



**CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING AND CONSTRUCTION**

**PROJECT MANUAL
Rehabilitation of Water Storage Tanks
Package 8
(East Water Purification Plant No. 1 GST-3, GST-4, GST-7 & GST-8)
WBS No. S-000600-0048-4**

VOLUME 1 of 1

Divisions 00 through 16

IDS PROJECT NO. 0057-068-08

August 2016

THIS DOCUMENT IS RELEASED
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UNDER THE AUTHORITY OF
MARCEL KHOUW, P.E. 101807
ON 08/01/16, IT IS NOT TO BE USED
FOR CONSTRUCTION PURPOSES.



TBPE F-002726 | TBPLS 10110700 & 1011704
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Document 00010

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END OF DOCUMENT

Document 00410A

BID FORM – PART A

To: **The Honorable Mayor and City Council of the City of Houston
City Hall Annex
900 Bagby Street
Houston, Texas 77002**

Project: Rehabilitation of Water Storage Tanks – Package 8

Project No.: WBS No. S-000600-0048-4

Bidder: _____

(Print or type full name of business entity, such as corporation, LLC, etc.)

OFFER

- A. Total Bid Price:** Having examined the Project location and all matters referred to in Bid Documents for the Project, we, the undersigned, offer to enter into a Contract to perform the Work for the Total Bid Price shown on the signature page of this Document
- B. Security Deposit:** Included with the Bid is a Security Deposit in the amount of 10 percent of the Total Bid Price subject to terms described in Document 00200 – Instructions to Bidders.
- C. Period for Bid Acceptance:** This offer is open to acceptance and is irrevocable for 90 days from Bid Date. That period may be extended by mutual written agreement of the City and Bidder.
- D. Addenda:** All Addenda have been received. Modifications to Bid Documents have been considered and all related costs are included in the Total Bid Price.
- E. Bid Supplements:** The following documents are attached:
- Security Deposit (*as defined in Document 00200 – Instructions to Bidders*)
 - Document 00450 - Bidder's Statement of MWSBE Status
 - Document 00452 - Contractor's Submission List - Fair Campaign Ordinance Form A
 - Document 00453 – Bidder's Statement of Residency (*not required for AIP funded project*)
 - Document 00454 - Affidavit of Non-interest
 - Document 00455 - Affidavit of Ownership or Control
 - Document 00456 - Bidder's Certificate of Compliance with Buy American Program (*required for AIP funded project*)
 - Document 00457 – Conflicts of Interest Questionnaire (CIQ)
 - Document 00458 - Bidder's Certificate Regarding Foreign Trade Restriction (*required for AIP funded project*)
 - Document 00459 - Contractor's Statement Regarding Previous Contracts Subject to EEO (*required for AIP funded project*)
 - Document 00460 – (POP 1) Pay or Play Acknowledgement Form
 - Document 00470 – Bidder's MWSBE Participation Plan (*required unless no MWSBE participation goal is provided in Document 00800 (the "Goal")*).

- [X] Document 00471 – Pre-bid Good Faith Efforts *(required if the goal in Bidder's Participation Plan–Document 00470 is lower than the Goal).*
- [X] Document 00472 – Bidder's Goal Deviation Request *(required if the goal in Bidder's Participation Plan–Document 00470 is lower than the Goal).*
- [X] Others as listed: Valid official letter from OBO with your designation as a City or Local Business *(Bidder's Participation Hire Houston first)*

CONTRACT TIME

- A.** If offer is accepted, Contractor shall achieve Date of Substantial Completion within **480 calendar days** after Date of Commencement of the Work, subject to adjustments of Contract Time as provided in the Contract.

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Document 00410B

BID FORM - PART B

1.0 TOTAL BID PRICE HAS BEEN CALCULATED BY BIDDER, USING THE FOLLOWING COMPONENT PRICES AND PROCESS (PRINT OR TYPE NUMERICAL AMOUNTS):

A. STIPULATED PRICE: \$ N/A

(Total Bid Price; minus Base Unit Prices, Extra Unit Prices, Cash Allowances and All Alternates, if any)

B. BASE UNIT PRICE TABLE:

Item No.	Spec. Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in Figures
1	01502	Mobilization	L.S.	1	\$ 300,000.00 ⁽¹⁾	\$ 300,000.00 ⁽¹⁾
2	01110	East Water Purification Plant No. 1 GST-3: Furnish all materials, labor, equipment, and appurtenances for rehabilitation of a 5.0 MG ground storage tank including removal and replacement of interior baffle system in accordance with the contract plans and specifications, Complete in place.	L.S.	1		
3	01110	East Water Purification Plant No. 1 GST-4: Furnish all materials, labor, equipment, and appurtenances for rehabilitation of a 5.0 MG ground storage tank including removal and replacement of interior baffle system in accordance with the contract plans and specifications, Complete in place.	L.S.	1		
4	01110	East Water Purification Plant No. 1 GST-7: Furnish all materials, labor, equipment, and appurtenances for rehabilitation of a 5.0 MG ground storage tank including removal and replacement of interior baffle system in accordance with the contract plans and specifications, Complete in place.	L.S.	1		
5	01110	East Water Purification Plant No. 1 GST-8: Furnish all materials, labor, equipment, and appurtenances for rehabilitation of a 5.0 MG ground storage tank including removal and replacement of interior baffle system in accordance with the contract plans and specifications, Complete in place.	L.S.	1		
6	01110	East Water Purification Plant No. 1 Valve Pit A: Blasting and coating of yard piping in valve pit, and removal and replacement of valves and flexible couplings in accordance with the contract plans and specifications, Complete in place.	L.S.	1		

B. BASE UNIT PRICE TABLE: - Cont'd

Item No.	Spec. Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in Figures
7	01110	East Water Purification Plant No. 1 Valve Pit B: Blasting and coating of yard piping in valve pit, and removal and replacement of valves and flexible couplings in accordance with the contract plans and specifications, Complete in place.	L.S.	1		
TOTAL BASE UNIT PRICES						\$ _____

C. EXTRA UNIT PRICE TABLE:

Item No.	Spec. Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in Figures
8	05091	Furnish all labor, equipment, and appurtenances for "extra welding repair, all weld sizes", Complete in place.	L.F.	2,500	\$ _____ \$6.00 ⁽²⁾	
9	05091	Furnish Welder to perform miscellaneous welding for "extra welding man-hours", Complete in place.	M.H.	300	\$ _____ \$50.00 ⁽²⁾	
10	05091	Furnish Welder Apprentice to perform miscellaneous welding for "extra welding man-hours", Complete in place.	M.H.	300	\$ _____ \$35.00 ⁽²⁾	
11	09971	Furnish all materials, labor, equipment and appurtenances for installation of "extra epoxy caulking at badly pitted surfaces," Complete in place.	GAL.	200	\$ _____ \$150.00 ⁽²⁾	
12	13202	Furnish all materials, labor, equipment and appurtenances for "extra 6-inch diameter floor or roof patches including welding in place and grinding smooth", Complete in place.	EA.	400	\$ _____ \$75.00 ⁽²⁾	
13	13202	Furnish all materials, labor, equipment, and appurtenances for "extra structural members, roof rafters, and all supporting structures, all shapes, all sizes including removal and disposal of old members", Complete in place.	LBS.	6,000	\$ _____ \$10.00 ⁽²⁾	
14	13202	Furnish all materials, labor, equipment, and appurtenances for installation of an extra replacement Crow's Nest according to the contract documents, including welding and painting, Complete in place.	EA.	1	\$ _____ \$6,000.00 ⁽²⁾	

C. EXTRA UNIT PRICE TABLE: - Cont'd

Item No.	Spec. Ref.	Extra Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in Figures
15	13202	Furnish all materials, labor, equipment, and appurtenances for "extra shell plates, all sizes, all thicknesses, including removal and disposal of old plates". Complete in place.	LBS.	3,000	\$ _____ \$10.00 ⁽²⁾	
16	13202	Furnish all materials, labor, equipment, and appurtenances for "extra roof plates, all sizes, all thicknesses, including removal and disposal of old plates". Complete in place.	LBS.	2,500	\$ _____ \$10.00 ⁽²⁾	
17	13202	Furnish all materials, labor, equipment, and appurtenances for "extra roof rafters, and clips including removal and disposal of old members". Complete in place.	LBS.	3,000	\$ _____ \$10.00 ⁽²⁾	
18	13202	Furnish all materials, labor, equipment, and appurtenances for "extra floor plates, all sizes, all thickness, including sand fill, including removal and disposal of old plates and underlying fill". Complete in place.	LBS.	3,000	\$ _____ \$10.00 ⁽²⁾	
19	16111	Furnish all materials, labor, equipment and appurtenances for installation of "extra 3/4-inch galvanized conduit," Complete in place.	LF.	1,200	\$ _____ \$25.00 ⁽²⁾	
TOTAL EXTRA UNIT PRICES						\$ _____

D. CASH ALLOWANCE TABLE:

Item No.	Spec. Ref.	Cash Allowance Short Title	
1	01110	Code Enforcement and Building Permit for Galena Park	\$ 35,000.00
TOTAL CASH ALLOWANCES			\$ 35,000.00

E. ALTERNATES TABLE: N/A

F. TOTAL AMOUNT BID: \$ _____

(Add Totals for Items A., B., C., D., and E. above)

2.0 SIGNATURES: By signing this Document, I agree that I have received and reviewed all Addenda and considered all costs associated with the Addenda in calculating the Total Bid Price.

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

**By: _____
Signature Date

Name: _____
(Print or type name) Title

Address: _____
(Mailing)

(Street, if different)

Telephone and Fax Number: _____
(Print or type numbers)

* If Bid is a joint venture, add additional Bid Form signature sheets for each member of the joint venture.

** Bidder certifies that the only person or parties interested in this offer as principals are those named above. Bidder has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding.

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

Footnotes for Tables B through E:

(1) Fixed Unit Price determined prior to Bid. **Cannot** be adjusted by Bidder.

(2) Minimum Bid Price determined prior to Bid. Can be increased by the Bidder, but not decreased by crossing out the Minimum and inserting revised price on the line above. **Cannot** be decreased by the Bidder.

