCE STANDARDS

- A. ASTM – American Society for Testing and Materials.
1. A36 – Standard Specification for Carbon Structural Steel.
  2. D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).

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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.
- C. City of Friendswood Technical Specifications.
1. Document 00300 – Unit Price Form.
  2. Section 01270 – Measurement and Payment.
  3. Section 01330 – Submittal Procedures.
  4. Section 01410 – TPDES Requirements.
  5. Section 01505 – Temporary Facilities and Controls.
  6. Section 01560 – Tree and Plant Protection.
  7. Section 01575 – Stabilized Construction Exit.
  8. Section 01580 – Waste Material Disposal.
  9. Section 02100 – Clearing and Grubbing.
  10. Section 02125 – Excavation and Backfill for Utilities.
  11. Section 02135 – Excavation for Roadway.
  12. Section 02140 – Utility Backfill Materials.

13. Section 02210 – Corrugated Metal Pipe (CMP).
14. Section 02220 – High Density Polyethylene Pipe (HDPE).
15. Section 02235 – Polyvinyl Chloride Pipe (PVC).
16. Section 03300 – Structural Concrete.

#### 1.4 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.

#### 1.5 SUBMITTALS

- A. Conform to requirements of Section 01330 -Submittal Procedures.
- B. Submit manufacturer's literature for product specifications and installation instructions.
- C. Submit manufacturers catalog sheets and other product data on geotextile or filter fabrics, outlet pipe, perforated riser and connectors.
- D. Submit proposed methods, equipment, materials, and sequence of operations for storm-water pollution prevention structures.
- E. Submit shop drawings for Drop Inlet Baskets.

## **PART II: PRODUCTS**

### **2.1 CONCRETE**

- A. Concrete: Class A in accordance with Section 03300 – Concrete for Utility Construction or as shown on the Drawings.

### **2.2 AGREGATE MATERIALS**

- A. Use poorly graded cobbles with diameter greater than three inches (3 In) and less than five inches (5 In).
- B. Provide gravel lining in accordance with Section 2140 – Utility Backfill Materials or as shown on the Drawings.
- C. 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.
- D. Sediment Pump Pit Aggregate: Use nominal two inch (2 In) diameter river gravel.

### **2.3 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.

### **2.4 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.

## 2.5 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.

## 2.6 SANDBAGS

- A. Provide woven material made of polypropylene, polyethylene, or polyamide material.
  - 1. A minimum unit weight of four ounces per square yard (4 Oz/Sy).
  - 2. A minimum grab strength of one hundred pounds per square inch (100 psi) in any principal direction (ASTM D4632).
  - 3. Mullen burst strength exceeding three hundred pounds per square inch (300 psi) (ASTM D3786).
  - 4. Ultraviolet stability exceeding seventy percent (70%).
  - 5. Size:
    - a. Length: Eighteen inches (18 In) to twenty-four inches (24 In).
    - b. Width: Twelve inches (12 In) to eighteen inches (18 In).
    - c. Thickness: Six inches (6 In) to eight inches (8 In).

- d. Weight: Fifty pounds (50 Lbs) to one hundred twenty-five pounds (125 Lbs).

## 2.7 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.

## 2.8 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. Provide erosion and sediment control structures at locations shown on the Drawings.
- B. 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.
- C. 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.
- D. 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. Dispose of materials in accordance with Section 01580 – Waste Material Disposal.

- E. Remove and dispose sediment deposits at the designated spoil site for the Project. If a project spoil site is not designated on the Drawings, dispose of sediment off site at approved location in accordance with Section 01580 – Waste Material Disposal.
- F. Unless otherwise shown on the Drawings, compact embankments, excavations, and trenches in accordance with Section 02135 – Excavation for Roadway or Section 02125 – Excavation and Backfill for Utilities.
- G. 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.
- H. Protect existing trees and plants in accordance with Section 1560 – Tree and Plant Protection.

### 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 in accordance with Section 02140 – Utility Backfill Materials.
- 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. Clear in accordance with Section 02100 – Clearing and Grubbing. Compact embankments in accordance with Section 02135 – Excavation for Roadway.
- E. 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. Place pipe in accordance with Section 02125 – Excavation and Backfill for Utilities.

### 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, following Section 01575 – Stabilized Construction Exit.
- 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 runoff. Release wash water into drainage swales or inlets protected by erosion and sediment controls. Build wash areas following Section 01575 – Stabilized Construction Exit. 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.
- B. Dispose of sediments and waste products following Section 01505 – Temporary Facilities and Control.

**END OF SECTION**

## **SECTION 01575**

### **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 MEASUREMENT AND PAYMENT**

- A. Unit Price Contracts. If Contract is Unit Price Contract, payment for work in this Section will be based on the following:

- 1. Stabilized construction roads, parking areas, exits and truck-washing areas: per square yard of aggregate placed in eight inch (8 In) layers. No separate payment will be made for street cleaning necessary to meet TPDES requirements. Include cost of work for street cleaning under related Technical Specification section.

- B. Total Stipulated Price (Lump Sum) Contracts. If the Contract is a Total Stipulated Price Contract, include payment for work under this Section in the Total Stipulated Price.

##### **1.3 SUBMITTALS**

- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit manufacturers catalog sheets and other Product Data on geotextile fabric.
- C. Submit sieve analysis of aggregates conforming to requirements of this Technical Specification.

##### **1.4 REFERENCES**

- A. ASTM – American Society for Testing and Materials.
  - 1. ASTM D 4632 -Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

- B. CFTS – City of Friendswood Technical Specifications.
  - 1. Section 01330 – Submittal Procedures.
  - 2. Section 01570 – Storm Water Pollution Control.
- 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 01570 – Storm Water Pollution Control.

### 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.

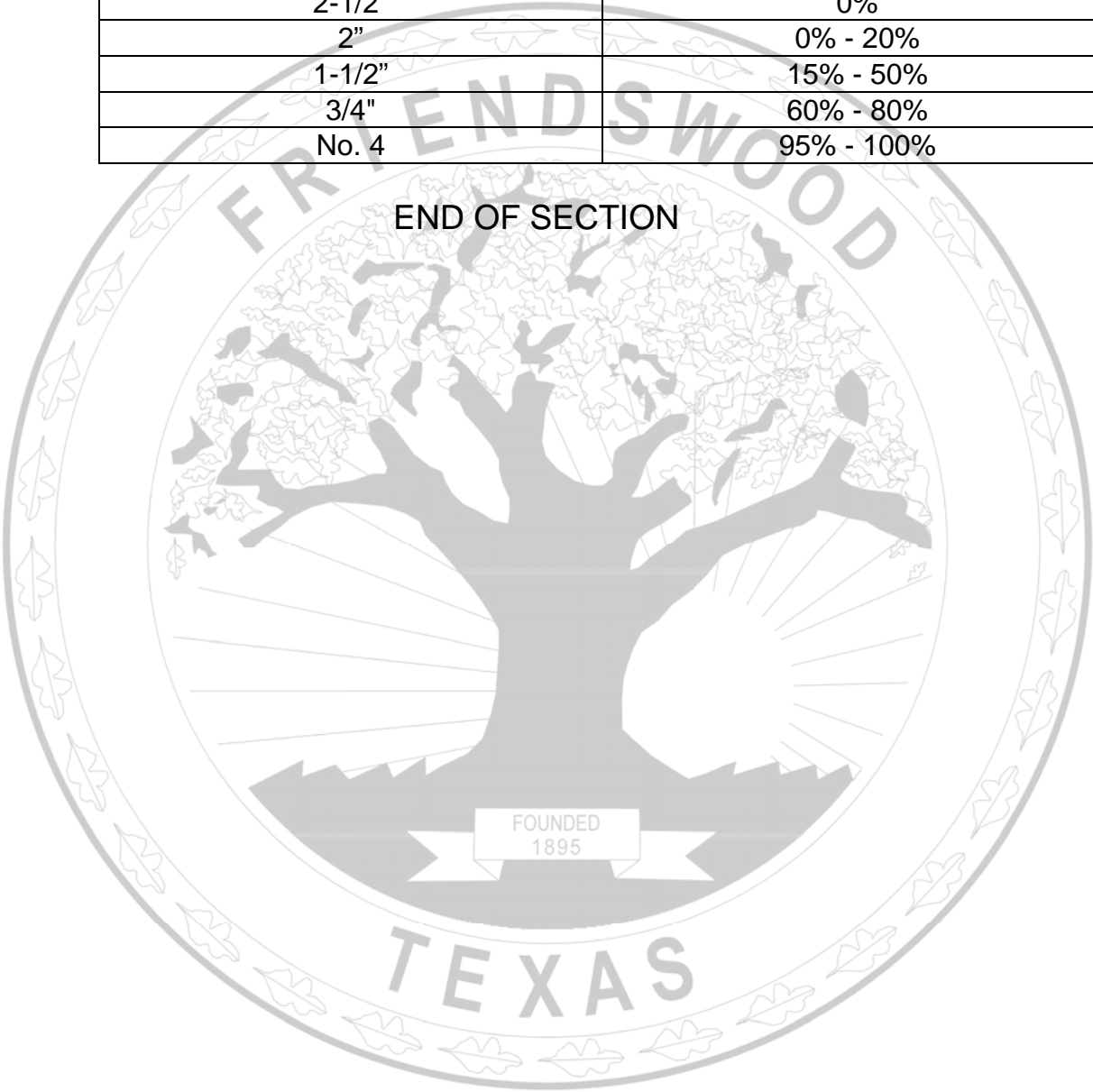
- C. Clean tires to remove sediment on vehicles leaving construction areas prior to entering public right-of-ways. Construct truck washing areas needed to remove sediment. Wash trucks on stabilized areas that drain into drainage systems protected by erosion and sediment control measures.
- D. Details 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**