END OF DOCUMENT

Section 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Summary of the Work including work by the City, work covered by contract documents, cash allowances, City-furnished products, work sequence, contractor use of premises, warranty, and additional conditions for substantial completion.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of the Contract is for rehabilitation of four (4) ground storage tanks, at the East Water Purification Plant No. 1.
- B. General Requirements:
 - 1. The completed work shall not lack any part which can be reasonably implied as incidental for proper and useful operation of the facility. This includes all items of equipment, labor, and materials, whether or not shown in the Contract Documents, where such items are required to fulfill the intent of the Contract, and all shall be in accordance with code requirements, standards of regulatory agencies, manufacturer's recommendations, and acceptable industry practice.
 - 2. The Contractor shall provide a superintendent who can act on behalf of the Contractor to be on site or be available at all times while work is underway.
 - 3. Although some minor items may not be specifically identified by quantity or description, they shall be considered a part of the Work and shall be included in the applicable Proposal Item with which they are a component part.
 - 4. The need for and use of any labor or material not specifically described but necessary to complete the project described by the Contract Documents shall not represent a claim for extra payment.

C. Scope of Work

Work of the Contract is for rehabilitation of four (4) ground storage tanks, at the East Water Purification Plant No. 1.

SUMMARY OF WORK

Provide materials, labor, equipment and superintendence in accordance with these Technical Specifications, Drawings, and Contract Documents. Contractor's responsibility includes, but is not limited to: construction sequencing in accordance with the Contract Documents, quality control of workmanship and materials, handling of all material, handling and disposal of all waste, and compliance with regulatory standards governing the work.

<u>WATER PLANT</u>	<u>TANK ID</u>	<u>LOCATION</u>	<u>KEY MAP</u>
East Water Purification Plant No. 1	GST-3 (5 MG)	12555 Clinton Dr.	496 Y
East Water Purification Plant No. 1	GST-4 (5 MG)	12555 Clinton Dr.	496 Y
East Water Purification Plant No. 1	GST-7 (5 MG)	12555 Clinton Dr.	496 Y
East Water Purification Plant No. 1	GST-8 (5 MG)	12555 Clinton Dr.	496 Y
East Water Purification Plant No. 1 Valve Pit A	N/A	12555 Clinton Dr.	496 Y
East Water Purification Plant No. 1 Valve Pit B	N/A	12555 Clinton Dr.	496 Y

The work in general, to be performed under this Contract consists of, but is not limited to the following general tasks which are more specifically described in the Drawings and other Sections of these Specifications.

1. East Water Purification Plant No. 1 GST-3:
 - a. City to remove and re-install tank security and SCADA equipment, contractor to coordinate his work with the City,
 - b. Contractor to remove and replace all conduits, brackets, mounts, etc. necessary to blast and coat the tank exterior,
 - c. Furnish all required connections and appurtenances,
 - d. Install new valves, including connections to existing piping as indicated in the Drawings,
 - e. Perform tank repairs as noted in the Drawings and Specifications,
 - f. Remove existing baffle system and replace with new baffle system,
 - g. Contractor to blast and coat existing piping as shown in the Drawings,
 - h. Prepare interior of tank and apply protective coatings as specified,
 - i. Prepare exterior of tank and apply protective coatings as specified,
 - j. Clean and disinfect tank and appurtenances,
 - k. Remove and replace galvanic cathodic protection system as specified,
 - l. Removal of existing equipment and installation of new Hydro-Ranger 200 including new level transducer, conduit, and cabling,
 - m. Removal of existing equipment and installation of new overflow sensor, conduit and cabling,
 - n. Clean and re-grade site as required including repair of Contractor damaged roadways and site areas to original or better condition. Site shall be kept clean both during and upon completion of construction,
 - o. Miscellaneous and other work necessary or incidental for completion of the project, and

- p. Spot clean tank interior for year-end inspection. If the one-year anniversary occurs on or between May 1 and September 30, the inspection may be re-scheduled for some time after September 30.
2. East Water Purification Plant No. 1 GST-4:
- a. City to remove and re-install tank security and SCADA equipment, Contractor to coordinate his work with the City,
 - b. Contractor to remove and replace all conduits, brackets, mounts, etc. necessary to blast and coat the tank exterior,
 - c. Furnish all required connections and appurtenances,
 - d. Install new valves, including connections to existing piping as indicated in the Drawings,
 - e. Perform tank repairs as noted in the Drawings and Specifications,
 - f. Remove existing baffle system and replace with new baffle system,
 - g. Contractor to blast and coat existing piping as shown in the Drawings,
 - h. Prepare interior of tank and apply protective coatings as specified,
 - i. Prepare exterior of tank and apply protective coatings as specified,
 - j. Clean and disinfect tank and appurtenances,
 - k. Remove and replace galvanic cathodic protection system as specified,
 - l. Removal of existing equipment and installation of new Hydro-Ranger 200 including new level transducer, conduit, and cabling,
 - m. Removal of existing equipment and installation of new overflow sensor, conduit and cabling,
 - n. Clean and re-grade site as required including repair of Contractor damaged roadways and site areas to original or better condition. Site shall be kept clean both during and upon completion of construction,
 - o. Miscellaneous and other work necessary or incidental for completion of the project, and
 - p. Spot clean tank interior for year-end inspection. If the one-year anniversary occurs on or between May 1 and September 30, the inspection may be re-scheduled for some time after September 30.
3. East Water Purification Plant No. 1 GST-7:
- a. City to remove and re-install tank security and SCADA equipment, contractor to coordinate his work with the City,
 - b. Contractor to remove and replace all conduits, brackets, mounts, etc. necessary to blast and coat the tank exterior,
 - c. Furnish all required connections and appurtenances,
 - d. Install new valves, including connections to existing piping as indicated in the Drawings,
 - e. Perform tank repairs as noted in the Drawings and Specifications,
 - f. Remove existing baffle system and replace with new baffle system,
 - g. Contractor to blast and coat existing piping as shown in the Drawings,

SUMMARY OF WORK

- h. Prepare interior of tank and apply protective coatings as specified,
 - i. Prepare exterior of tank and apply protective coatings as specified,
 - j. Clean and disinfect tank and appurtenances,
 - k. Remove and replace galvanic cathodic protection system as specified,
 - l. Removal of existing equipment and installation of new Hydro-Ranger 200 including new level transducer, conduit, and cabling,
 - m. Removal of existing equipment and installation of new overflow sensor, conduit and cabling,
 - n. Clean and re-grade site as required including repair of Contractor damaged roadways and site areas to original or better condition. Site shall be kept clean both during and upon completion of construction,
 - o. Miscellaneous and other work necessary or incidental for completion of the project, and
 - p. Spot clean tank interior for year-end inspection. If the one-year anniversary occurs on or between May 1 and September 30, the inspection may be re-scheduled for some time after September 30.
4. East Water Purification Plant No. 1 GST-8:
- a. City to remove and re-install tank security and SCADA equipment, Contractor to coordinate his work with the City,
 - b. Contractor to remove and replace all conduits, brackets, mounts, etc. necessary to blast and coat the tank exterior,
 - c. Furnish all required connections and appurtenances,
 - d. Install new valves, including connections to existing piping as indicated in the Drawings,
 - e. Perform tank repairs as noted in the Drawings and Specifications,
 - f. Remove existing baffle system and replace with new baffle system,
 - g. Contractor to blast and coat existing piping as shown in the Drawings,
 - h. Prepare interior of tank and apply protective coatings as specified,
 - i. Prepare exterior of tank and apply protective coatings as specified,
 - j. Clean and disinfect tank and appurtenances,
 - k. Remove and replace galvanic cathodic protection system as specified,
 - l. Removal of existing equipment and installation of new Hydro-Ranger 200 including new level transducer, conduit, and cabling,
 - m. Removal of existing equipment and installation of new overflow sensor, conduit and cabling,
 - n. Clean and re-grade site as required including repair of Contractor damaged roadways and site areas to original or better condition. Site shall be kept clean both during and upon completion of construction,
 - o. Miscellaneous and other work necessary or incidental for completion of the project, and

- p. Spot clean tank interior for year-end inspection. If the one-year anniversary occurs on or between May 1 and September 30, the inspection may be re-scheduled for some time after September 30.
5. East Water Purification Plant No. 1 Valve Pit A:
- a. Contractor to remove and replace all conduits, brackets, mounts, etc. necessary to blast and coat the piping exterior,
 - b. Installation of inlet protection barriers as shown in the Drawings,
 - c. Perform repairs as noted in the Drawings and Specifications,
 - d. Install new flexible couplings and valves, including connections to existing piping as indicated in the Drawings,
 - e. Contractor to blast and coat existing piping in the valve pit as shown in the Drawings,
 - f. Clean site as required including repair of Contractor damaged roadways and site areas to original or better condition. Site shall be kept clean both during and upon completion of construction, and
 - g. Miscellaneous and other work necessary or incidental for completion of the project.
6. East Water Purification Plant No. 1 Valve Pit B:
- a. Contractor to remove and replace all conduits, brackets, mounts, etc. necessary to blast and coat the piping exterior,
 - b. Installation of inlet protection barriers as shown in the Drawings,
 - c. Perform repairs as noted in the Drawings and Specifications,
 - d. Install new flexible couplings and valves, including connections to existing piping as indicated in the Drawings,
 - e. Contractor to blast and coat existing piping in the valve pit as shown in the Drawings,
 - f. Clean site as required including repair of Contractor damaged roadways and site areas to original or better condition. Site shall be kept clean both during and upon completion of construction, and
 - g. Miscellaneous and other work necessary or incidental for completion of the project.
- D. Project Identification Signs will be considered incidental to mobilization.
- 1.03 CASH ALLOWANCES
- A. Include the following specific Cash Allowances in Contract Price under provision of Paragraph 3.11 – Document 00700 - General Conditions:
- 1. Code Enforcement and Building Permit for Galena Park - \$35,000

SUMMARY OF WORK

1.04 CITY-FURNISHED PRODUCTS

- A. Items Furnished by the City for installation and final connection by Contractor - **NOT INCLUDED**
- B. Contractor's Responsibilities:
 - 1. Arrange and pay for Product delivery to the site.
 - 2. Receive and unload Products at the site; jointly with the City, inspect for completeness or damage.
 - 3. Handle, store, install, and finish Products.
 - 4. Repair or replace damaged items.

1.05 WORK SEQUENCE

- A. Construct the Work in Phases during the construction period. Coordinate construction schedule and operations with the City. Within ten (10) days of notification of award of the contract, the Contractor shall submit to the Owner a detailed schedule showing dates when each work task is planned to begin and end.
- B. Only two (2) tanks shall be out of service at any time.
- C. Coordination of the Work: Refer to Section 01312 - Coordination and Meetings.

1.06 CONTRACTOR USE OF PREMISES

- A. Comply with procedures for access to the site as specified in Section 01560 – Site Security and for Contractor's use of rights-of-way as specified in Section 01145 - Use of Premises.
- B. Construction Operations: Limited to the City's rights-of-way provided by the City and areas shown or described in the Contract documents.
- C. Utility Outages and Shutdown: Provide a minimum of 48 hours notice to the City and private utility companies (when applicable), excluding weekends and holidays, in advance of required utility shutdown. Coordinate all work as required.

1.07 STREET CUT ORDINANCE – **NOT USED**

1.08 WARRANTY

- A. Comply with warranty requirements in accordance with Document 00700 - General Conditions.

1.09 ADDITIONAL CONDITIONS FOR SUBSTANTIAL COMPLETION

- A. In addition to requirements outlined in Document 00700 – General Conditions, for Contractor to be substantially complete with the Work and call for inspection by Project Manager to confirm, the following conditions must be met or completed:

1. All testing shall be completed and accepted by Project Manager.
2. Completion of site restoration.
3. Substantial completion shall be contingent on the successful completion of the leak test.

PART 2 P R O D U C T S - NOT USED

PART 3 E X E C U T I O N - NOT USED

END OF SECTION

Section 01145

USE OF PREMISES

1.01 SECTION INCLUDES

- A. General use of the site including properties inside and outside of rights-of-way, work affecting road, ramps, streets and driveways and notification to adjacent occupants.

1.02 RIGHTS-OF-WAY

- A. Confine access, and operations and storage areas to rights-of-way provided by the City as stipulated in Document 00700 - General Conditions; trespassing on abutting lands or other lands in the area is not allowed.
- B. Make arrangements, at no cost to the City, for temporary use of private properties. Contractor and Surety shall indemnify and hold harmless the City against claims or demands arising from such use of properties outside of rights-of-way. Submit a copy of agreements between private property owners and Contractor prior to use of the area. Agreements between private property owners and Contractor shall be notarized or bear the signatures of two witnesses.
- C. Obtain written permission from City of Houston Parks and Recreation Department for storage of materials on esplanades and other areas within rights-of-way under that department's jurisdiction. Submit copies of written permission prior to use of the area.
- D. Restrict total length of distributed materials along the route of construction to 1,000 linear feet unless otherwise approved in writing by City Engineer.

1.03 PROPERTIES OUTSIDE OF RIGHTS-OF-WAY

- A. Do not alter the condition of properties adjacent to and along rights-of-way.
- B. Do not use ways, means, methods, techniques, sequences, or procedures that result in damage to properties or improvements.
- C. Restore damaged properties outside of rights-of-ways at no cost to the city

1.04 USE OF SITE

- A. Obtain approvals from governing authorities prior to impeding or closing public roads and streets. Do not close more than two consecutive intersections at one time.

- B. Notify Project Manager and Public Works and Engineering Traffic Management Branch at least five working days prior to closing a street or street crossing. Obtain permits for street closures in advance.
 - C. Maintain 10-foot-wide minimum access lanes for emergency vehicles including access to fire hydrants.
 - D. Avoid obstructing drainage ditches or inlets. When obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.
 - E. Locate and protect private lawn sprinkler systems that may exist within the site. Repair or replace damaged systems to condition existing at start of the Work, or better. Test irrigation system prior to construction.
 - F. Conform to daily clean-up requirements of Article 3 of Document 00700 - General Conditions.
 - G. Beware of overhead power lines existing in area and in close proximity of the Project. When 10 feet of clearance between energized overhead power line and construction-related activity cannot be maintained, request Center Point Energy (CPE) de-energize or move conflicting overhead power line. Contact CPE representatives at (713) 207-2222. Schedule, coordinate and pay costs associated with de-energizing or moving conflicting overhead power lines. When there is no separate pay item for this effort, include these costs in various items of bid that make such work necessary.
- 1.05 NOTIFICATION TO ADJACENT OCCUPANTS
- A. Notify individual occupants in areas to be effected by the Work of proposed construction and time schedule. Notify not less than 72 hours or more than two weeks prior to work performed within 200 feet of homes or businesses. Follow form and content of sample door hanger provided by Project Manager.
 - B. Include in notification nature of the Work, and names and telephone numbers of two company representatives for resident contact available on 24-hour call.
 - C. Submit proposed notification to Project Manager for approval. Consider ethnicity of the neighborhood where English is not the dominant language. Provide notice in an understandable language.
- 1.06 PUBLIC, TEMPORARY, AND CONSTRUCTION ROADS AND RAMPS
- A. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when it is necessary to close public roads or streets.

- B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment, large tandem axle trucks or equipment that will damage the existing roadway surfaces.
- C. Construct and maintain access roads and parking areas as specified in Section 01504 - Temporary Facilities and Controls.

1.07 EXCAVATION IN STREETS AND DRIVEWAYS

- A. Avoid hindering or inconveniencing public travel on streets or intersecting alleys for more than two blocks at any one time, except by permission of City Engineer.
- B. Obtain Traffic Management Branch and City Engineer's approval when nature of the Work requires closure of an entire street. Permits required for street closure are Contractor's responsibility. Avoid unnecessary inconvenience to abutting property owners.
- C. Remove surplus materials and debris and open each block for public use, as work in that block is complete.
- D. Acceptance of any portion of the Work will not be based on return of street to public use.
- E. Avoid obstructing driveways or entrances to private property.
- F. Provide temporary crossings or complete excavation and backfill in one continuous operation to minimize duration of obstruction when excavation is required across drives or entrances.
- G. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices.

1.08 TRAFFIC CONTROL

- A. Comply with traffic regulation as specified in Section 01555 - Traffic Control and Regulation.

1.09 SURFACE RESTORATION

- A. Restore the site including landscaping to the condition existing before construction, or better.
- B. Repair paved areas per the requirements of Section 02951 - Pavement Repair and restoration.

USE OF PREMISESSTANDARD GENERAL REQUIREMENT

- C. Repair damaged turf areas, level with bank run sand conforming to Section 02317 - Excavation and Backfill for Utilities, or topsoil conforming to Section 02911 - Topsoil, and re-sod in accordance with Section 02922 - Sodding. Water and level newly sodded areas with adjoining turf using appropriate steel wheel rollers for sodding. Do not use spot sodding or sprigging.

1.10 LIMITS OF CONSTRUCTION

- A. Confine operations to lands within construction work limits shown on Drawings. Unless otherwise noted on Drawings adhere to the following:
 1. Where utility alignment is within esplanade, and construction limits are shown on Drawings to extend to edge of esplanade, keep equipment, materials, stockpiles a minimum of five feet from back of curb.
 2. Where construction limits shown on Drawings extend to property line, keep sidewalks free of equipment, materials, and stockpiles.

1.11 EQUIPMENT AND MATERIAL SALVAGE

- A. Upon completion of the Work, carefully remove salvageable equipment and material. Deliver them to City of Houston as directed by Project Manager. Dispose of equipment offsite at no additional cost to the City when Project Manager deems equipment unfit for further use.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01255

CHANGE ORDER PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Procedures for processing Change Orders, including:
 - 1. Assignment of a responsible individual for approval and communication of changes in the Work;
 - 2. Documentation of change in Contract Price and Contract Time;
 - 3. Change procedures, using proposals and Modifications;
 - 4. Execution of Change Orders;
 - 5. Correlation of Contractor submittals.

1.02 REFERENCES

- A. Blue Book is defined as the Rental Rate Blue Book for Construction Equipment (a.k.a. Data Quest Blue Book).
- B. Rental Rate is defined as the full-unadjusted base rental rate for the appropriate item of construction equipment.

1.03 RESPONSIBLE INDIVIDUAL

- A. Provide a letter indicating the name and address of the individual authorized to execute Modifications, and who will be responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. Provide this information at the pre-construction meeting.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

- A. Maintain detailed records of changes in the Work. Provide full information required for identification and evaluation of proposed changes, and substantiate costs of changes in the Work.
- B. Document each proposal for change in Contract Price or Contract Time with sufficient data to allow evaluation of proposal.

- C. Include the following minimum information on proposals:
1. Quantities of items in original Document 00410 – Bid Form with additions, reductions, deletions, and substitutions.
 2. Quantities and cost of items in original Schedule of Values with additions, reductions, deletions and substitutions.
 3. Provide Unit Prices for new items, with supporting information, for inclusion in Schedule of Unit Price Work.
 4. Justification for changes in Contract Time.
 5. Additional data upon request.
- D. For changes in the Work performed on a time-and-material basis, provide the following additional information:
1. Quantities and description of Products.
 2. Taxes, insurance and Bonds.
 3. Overhead and profit as noted in Document 00700 - General Conditions.
 4. Dates, times and by who work was performed.
 5. Time records and certified copies of applicable payrolls.
 6. Invoices and receipts for Products, rental equipment, and subcontracts, similarly documented.
- E. For changes in the Work performed on a time-and-materials basis, rental equipment is paid as follows:
1. Actual invoice cost for duration of time required to complete extra work without markup for overhead and profit. When extra work comprises only a portion of a rental invoice where equipment would otherwise be on site, compute hourly equipment rate by dividing the actual monthly invoice by 176. One day equals eight hours and one week equals 40 hours.
 2. Do not exceed estimated operating costs given in Blue Book for items of equipment. Overhead and profit will be allowed on the operating cost.

- F. For changes in the Work performed on a time-and-materials basis using Contractor-owned equipment, use Blue Book rates as follows:
 - 1. Contractor-owned equipment will be paid at the Blue Book Rental Rate for the duration of time required to complete extra work without markup for overhead and profit. Utilize lowest cost combination of hourly, daily, weekly or monthly rates. Use 150 percent of Rental Rate for double shifts, one extra shift per day, and 200 percent of Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of the appropriate Rental Rate shown in Blue Book. No other rate adjustments apply.
 - 2. Do not exceed estimated operating costs given in Blue Book. Overhead and profit will be allowed on operating costs. Operating costs will not be allowed for equipment on standby.