<b>SIEVE SIZE (Square Mesh)</b>	<b>PERCENT RETAINED (By Weight)</b>
2-1/2"	0%
2"	0% - 20%
1-1/2"	15% - 50%
3/4"	60% - 80%
No. 4	95% - 100%

**END OF SECTION**



## **SECTION 01580**

### **WASTE MATERIAL DISPOSAL**

#### **PART I: GENERAL**

##### **1.1 GENERAL REQUIREMENTS**

- A. Disposal of waste material and salvageable material.

##### **1.2 SUBMITTALS**

- A. Conform to requirements of Section 01330 -Submittal Procedures.
- B. Submit copy of approved "Development Permit", as defined in Chapter 34, Article II, Section 34-32 of City of Friendswood Code of Ordinances, prior to disposal of excess material in areas designated as being in "100-year Flood Hazard Area" within the City. Contact the City of Friendswood Flood Plain Manager, 910 S. Friendswood Drive, at (281) 996-3201 for flood plain information.
- C. Obtain and submit disposal permits for proposed disposal sites, if required by local ordinances.
- D. Submit copy of written permission from property owner, with description of property, prior to disposal of excess material adjacent to the Project. Submit written and signed release from property owner upon completion of disposal work.
- E. Describe waste materials expected to be stored on-site and a description of controls to reduce Pollutants from these materials, including storage practices to minimize exposure of materials to storm water; and spill prevention and response measures in the Project's Storm Water Pollution Prevention Plan (SWPPP). Refer to Section 01410 – TPDES Requirements.

##### **1.3 REFERENCES**

- A. CFCO – City of Friendswood Code of Ordinances.
  - 1. Chapter 34 – Flood Damage Prevention.
- B. CFTS – City of Friendswood Technical Specifications.
  - 1. Section 01330 – Submittal Procedures.

2. Section 01410 – TPDES Requirements.

PART II: PRODUCTS – NOT USED

PART III: EXECUTION

3.1 SALVAGEABLE MATERIAL

- A. Excavated Material: When indicated on the Drawings, load, haul, and deposit excavated material at location or locations shown on the Drawings outside limits of the Project.
- B. Base, Surface, and Bedding Material: Load shell, gravel, bituminous, or other base and surfacing material designated for salvage into City trucks.
- C. Pipe Culvert: Load culverts designated for salvage into City trucks.
- D. Other Salvageable Materials: Conform to requirements of individual Technical Specification Sections.
- E. Coordinate loading of salvageable material on City trucks with the Project Manager.

3.2 EXCESS MATERIAL

- A. Remove and legally dispose of vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage from job site.
- B. Excess soil may be deposited on private property adjacent to the Project when written permission is obtained from property owner. See Paragraph 1.2.D above.
- C. Verify flood plain status of any proposed disposal site. Do not dispose of excavated materials in area designated as within 100-year Flood Hazard Area unless "Development Permit" has been obtained. Remove excess material placed in "100-year Flood Hazard Area" within the City, without "Development Permit", at no additional cost to the City.
- D. Remove waste materials from site daily, in order to maintain site in neat and orderly condition.

**END OF SECTION**



## **SECTION 01585**

### **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.

##### **1.2 MEASUREMENT AND PAYMENT**

###### **A. UNIT PRICES:**

- 1. Measurement for control of ground water, if included in Document 00300 – Unit Price Form, will be on either a lump sum basis or a linear foot basis for continuous installations of wellpoints, eductor wells, or deep wells.
- 2. If not included in Document 00300 – Unit Price Form, include the cost to control ground water in unit price for work requiring such controls.
- 3. No separate payment will be made for control of surface water. Include cost to control surface water in unit price for work requiring controls.
- 4. Follow Section 01270 – Measurement and Payment for unit price procedures.

###### **B. Total Stipulated Price (Lump Sum) Contract.**

- 1. If the Contract is a Total Stipulated Price Contract, include payment for work under this Section in the Total Stipulated Price.