1.05 CHANGE PROCEDURES

- A. Changes to Contract Price or Contract Time can only be made by issuance of Document 00941 - Change Order. Issuance of Document 00940 - Work Change Directive will be formalized into a Change Order. Changes will be in accordance with requirements of Document 00700 - General Conditions.
- B. City Engineer will advise of Minor Changes in the Work as authorized by the Document 00700 - General Conditions by issuing Document 00942 – Minor Change.
- C. Request clarification of Drawings, Specifications, Contract documents or other information by using Document 00931- Request for Information. Response by Project Manager to Requests for Information does not authorize Contractor to perform tasks outside scope of the Work. Changes must be authorized as described in this Section.

1.06 PROPOSALS AND CONTRACT MODIFICATIONS

- A. Project Manager may issue Document 00932- Request for Proposal, which includes a detailed description of the proposed change with supplementary or revised Drawings and Specifications. Project Manager may also request a proposal in response to a Request for Information. Prepare and submit the proposal within seven days or as specified in request.
- B. Submit requests for Contract changes to City Engineer describing proposed change and its full effect on the Work, with a statement describing reason for change and effect on Contract Price and Contract Time including full documentation.

- C. Design Consultant may review Change Orders.

1.07 WORK CHANGE DIRECTIVE

- A. City Engineer may issue a signed Work Change Directive instructing Contractor to proceed with a change in the Work. Work Change Directive will subsequently be incorporated into a Change Order.
- B. Work Change Directives will describe changes in the Work and designate the method of determining change in Contract Price or Contract Time.
- C. Proceed promptly to execute changes in the Work in accordance with the Work Change Directive.

1.08 STIPULATED PRICE CHANGE ORDER

- A. A Stipulated Price Change Order will be based on an accepted proposal.

1.09 UNIT PRICE CHANGE ORDER

- A. Where Unit Prices for affected items of the Work are included in Document 00410 – Bid Form, the Change Order will be based on Unit Prices, subject to Articles 7 and 9 of Document 00700 - General Conditions.
- B. Where Unit Prices of the Work are not pre-determined in Document 00410-Bid Form, the Work Change Directive or accepted proposal will specify the Unit Prices to be used.

1.10 TIME-AND-MATERIAL CHANGE ORDER

- A. Provide itemized account and supporting data after completion of change, within time limits indicated for claims in Document 00700 - General Conditions.
- B. City Engineer will determine the change allowable in Contract Price and Contract Time as provided in Document 00700 - General Conditions.
- C. Maintain detailed records for work done on time-and-material basis as specified in Paragraph 1.04 above.
- D. Provide full information required for evaluation of changes and substantiate costs for changes in the Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

- A. City Engineer will issue Change Orders, Work Change Directives, or Minor Change in the Work for signatures of Parties as described in Document 00700 - General Conditions.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

- A. For Stipulated Price Contracts, promptly revise Schedule of Values and Application for Payment forms to record authorized Change Orders as separate line item.
- B. For Unit Price Contracts, the next monthly estimate of the Work after acceptance of a Change Order will be revised to include new items not previously included with appropriate Unit Prices.
- C. Promptly revise progress schedules to reflect change in Contract Time, and to adjust time for other items of work affected by the change, and resubmit for review.
- D. Promptly enter changes to on-site and record copies of Drawings, Specifications or Contract documents as required in Section 01785 - Project Record Documents.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01270

MEASUREMENT AND PAYMENT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected Products.

1.02 AUTHORITY

- A. Measurement methods delineated in Specification sections are intended to complement criteria of this Section. In event of conflict, requirements of the Specification section shall govern.
- B. Project Manager will take all measurements and compute quantities accordingly.
- C. Assist by providing necessary equipment, workers, and survey personnel.
- D. Measurement and Payment paragraphs are included only in those Specification sections of Division 01 where direct payment will be made. Include costs in the total bid price for those Specification sections in Division 01 that do not contain Measurement and Payment paragraphs,

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantity and measurement estimates stated in the Agreement are for contract purposes only. Quantities and measurements supplied or placed in the Work and verified by Project Manager will determine payment as stated in Article 9 of Document 00700 - General Conditions.
- B. When actual work requires greater or lesser quantities than those quantities indicated in Document 00410 – Bid Form, provide required quantities at Unit Prices contracted, except as otherwise stated in Article 9 of Document 00700 - General Conditions.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement by Weight: Reinforcing steel, rolled or formed steel or other metal shapes are measured by CRSI or AISC Manual of Steel Construction weights. Welded assemblies are measured by CRSI or AISC Manual of Steel Construction or scale weights.

MEASUREMENT AND PAYMENT**STANDARD GENERAL REQUIREMENT**

- B. Measurement by Volume:
 - 1. Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.
 - 2. Excavation and Embankment Materials: Measured by cubic dimension using average end area method.
- C. Measurement by Area: Measured by square dimension using mean length and width or radius.
- D. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
- E. Stipulated Price Measurement: By unit designated in the Agreement.
- F. Other: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.
- G. Measurement by Each: Measured by each instance or item provided.
- H. Measurement by Lump Sum: Measure includes all associated work.

1.05 PAYMENT

- A. Payment includes full compensation for all required supervision, labor, Products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or Installation of an item of the Work; and Contractor's overhead and profit.
- B. Total compensation for required Unit Price work shall be included in Unit Price bid in Document 00410 – Bid Form. Claims for payment as Unit Price work, but not specifically covered in the list of Unit Prices contained in Document 00410 – Bid Form, will not be accepted.
- C. Interim payments for stored materials will be made only for materials to be incorporated under items covered in Unit Prices, unless disallowed in Document 00800 - Supplementary Conditions.
- D. Progress payments will be based on Project Manager's observations and evaluations of quantities incorporated in the Work multiplied by Unit Price.
- E. Final payment for work governed by Unit Prices will be made on the basis of actual measurements and quantities determined by Project Manager multiplied by the Unit Price for work which is incorporated in or made necessary by the Work.

- 1.06 NONCONFORMANCE ASSESSMENT
- A. Remove and replace work, or portions of the Work, not conforming to the Contract documents.
 - B. When not practical to remove and replace work, City Engineer will direct one of the following remedies:
 - 1. Nonconforming work will remain as is, but Unit Price will be adjusted lower at discretion of City Engineer.
 - 2. Nonconforming work will be modified as authorized by City Engineer, and the Unit Price will be adjusted lower at the discretion of City Engineer, when modified work is deemed less suitable than specified.
 - C. Specification sections may modify the above remedies or may identify a specific formula or percentage price reduction.
 - D. Authority of City Engineer to assess nonconforming work and identify payment adjustment is final.
- 1.07 NONPAYMENT FOR REJECTED PRODUCTS
- A. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in an unacceptable manner.
 - 2. Products determined as nonconforming before or after placement.
 - 3. Products not completely unloaded from transporting vehicles.
 - 4. Products placed beyond lines and levels of required work.
 - 5. Products remaining on hand after completion of the Work, unless specified otherwise.
 - 6. Loading, hauling, and disposing of rejected Products.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01312

COORDINATION AND MEETINGS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. General coordination including pre-construction meeting, site mobilization conference, and progress meetings.

1.02 COORDINATION OF DOCUMENTS

- A. Coordination is required throughout documents. Refer to Contract documents and coordinate as necessary.

1.03 CONTRACTOR COORDINATION

- A. Coordinate scheduling, submittals, and work of various Specification sections to assure efficient and orderly sequence of Installation of interdependent construction elements.
- B. Coordinate completion and clean up of the Work prior to the Date of Substantial Completion and for portions of the Work designated for City's partial occupancy.
- C. Coordinate access to the site for correction of nonconforming work to minimize disruption of the City's activities where the City is in partial occupancy.

1.04 PRE-CONSTRUCTION MEETING

- A. Project Manager will schedule pre-construction meeting.
- B. Attendance Required: City representatives, Design Consultant, special consultants as required by Project Manager, Contractor, and major Subcontractors and Suppliers.
- C. Agenda:
 - 1. Distribution of Contract documents.
 - 2. Designation of personnel representing the Parties and Design Consultant.

3. Review of insurance.
4. Discussion of formats for Schedule of Values and Construction Schedule.
5. Procedures and processing of Shop Drawings, substitutions, pay estimates or Applications for Payment, Requests for Information, Requests for Proposal, Modifications, and the Contract closeout, other submittals.
6. Scheduling of the Work and coordination with other contractors.
7. Review of Subcontractors and Suppliers.
8. Appropriate agenda items listed for the site mobilization conference, Paragraph 1.05.C, when pre-construction meeting and site mobilization conference are combined.
9. Procedures for testing.
10. Procedures for maintaining record documents.

1.05 SITE MOBILIZATION CONFERENCE

- A. When required by Contract documents, Project Manager will schedule a conference at the Project site prior to Contractor mobilization.
- B. Attendance Required: City representatives, Design Consultant, special consultants, Superintendent, and major Subcontractors.
- C. Agenda:
 1. Use of premises by the City and Contractor.
 2. Safety and first aid procedures.
 3. Construction controls provided by the City.
 4. Temporary utilities.
 5. Survey and layout.
 6. Security and housekeeping procedures.
 7. Field office requirements.

1.06 PROGRESS MEETINGS

- A. Hold meetings at Project field office or other location designated by Project Manager. Hold meetings at monthly intervals, or more frequently when directed by Project Manager.
- B. Attendance Required: Superintendent, major Subcontractors and Suppliers, City representatives, Design Consultant and its subconsultants as appropriate for agenda topics for each meeting.
- C. Project Manager will make arrangements for meetings, and for recording minutes.
- D. Project Manager will prepare the agenda and preside at meetings.
- E. Provide required information and be prepared to discuss each agenda item.
- F. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of construction schedule, pay estimates, cash flow curve, payroll and compliance submittals.
 - 3. Field observations, problems, and necessary decisions.
 - 4. Identification of problems that impede planned progress.
 - 5. Review of submittal schedule and status of submittals.
 - 6. Review of RFI and RFP status.
 - 7. Modification status.
 - 8. Review of off-site fabrication and delivery schedules.
 - 9. Maintenance of Construction Schedule.
 - 10. Corrective measures to regain Construction Schedule.
 - 11. Planned progress during the succeeding work period.
 - 12. Coordination of projected progress.
 - 13. Maintenance of quality and work standards.

COORDINATION AND MEETINGS

CITY OF HOUSTON
STANDARD GENERAL REQUIREMENT

14. Effect of proposed Modifications on Construction Schedule and coordination.
15. Review Project Record Contract Drawings.
16. Other item relating to the Work.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01321

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Photographic requirements for construction photographs and submittals.

1.02 DEFINITIONS

- A. Pre-construction Photographs: Photographs taken, in sufficient numbers and detail, prior to Date of Commencement of the Work, to show original construction site conditions.
- B. Progress Photographs: Photographs, taken throughout the duration of construction at regular intervals and from fixed vantage points, pre-approved by the City, that document progress of the Work.
- C. Finished Photographs: Photographs, taken by a professional photographer near Date of Substantial Completion and before City Council's acceptance of the Work, that are suitable for framing and for use in brochures or on the Internet

1.03 SUBMITTALS

- A. Refer to Section 01330, Submittal Procedures, for submittal requirements.
- B. Format and Media. Film or digital photography may be used. Submit color photographs, unless otherwise specified.
 - 1. Prints. Submit each Progress or Pre-construction Photograph print in a three-hole plastic pocket or sleeve, bound in a three-ring notebook. Produce prints on photographic-quality paper approved by Project Manager. Minimum size for Pre-construction Photograph prints shall be 3-inches by 5-inches. Progress Photograph prints shall be 8-inches by 10-inches.
 - 2. Film. Use 35mm or larger color film. Submit negatives used to make submitted photographs, in 3-hole 8-1/2 inch by 11-inch plastic sheets with sleeves for negatives.
 - 3. Digital Photography. Use 2.1 megapixel density or greater for photographs. Scanned photographs must equal or exceed 400 dots

per inch when scanned from 8-inch by 10-inch prints. Submit digital photographic files on computer disks. Format disks for MS-DOS (Microsoft Disk Operating System) filing system and in JPEG (Joint Photographic Experts Group) format.

- C. Submittal Quantities and Frequencies.
1. Pre-construction Photographs:
 - a. For Stipulated Price Contracts, submit two sets of Pre-construction Photographs, if required, prior to first Application for Payment.
 - b. For Unit Price Contracts, submit two sets of Pre-construction Photographs prior to start of construction operations.
 2. Progress Photographs:
 - a. For Stipulated Price Contracts, submit three sets of Progress Photographs with each Application for Payment at the times established for submittal of Applications for Payment. Monthly Applications for Payment shall be deemed incomplete if not accompanied by the required Progress Photographs. Contractor's failure or election to not submit a monthly Application for Payment shall not affect the requirement for monthly Progress Photographs.
 - b. Progress Photographs are not required for Unit Price Contracts unless otherwise specified.
 3. Finished Photographs: For Stipulated Price Contracts submit two sets of Finished Photographs, if required, after Date of Substantial Completion and prior to final payment. Each set shall contain one 11-inch by 14-inch matte finish color photographic print from each of the two vantage points pre-approved by the City. Vantage points for Finished Photographs will be approved separately from vantage points approved for Progress Photographs. Finished Photographs are not required for Unit Price Contracts unless otherwise specified.
- D. Labeling. Place a label on the back of each photographic print, applied so as to not show through on the front. Labels shall contain the following information:
1. Name of Project, address of Project and GFS Number.
 2. Name and address of Contractor.
 3. Date photograph was taken.
 4. Location photo was taken from and short description of photo subject.

- 5. Name and address of professional photographer who took the photograph, if applicable.
 - E. Hand-deliver or transmit prints in standard photographic mailers marked "Photographs - Do Not Bend".
 - F. Photographic prints, negatives, photographic files and disks become the property of the City. Do not be publish photographs without written consent by the City.
- 1.04 QUALITY ASSURANCE
- A. Contractor shall be responsible for the quality of and timely execution and submittal of photographs.
 - B. For Finished Photographs, Contractor shall use a professional photographer, with five years minimum professional experience in the Houston area. Contractor shall submit name, address and credentials of professional photographer for Project Manager's review and approval.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 PRE-CONSTRUCTION PHOTOGRAPHS

- A. Prior to commencement of construction operations, photograph the site to include initial construction corridor, detour routes, and staging or storage areas.
 - 1. For Stipulated Price Contracts, unless specified as a requirement in other Sections, these photographs are optional for Contractor, but are highly recommended for areas bounded by other property owners.
 - 2. Pre-construction photographs are required for Unit Price Contracts. For line projects with scheduled construction segments, take Pre-construction Photographs prior to commencement of work on each segment.

CONSTRUCTION PHOTOGRAPHS**STANDARD GENERAL REQUIREMENT**

- B. Prepare Pre-construction Photographs as follows:
1. Show the following information on a non-reflective chalkboard placed within the picture frame:
 - a. Job number.
 - b. Project Number.
 - c. Date and time photographs were taken (Automatic date/time in negative is acceptable).
 - d. Baseline station, direction of view (i.e. N, S, NW, etc.) and house number or street address and street name.
 2. Pre-construction Photographs shall indicate condition of the following:
 - a. Esplanades and boulevards.
 - b. Yards (near side and far side of street).
 - c. House walks and sidewalks.
 - d. Curbs.
 - e. Areas between walks and curbs.
 - f. Particular features (e.g. yard lights, shrubs, fences, trees).
 3. Show date photographs were taken on negatives.
- C. Show the location of vantage points and direction of shots on a key plan of the site.

3.02 PROGRESS PHOTOGRAPHS

- A. Progress Photographs document monthly advancement of the Work. Select vantage points for each shot so as to best show status of construction and progress since last photograph submittal. Select camera stations that will require little or no movement or adjustment over the duration of construction.
- B. Take monthly Progress Photographs at regular intervals to coincide with cutoff dates associated with each Application for Payment.

3.03 FINISHED PHOTOGRAPHS

- A. Finished Photographs shall be "staged" and taken by a professional photographer to depict the most flattering images of a finished facility. Two vantage points, from which Finished Photographs will be taken, shall be agreed to in advance by the City. Photographer shall consider lighting, time of day, height of eye, landscaping and placement of vehicles, people and other props in each picture. Filters and post-photography processing may be utilized to achieve a finished product acceptable to the City.

3.04 LOCATION

- A. Vantage points, times and conditions for camera stations and photography for Progress and Finished Photographs shall be mutually agreed upon by the City, Contractor and Photographer. Progress Photograph vantage points may be changed by mutual agreement as the Work progresses, at no additional cost to the City.

END OF SECTION

Section 01326

CONSTRUCTION SCHEDULE (BAR CHART)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide an initial Construction Schedule as required by this section for the Work. Do not start construction until Project Manager reviews the schedule.

1.02 FORM AND CONTENT OF INITIAL CONSTRUCTION SCHEDULE

A. Bar Chart:

1. Show major construction activities such as pipe laying, by traffic control phases or other approved key areas; tunnel construction, pavement removal, pavement replacement, pressure testing, chlorination, clean up and punch list as separate activities on the schedule.
2. Show week duration for each activity.
3. Show separate activities for each Shop Drawing and Product Data submittal critical to timely completion. Show submittal dates and dates Project Manager needs to provide approved submittals.
4. Provide separate horizontal bar for each activity. List start and finish date for each activity at left side of diagram.
5. Horizontal Time Scale: Identify first work day of each week.
6. Scale and Spacing: Notes must be legible. Allow space for notations and future revisions.
7. Order of Listings: Order bar chart listings by phases or other approved groups of activities that are contiguous. List activities in chronological order within each phase or group.

B. Narrative Description:

1. Submit narrative descriptions of anticipated work sequences as indicated by the sequence of activities presented in the schedule.

2. Discuss any activity that affects the public (such as phases of traffic control), interaction with specific forces of the City (such as valve operation, chlorination and testing) or other associated contractors.

1.03 PROGRESS REVISIONS

- A. Submit progress revisions or necessary information to complete and process Payment Applications. When required, re-submittals for rejected revisions must be submitted and reviewed prior to the following month's processing of a Payment Application. The following month's Payment Application will not be processed until the re-submittal is reviewed and required progress revisions are received.
- B. Provide a narrative report to describe:
 1. Major changes in scope.
 2. Revised projections in progress, completion, or changes in activity duration.
 3. Other identifiable changes.
 4. Problem areas, anticipated delays, and the impact on schedule.
 5. Corrective action recommended and its effect.
 6. Effect of changes on schedules or other contractors.
 7. Product delivery lead times.
- C. Include additional data with Bar Chart described in Paragraph 1.03A of this Section:
 1. Show original dates for each activity in the approved initial progress schedule by narrow bar next to a wider bar for the current schedule.
 2. Show date each activity actually started or finished when an event has occurred. Clearly identify actual dates in two right-most columns in left portion of an 11 by 17-inch chart.
 3. Indicate the percentage progress to the date of submittal for each activity.

1.04 SUBMITTALS

- A. Submit the initial progress schedule within 15 days after award of contract. Project Manager will review the schedule and return a reviewed copy within 21 days after receipt.
- B. Cut-off dates for progress revisions may be as early as the 20th of the month to avoid delaying processing of Payment Applications. Use the cut-off date for the first approved revision for further revisions.
- C. When required, re-submit within seven days after return of review copy.
- D. Include connecting lines between bars in the schedule to indicate the sequence that activities will be accomplished. Connecting lines when the activity's start or finish is modified will identify impact of preceding or succeeding activities. Submit a minimum of six copies of the bar chart on 11 by 17-inch opaque reproductions. Project Manager will retain five copies and return the remaining copy.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01330

SUBMITTAL PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Submittal procedures for:

1. Schedule of Values
2. Construction Schedules and Cash Flow Curve (billing forecast).
3. Shop Drawings, Product Data and Samples
4. Operations and Maintenance (O&M) Data
5. Manufacturer's Certificates
6. Construction Photographs
7. Project Record Documents and monthly certification.
8. Video Tapes
9. Design Mixes

1.02 SUBMITTAL PROCEDURES

A. Scheduling and Handling:

1. Submit Shop Drawings, data and Samples for related components as required by Specifications and Project Manager.
2. Schedule submittals well in advance of need for construction Products. Allow time for delivery of Products after submittal approval.
3. Develop submittal schedule that allows sufficient time for initial review, correction, resubmission and final review of all submittals. Allow a minimum of 30 days for initial review. Project Manager will review and return submittals to Contractor as expeditiously as possible but time required for review will vary depending on complexity and quantity of data submitted.