### 1.3 REFERENCES

- A. ASTM – American Society for Testing and Materials.
  - 1. ASTM D698 – Standard Test Methods for Laboratory Compaction of Soils Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600kN-m/m<sup>3</sup>).
- B. CFTS – City of Friendswood Technical Specifications.
  - 1. Document 00300 – Unit Price Forms.
  - 2. Section 01270 – Measurement and Payment.
- C. CFSWMP – City of Friendswood Storm Water Management Plan manual.
- D. Federal Regulations.
  - 1. Federal Regulation 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
- E. TCEQ – Texas Commission on Environmental Quality.
- F. 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

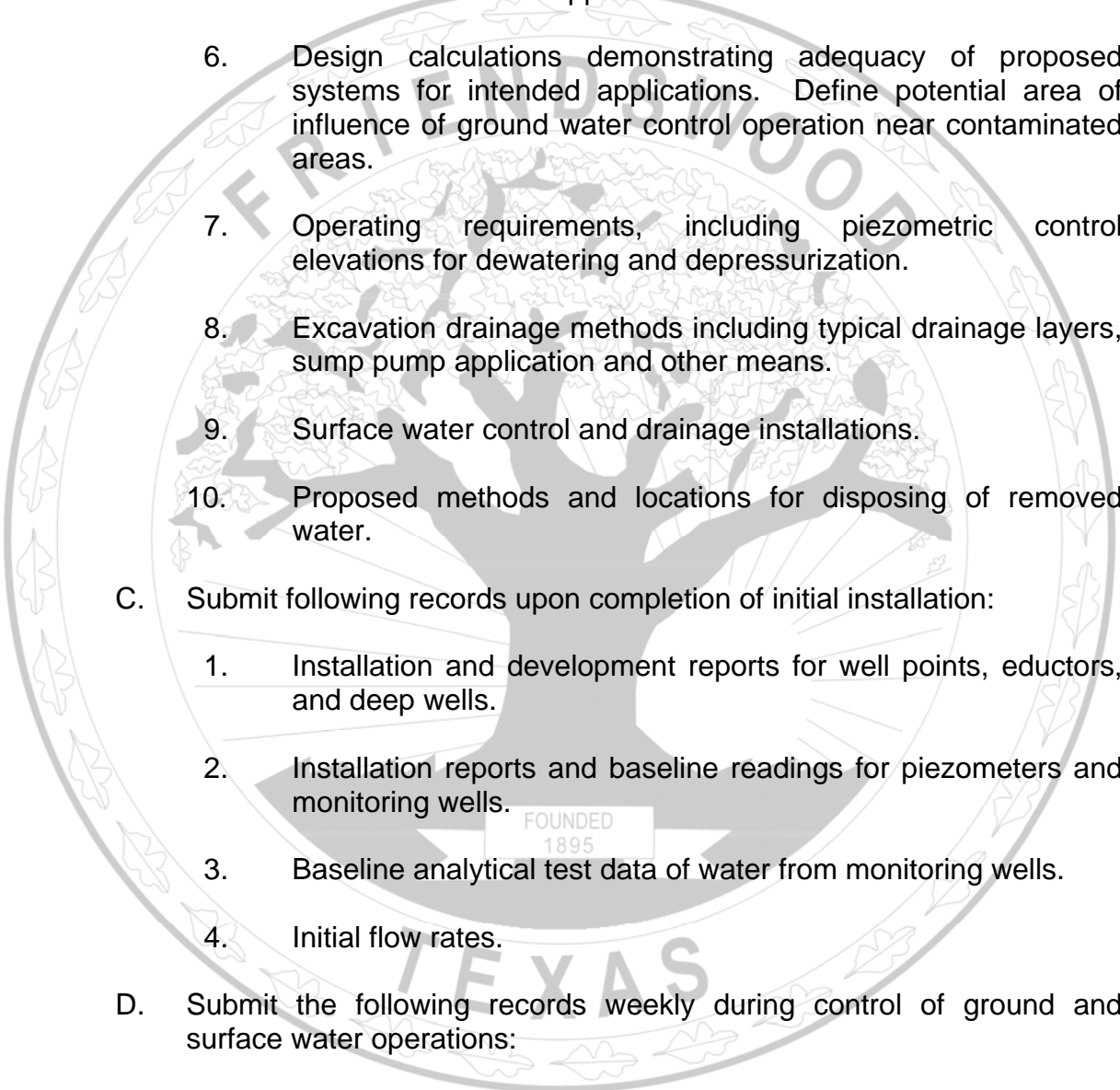
- A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems. Submit proposed method and spacing of readings for review prior to obtaining water level readings.
- B. Design ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 02280 -Trench Safety Systems, 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. Conform to requirements of Section 01330 – Submittals Procedures.
- B. 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.

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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.
- C. 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.
- D. 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 through submittals required in Paragraph 1.6, Submittals.
- 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**