4. Project Manager's review of submittals covers only general conformity to Drawings, Specifications and dimensions that affect layout. Contractor is responsible for quantity determination. No quantities will be verified by Project Manager. Contractor is responsible for errors, omissions or deviations from Contract requirements; review of submittals does not relieve Contractor from the obligation to furnish required items in accordance with Drawings and Specifications.
5. Submit five copies of documents unless otherwise specified.
6. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
7. Assume risk for fabricated Products delivered prior to approval. Do not incorporate Products into the Work, or include payment for Products in periodic progress payments, until approved by Project Manager.

B. Transmittal Form and Numbering:

1. Transmit each submittal to Project Manager with Transmittal letter which includes:
 - a. Date and submittal number
 - b. Project title and number
 - c. Names of Contractor, Subcontractor, Supplier and manufacturer
 - d. Identification of Product being supplied
 - e. Location of where Product is to be Installed
 - f. Applicable Specification section number
2. Identify deviations from Contract documents clouding submittal drawings. Itemize and detail on separate 8-1/2 by 11-inch sheets entitled "DEVIATIONS FOR _____." When no deviations exist, submit a sheet stating no deviations exist.
3. Have design deviations signed and sealed by an appropriate design professional, registered in the State of Texas.
4. Sequentially number transmittal letters beginning with number one. Use original number for resubmittals with an alphabetic suffix (i.e., 2A for the first resubmittal of submittal 2, or 15C for third resubmittal of submittal 15, etc.). Show only one type of work or Product on each submittal. Mixed submittals will not be accepted.

- C. Contractor's Stamp:
 - 1. Apply Contractor's Stamp certifying that the items have been reviewed in detail by Contractor and that they comply with Contract requirements, except as noted by requested variances.
 - 2. As a minimum, Contractor's Stamp shall include:
 - a. Contractor's name
 - b. Job number
 - c. Submittal number
 - d. Certification statement Contractor has reviewed submittal and it is in compliance with the Contract
 - e. Signature line for Contractor
- D. Submittals will be returned with one of the following Responses:
 - 1. "ACKNOWLEDGE RECEIPT" when no response and resubmittal is required.
 - 2. "NO EXCEPTION" when sufficient information has supplied to determine that item described is accepted and that no resubmittal is required.
 - 3. "EXCEPTIONS 'AS NOTED" when sufficient information has been supplied to determine that item will be acceptable subject to changes, or exceptions, which will be clearly stated. When exceptions require additional changes, the changes must be submitted for approval. Resubmittal is not required when exceptions require no further changes.
 - 4. "REJECTED-RESUBMIT" when submittal does not contain sufficient information, or when information provided does not meet Contract requirements. Additional data or details requested by Project Manager must be submitted to obtain approval.

1.03 MANUFACTURER'S CERTIFICATES

- A. When required by Specification sections, submit manufacturers' certificate of compliance for review by Project Manager.
- B. Place Contractor's Stamp on front of certification.
- C. Submit supporting reference data, affidavits, and certifications as appropriate.
- D. Product certificates may be recent or from previous test results, but must be acceptable to Project Manager.

1.04 DESIGN MIXES

- A. When required by Specification sections, submit design mixes for review.
- B. Place Contractor's Stamp, as specified in this section, on the front of each design mix.
- C. Mark each mix to identify proportions, gradations, and additives for each class and type of mix submitted. Include applicable test results from samples for each mix. Perform tests and certifications within 12 months of the date of the submittal.
- D. Maintain copies of approved mixes at mixing plant.

1.05 CHANGES TO CONTRACT

- A. Changes to Contract may be initiated by completing a Request for Information form. Project Manager will provide a response to Contractor by completing the form and returning it to Contractor.
 - 1. If Contractor agrees that the response will result in no increase in cost or time, a Minor Change in the Work will be issued by City Engineer.
 - 2. If Contractor and Project Manager agree that an increase in time or cost is warranted, Project Manager will forward the Request for Proposal for negotiation of a Change Order.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01340

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Methods, schedules, and processes to be followed for Shop Drawings, Product Data and Sample submittals.

1.02 REQUIREMENT

- A. Submit Shop Drawings, Product Data and Samples as required by Document 00700 - General Conditions and Specification sections, using procedures specified in Section 01330 - Submittal Procedures and the requirements of this Section.
- B. Shop Drawings, Product Data and Samples are not considered Contract documents.

1.03 SHOP DRAWING/SUBMITTAL SCHEDULE

- A. Submit a separate Shop Drawing submittal schedule at same time the Construction Schedule is submitted. List Products for which Shop Drawings and other submittals are required in the order that they appear in Specifications. Include Product Data and Sample submittals in the schedule. Payment Applications or Certificates for Payment will not be processed until Project Manager has approved the Shop Drawing submittal schedule.

1.04 SHOP DRAWINGS

- A. Submit a minimum of seven sets of Shop Drawings and Product Data in a form and quality suitable for microfilming. Review and sign Shop Drawings indicating compliance with the Contract.
- B. Place Contractor's Stamp on each drawing as described in Section 01330 - Submittal Procedures.
- C. Show the following accurately and distinctly:
 - 1. Field and erection dimensions;
 - 2. Arrangement and section views;

3. Relation to adjacent materials or structure, including complete information for making connections between the Work and work under other contracts;
 4. Types of Products and finishes;
 5. Parts list and descriptions;
 6. Assembly drawings of equipment components and accessories showing respective positions and relationships to the complete equipment package;
 7. Identify details by referencing drawing sheet and detail numbers, schedule or room numbers as shown on the Contract drawings, where necessary for clarity.
- D. Scale drawings to provide a true representation of the specific equipment or item Furnished.
- E. Coordinate and submit components, necessary for Project Manager to adequately review submittal, as a complete package. Reproduction of the Drawings for use in Shop Drawings is not allowed.
- F. For major changes to original documents, submit Computer-Aided Design (CAD) drawings on a media acceptable to Project Manager.

1.05 PRODUCT DATA

- A. Submit Product Data for review as required in Specifications.
- B. Place Contractor's stamp, on each data item submitted, as described in Section 01330 - Submittal Procedures.
- C. Mark each copy to identify applicable Products, models, and options to be used in the Work. Where required by Specifications, supplement manufacturers' standard data to provide information unique to the Work.
- D. Give manufacturers, trade name, model or catalog designation and applicable reference standard for Products specified only by reference standards.
- E. Pre-approved and Pre-qualified Products.
 1. For "pre-approved", "pre-qualified" and "approved" Products named in the City standard products list, provide an appropriate list designation,

as described in Section 01630 - Product Substitution Procedures, within 30 days after Notice to Proceed.

2. For Products proposed as alternates to "approved" products, provide information required to demonstrate that the proposed Products meet the level of quality and performance criteria of the "approved" product.

1.06 SAMPLES

- A. Submit Samples for review as required by Specifications. Have Samples reviewed and signed by a Registered Professional.
- B. Place Contractor's stamp on each Sample or firmly attach a sheet of paper with Contractor's stamp, as described in Section 01330 - Submittal Procedures.
- C. Submit the number of Samples specified in Specifications; Project Manager will retain one.
- D. Reviewed Samples that may be used in the Work are identified in Specifications.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01422

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes general quality assurance as related to Reference Standards and a list of references.

1.02 QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on the date as stated in the General Conditions.
- C. Request clarification from Project Manager before proceeding should specified reference standards conflict with Contract documents.

1.03 SCHEDULE OF REFERENCES

AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094
AGC	Associated General Contractors of America 333 John Carlyle Street Alexandria, VA 22314
AI	Asphalt Institute Research Park Drive P.O. Box 14052 Lexington, KY 40512

REFERENCE STANDARDS**STANDARD GENERAL REQUIREMENT**

AITC	American Institute of Timber Construction 7012 S. Revere Parkway, Suite 140 Englewood, CO 80112
AISC	American Institute of Steel Construction One East Wacker Dr. Chicago, IL 60601
AISI	American Iron and Steel Institute 1101 17 th Street NW, Suite 1300 Washington, DC 20036
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016
ANSI	American National Standards Institute 1819 L Street NW Sixth Floor Washington, D.C. 20036
APA	American Plywood Association Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005
AREA	American Railway Engineering and Maintenance-of-Way- Association 8201 Corporate Drive, Suite 1125 Landover, Maryland 20785
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428
AWPA	American Wood-Preservers' Association P.O. Box 5690 Granbury, TX 76049
AWS	American Welding Society 550 NW 42 nd Avenue Miami, FL 33126

CITY OF HOUSTON
STANDARD GENERAL REQUIREMENT

REFERENCE STANDARDS

AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
COH	City of Houston P.O. Box 1562 Houston, TX 77251-1562
CLFMI	Chain Link Fence Manufacturers Institute 9891 Broken Land Parkway, Suite 300 Columbia, MD 21046.
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60173-4758
EJMA	Expansion Joint Manufacturers Association 25 North Broadway Tarrytown, NY 10591
FS	Federal Standardization Documents General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406
ICEA	Insulated Cable Engineer Association P.O. Box 440 S. Yarmouth, MA 02664
IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane P.O. Box 440 Piscataway, NJ 08855-459
ISA	International Society of Arboriculture P.O. Box 3129 Champaign, IL 61826-3129
MIL	Military Specifications General Services Administration Specifications Unit (WFSIS) 7th and D Streets, S.W. Washington, DC 20406

REFERENCE STANDARDSCITY OF HOUSTON
STANDARD GENERAL REQUIREMENT

NACE	National Association of Corrosion Engineers 1440 South Creek Drive Houston, TX 77084-4906
NEMA	National Electrical Manufacturers' Association 1300 North 17 th Street, Suite 1847 Rosslyn, VA 22209
NFPA	National Fire Protection Association 1 Batterymarch Park P.O. Box 9101 Quincy, MA 02269-9101
OSHA	Occupational Safety Health Administration U.S. Department of Labor Office of Public Affairs – Room N3647 Washington, DC 20210
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083
PCI	Prestressed Concrete Institute 209 W. Jackson Blvd. Chicago, IL 60606
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021
SSPC	Society for Protective Coatings (Steel Structures Painting Council) 40 24 th Street, Sixth Floor Pittsburgh, PA 15222
TAC	Texas Administrative Code Texas Water Resources Conservation Commission P. O. Box 13087 Library MC-196 Austin, TX 78711-3087
TxDOT	Texas Department of Transportation 125 East 11 th Street Austin, TX 78701-2483

CITY OF HOUSTON
STANDARD GENERAL REQUIREMENT

REFERENCE STANDARDS

UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
UNI-BELL	UNI-BELL Pipe Association 2655 Villa Creek Drive, Suite 155 Dallas, TX 75234

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01450

CONTRACTOR'S QUALITY CONTROL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Quality assurance and control of Installation and manufacturers' field services and reports.

1.02 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

- A. Monitor quality control over Suppliers, manufacturers, Products, services, site conditions and workmanship, to produce work of specified quality at no additional cost to the City.
- B. Comply fully with manufacturers' Installation instructions, including each step in sequence.
- C. Request clarification from Project Manager before proceeding when manufacturers' instructions conflict with the Contract.
- D. Comply with specified standards as minimum requirements for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform the Work by persons qualified to produce a specified level of workmanship.

1.03 REFERENCES

- A. Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual Specification sections, or as required by Project Manager, provide Product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and Installation, quality of workmanship, start-up of equipment, operator training, testing, adjusting and balancing of equipment as applicable and to initiate required operation. Conform to minimum time requirements for start-up operations and operator training when provided in Specification sections.

CONTRACTOR'S QUALITY CONTROL **STANDARD GENERAL REQUIREMENT**

- B. At Project Manager's request, submit qualifications of manufacturers' representative to Project Manager 15 days in advance of required representatives' services. Representative is subject to approval by Project Manager.

- C. Manufacturer's representatives shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to a manufacturer's written instructions. Submit report within 14 days of observation to Project Manager for review.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01452

INSPECTION SERVICES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Inspection services and references

1.02 INSPECTION

- A. City Engineer will appoint an Inspector to represent the City and perform inspections, tests, and other services specified in individual Specification sections.
- B. City Engineer may also appoint, employ, and pay an independent firm to provide additional inspection or construction management services as indicated in Section 01454 - Testing Laboratory Services.
- C. The independent firm will submit reports to Project Manager, indicating observations and results of tests and indicating compliance or noncompliance with Contract requirements.
- D. Contractor shall assist and cooperate with the Inspector; furnish samples of materials, design mix, equipment, tools, and storage.
- E. Contractor shall notify Project Manager 24 hours prior to expected time for operations requiring services.
- F. Contractor shall sign and acknowledge reports for Inspector.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01454

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing laboratory services and Contractor responsibilities related to those services.

1.02 REFERENCES

- A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- B. ASTM D 3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
- C. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- D. ASTM E 329 - Standard Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- E. ISO/TEC Guide 25 - General Requirements for the Competence of Calibration and Testing Laboratories.

1.03 SELECTION AND PAYMENT

- A. The City will select, employ, and pay for services of an independent testing laboratory to perform inspection and testing identified in Part 3 of individual Specification sections.
- B. Contractor shall employ and pay for services of an independent testing laboratory or laboratories to perform inspection and testing identified in Part 2 of individual Specification sections.
- C. Employment of a testing laboratory by the City shall not relieve Contractor of its obligation to perform work in accordance with requirements of Contract documents.

TESTING LABORATORY SERVICES **STANDARD GENERAL REQUIREMENT**

- D. The City will deduct a minimum two-hour charge for testing laboratory time from periodic progress payment when operations requiring testing or inspection are canceled without prior notification.
- E. The City will deduct cost of retesting from periodic progress payment whenever failed work is removed, replaced and retested.

1.04 QUALIFICATION OF LABORATORY

- A. Meet laboratory requirements of ASTM E 329 and applicable requirements of ASTM C 1077, ASTM D 3666, and ASTM D 3740.
- B. Meet ISO/TEC Guide 17025 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual Specification sections.
- C. If laboratory subcontracts are part of the testing services, such work will be placed with a laboratory complying with the requirements of this Section.

1.05 LABORATORY REPORTS

- A. Testing laboratory shall provide and distribute copies of laboratory reports to the distribution list Project Manager provides at the pre-construction conference.
- B. Keep one copy of each laboratory report distributed or faxed at the site field office for duration of the Work.
- C. Laboratory will fax material supplier, Contractor and Project Manager reports that indicate failing test results by no later than close of business on the working day following test completion and review.

1.06 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge requirements of the Contract.
- B. Laboratory may not approve or accept any portion of the Work.
- C. Laboratory may not assume Contractor duties.
- D. Laboratory has no authority to stop the Work.

1.07 CONTRACTOR RESPONSIBILITIES

- A. Provide safe access to the Work and to manufacturer's facilities for Project Manager and for testing laboratory personnel.
- B. Provide testing laboratory with a copy of the Construction Schedule and a copy of each update to Construction Schedule.
- C. Notify Project Manager and testing laboratory during normal working hours of the day previous to expected time for operations requiring inspection and testing services. When Contractor fails to make timely prior notification, do not proceed with the operations requiring inspection and testing services.
- D. Notify Design Consultant 24 hours in advance when Specification requires presence of Design Consultant for sampling or testing.
- E. Request and monitor testing as required to provide timely results and to avoid delays to the Work. Provide samples to laboratory in sufficient time to allow required test to be performed in accordance with specified test methods before intended use of the Product.
- F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested, to obtain and handle samples at site or at source of Products to be tested, and to facilitate tests and inspections including storage and curing of test samples.
- G. Make arrangements with laboratory through Project Manager. Payment for additional testing will be made in accordance with Document 00700 - General Conditions:
 - 1. Re-testing required for failed tests.
 - 2. Re-testing for nonconforming work.
 - 3. Additional sampling and tests requested beyond specified requirements.
 - 4. Insufficient notification of cancellation of tests for work scheduled but not performed.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 CONDUCTING TESTING

- A Conform to laboratory sampling and testing methods specified in individual Specification sections to the latest issues of ASTM standards, TxDOT methods, or other recognized test standards as approved by Project Manager.

- B Requirements of this Section shall also apply to those tests for approval of materials, for mix designs, and for quality control of materials as performed by employed testing laboratories.

END OF SECTION

Section 01502

MOBILIZATION

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 MEASUREMENT AND PAYMENT

- A. Unit Price Contracts. If Contract is Unit Price Contract, measurement for mobilization is on a lump sum basis.
- B. Stipulated Price (Lump Sum) Contract. If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.
- C. Mobilization payments will be included in monthly payment estimates upon written application by Contractor subject to the following provisions:

1. Authorization for payment of 50 percent of that portion of Contract Price designated for mobilization will be made upon receipt and approval by Project Manager of the following items, as applicable:
 - a. Safety Program (Document 00700, Paragraph 10.1.1).
 - b. Site Utilization Plan (Section 01145).
 - c. Schedule of Values (Section 01292), if any.
 - d. Initial Construction Photographs (Section 01321), if needed.
 - e. Preliminary Construction Schedule and Billing Forecast (Section 01325).
 - f. Construction Schedule (Section 01325 or Section 01326, as applicable).
 - g. Submittal Schedule (Section 01330).
 - h. Site specific Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) along with storm water application fee (Section 01410), if required.
 - i. Contractor's Quality Control Plan (Section 01450), if required.

- j. Establishment of a Field Office for Project Manager meeting requirements of Section 01520 - Temporary Field Office.
 - k. Traffic Control Plan (Section 01555), if required.
 - l. Plan for Control of Ground and Surface Water (Section 01578), if required.
 - m. Project Signs Submittal (Section 01580).
 - n. Trench Safety Program (Section 02260), if required.
 - o. Dewatering plan, when required.
2. Authorization for payment of the balance of that portion of Contract Price designated for mobilization will be made upon completion of the Work amounting to five percent of Original Contract Price. The amount of Contract Price designated for mobilization may not be applied in computing whether or not five percent of the Original Contract Price has been obtained.
 3. Mobilization payments will be subject to retainage amounts stipulated in Document 00700 – General Conditions.

PART 2 PRODUCTS -Not Used

PART 3 EXECUTION -Not Used

END OF SECTION

Section 01504

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- 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 Contractor's responsibilities for protection of persons and property.

1.02 MEASUREMENT AND PAYMENT

A. UNIT PRICES

- 1. No separate payment will be made for any temporary facilities and controls required under this section. Include cost of such work in contract price listed for mobilization.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. Comply with applicable requirements specified in other sections of 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 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 Houston, Department of Public Works and Engineering, Taps and Meters Section. Pay required deposit based on rates established by latest ordinance.
3. Provide and maintain an adequate supply of potable water for domestic consumption by Contractor personnel, 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 10 foot-candles for open areas; 20-foot-candles for stairs and shops. Provide a minimum of one 300-watt lamp for each 200 square feet 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 50 degrees F.
- E. Telephone:
1. Provide emergency telephone service at Project site for use by Contractor 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 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.
 3. Locate toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.

3.02 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.

3.03 SAFETY REQUIREMENTS

- A. Submit a safety program at the pre-construction meeting and follow the program in accordance with Document 00700 – General Conditions. Include documented response to trench safety requirements of Section 02260 - 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. 5182a, 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 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 Contractor's responsibility without reliance or superintendence of or direction by Project Manager. Immediately advise Project Manager of investigation or inspection by Federal Safety and Health inspectors of Contractor's or Subcontractor's work or place of work on site under the Contract, and after investigation or inspection, advise Project Manager of results. Submit one copy of accident reports to Project Manager within 10 days 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 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.

3.04 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 person thoroughly trained in first aid and CPR procedures present on the site when work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens".

3.05 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.

3.06 SECURITY MEASURES

- A. Protect the Work, materials, equipment, and property from loss, theft, damage, or vandalism. Protect 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.

3.07 PROTECTION OF UTILITIES AND PIPELINES

- A. Prevent damage to existing public utilities during construction. Approximate locations of known utilities are shown on 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 48 hours in advance. The toll free telephone number is 1-800-669-8344, Texas One Call System.
- 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 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 Contractor and Project Manager at the site to discuss procedures to be used. Request pipeline company's representative to locate the pipelines in at least three locations: at each side and at centerline of proposed excavation of proposed utility. Also request representative and Project Manager to be present to observe Contractor operations when excavation is conducted within 15 feet of pipeline.
- F. Utility service lines are not shown on the construction document drawings. Contractor should anticipate that such service lines exist and should exercise extreme caution during construction. The utility service lines should be repaired and restored immediately as per the specification, if damaged due to any construction activities. No separate payment will be made for this repair and restoration work. Include payment in unit price for work in appropriate sections.
- G. Prior to abandonment of utility, make appropriate arrangements with City and owner of utility to terminate service, remove meters, transformers, and poles as may be required by site conditions.

3.08 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 light at each barricade.
 - b. Maintain barricades, signs, lights, and provide watchmen until 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, 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, City Engineer will direct Contractor in writing to perform the Work under Modification provisions in Document 00700 - 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 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 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.

3.09 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 City personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by 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 30 –Noise and Sound Level Regulation, 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 Project Manager.
- C. Select construction equipment that operates with minimum noise and vibration. When directed by Project Manager, correct objectionable noise or vibration produced by operation of equipment at no additional cost to the City. Sound Power Level (PWL) of equipment shall not exceed 85 dbA (re: 10^{-12} watts) measured five feet from the equipment, or at a lower level if prescribed by City Ordinances. Equipment noise requirements are contained in equipment specifications.

3.14 DUST CONTROL

- A. Use water or other methods approved by 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 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.

END OF SECTION

Section 01520

TEMPORARY FIELD OFFICE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A Temporary field office building and associated parking area.

1.02 FACILITY DESCRIPTION

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

PART 2 PRODUCTS

2.01 FIELD OFFICE

A General:

1. Locate office in vicinity of the Work at a location approved by Project Manager or where indicated on Drawings.
2. Furnish, Install and maintain field office for exclusive use of authorized representatives of the City. Provide sufficient room for Project meetings and Inspector's office.
3. Provide office within 10 days of Date of Commencement of the Work.
4. Construct two 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.

Weather tight with insulated roof, walls and 7-foot ceiling (minimum).

3. Stairs or walkway with handrail and covered entrance platform (minimum 4 feet by 4 feet) with mud scraper at door.
4. Resilient floor covering.
5. Screened windows with area equal to approximately 10 percent 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 75 foot-candles minimum at desktop height
3. Automatic heating to maintain 65 degrees F in winter.
4. Automatic cooling to maintain 75 degrees F in summer.
5. Electric power service.
6. Three telephone service lines one for voice, one for data, and one for fax, for exclusive use of authorized representatives of the City.
7. Sanitary facilities in field office with one water closet, one lavatory, and one medicine cabinet for exclusive use of authorized representatives of the City.

D. Minimum Furnishings:

1. One 5-drawer desk
2. Two swivel desk chairs with casters.
3. One plan table.
4. One drawing plan rack.
5. One 4-drawer legal file cabinet complete with fifty legal-size hanging folders and two full-sized carriers.
6. One marker board with cleaner and markers.

7. Two waste baskets.
 8. One 30-inch by 36-inch tack board.
 9. One all-purpose fire extinguisher.
 10. Six protective helmets (hard hats) with ratchet adjustment for exclusive use of authorized representatives of the City.
 11. Conference table and chairs to accommodate 10 persons.
 12. All in one printer, copier, plain paper fax machine.
 13. Telephone instrument separate from fax machine.
- E. Provide adequate space for one set of Contract documents for ready reference.

PART 3 EXECUTION

3.01 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.

3.02 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 1 G E N E R A L

1.01 SECTION INCLUDES

- 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.

1.02 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 Drawings, and provision of traffic control devices, equipment, and personnel necessary to protect the Work and public. Payment will be based on Contractor's Schedule of Values for traffic control and regulation.
 - 2. Payment for traffic control will be authorized by Project Manager in three (3) parts. Partial payment will be made according to following schedule:
 - a. Payment of 25 percent of traffic control amount will be authorized when permanent control devices and necessary temporary markings, sufficiently deployed along job site as required to maintain progress of work, are installed at job site and approved. This limiting percentage will be prorated based upon extent of Contractor's setup.
 - b. A payment of 50 percent of traffic control amount will be authorized when pavement replacement commences. This limiting percentage will be prorated based upon linear footage, as measured along centerline axis of water main, of pavement replaced.
 - c. A payment of 25 percent of traffic control amount will be authorized when permanent pavement markings are restored and all unnecessary permanent and temporary control devices removed. This limiting percentage will be prorated based upon the extent of restoration.

3. Flagmen: Measurement is on a lump sum basis for flagmen as required for the project. The amount invoiced shall be determined based on the schedule of value submitted for flagmen.
4. 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.
5. Portable Concrete Low Profile Traffic Barrier picked up from City of Houston Stockpile. Payment is on a unit price basis for each linear foot of low profile traffic barrier picked up from designated stockpile, moved onto the project, set at location and connected together.
6. 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.
7. 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.
8. 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.
9. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price Contracts. Include payment for work under this section in the total Stipulated Price.

1.03 REFERENCES

- A. Texas Manual on Uniform Traffic Control Devices (TMUTCD)
- B. Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act, and Article 2.12, Texas Code of Criminal Procedure.

- C. Code of Ordinances, City of Houston, Texas.
 - 1. Chapter 10 Buildings And Neighborhood Protection, Article X Cleanup After Demolition Or Removal Of Structures
 - 2. Chapter 40 Streets and Sidewalks, Article XVII Pedestrian Way Impairments

1.04 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 Registered Texas Professional Engineer.
- C. Submit copies of approved lane closure permits issued by City Traffic Engineering Branch.
- D. Submit Schedules of Values for traffic control plan and flagmen within 30 days following Notice to Proceed.
- E. Submit records verifying qualifications of Uniformed Peace Officers and Certified Flagmen proposed for use on the Work.
- F. When working in the central business district, submit copies of approved Pedestrian Way permits issued by the City's Traffic Engineering Branch.

1.05 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. Unless otherwise approved by Project Manager, use Uniformed Peace Officer for work along major thoroughfares, schools, churches, hospitals and Work at signalized intersections.
- 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 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 by the City's E. B. Cape Center.
 2. Speaks English. 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 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

- A. Comply with TMUTCD requirements.
- B. Traffic cones and drums, flares and lights: Conform to local jurisdictions' requirements.
- C. When working in the Central business district, provide pedestrian pathway

signage approved by the City's Traffic Engineering Branch.

2.02 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 3 EXECUTION

3.01 PUBLIC ROADS

- A. Submit requests forms for lane closure and sidewalk closure to the City's Traffic Engineering Branch at least three working days prior to need for blocking vehicular lanes or sidewalks. Do not block lanes or sidewalks without approved permits. Obtain application from the City's Traffic Engineering Branch at 611 Walker, 5th floor or at the following internet address: <http://www.ci.houston.tx.us/pwe/mrow/laneclosure.htm>.
- 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 Project Manager.
- C. Give Project Manager one-week notice before implementing approved traffic control phases. Inform local businesses of impending traffic control activities.
- D. Notified police department, fire department, METRO, and local schools, churches, and businesses in writing a minimum of five business days prior to beginning work.
- E. Maintain 10-foot 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 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 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 adjacent cross streets are not closed simultaneously.
- L. Do not close more than two consecutive esplanade openings at a time without prior approval from Project Manager.

3.02 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.

3.03 FLARES AND LIGHTS

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

3.04 HAUL ROUTS

- A. Utilize haul routes designated by authorities or shown on 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.

3.05 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. Notify the City's Traffic Engineering Branch a minimum of 60 days in advance of need for control boxes and switchgear. The City will perform necessary service, programming or adjustments, to signal boxes and switchgear if required during construction.

- B. Install and operate traffic control signals to direct and maintain orderly traffic flow in areas under Contractor's control affected by 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 Project Manager, provide driveway signs with name of business that can be accessed from each crossover. Use two signs for each crossover.
- E. Replace existing traffic control devices in Project area.
- F. Project Manager may direct 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.

3.06 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 of daily traffic is comprised of commercial or truck traffic,
 - 3. more than two separate plates are used for bridging, and
 - 4. when bridge is to be used for more than five consecutive days.
- D. Extend steel plates used for bridging a minimum of 1 foot 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.

3.07 REMOVAL

- A. Remove equipment and devices when no longer required.

B. Repair damage caused by installation.

C. Remove post settings to a depth of 2 feet.

3.08 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 crosswalk,
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 Contractor of responsibility to take other means necessary to protect the Work and public.

3.09 INSTALLATION STANDARDS

A. Place temporary pavement for single lane closures, in accordance with TMUTCD.

B. Reinstall temporary and permanent pavement markings as approved by Project Manager. When weather conditions do not allow application according to manufacturer's requirements, alternate markings may be considered. Submit proposed alternate to 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 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 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 Project Manager to reuse damaged or vandalized signs, drums, and barricades.

END OF SECTION

Section 01560

SITE SECURITY

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Contractor shall be responsible for protection of the site, and all work, materials, equipment, and existing facilities hereon, from actions of the Contractor, and his employees, including all sub-contractors and suppliers, whether engaged in the execution of the Work under this Contract, or engaged in any other activity while present on the site.
- B. Contractor shall also be responsible for loss protection and protecting all of the Contractor's property, equipment, assets and employees while on the East Water Purification Plant No. 1 work site.
- C. No claim shall be made against the City by reason of any act of an employee or trespasser.
- D. Contractor shall comply with all security measures required by the City, including access badging requirements, background security checks, vehicle searches, and all other security measures, either required in this Section or as appropriate on the job site. City reserves the right to permanently exclude from the site, at any time, any personnel proposed by the Contractor for security reasons, including, but not limited to, failure to comply with City security measures.
- E. Contractor shall be responsible for payment for City security personnel, when required outside the normal working hours described herein.
- F. Contractor shall be solely responsible for all security and loss prevention within the Temporary Field Office Area and work Area throughout the duration of the Contract.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for site security provided by the Contractor under this section. Include the cost for site security required under this section in the lump sum base bid item. This specifically includes the cost to the Contractor for Payment to the City for overtime security personnel required by the Contractor's proposed work schedule, and costs associated with security background checks, compliance with City security badging requirements, or any other security requirements established by the City.

1.03 PAYMENT BY CONTRACTOR TO CITY FOR OVERTIME SITE SECURITY

- A. Contractor shall reimburse the City for overtime site security for personnel and equipment that are required beyond the normal working hours as defined in this Section.
- B. Reimbursement shall be made on a time and materials basis at a unit price of \$27 per man-hour and \$8 per hour for truck rental.

1.04 CITY'S RESPONSIBILITY – SECURITY PERSONNEL

- A. Through the duration of the Contract, the City will provide a security guard to either the Plant Main Access Gate, 24 hours a day, 7 days a week. Contractor shall not be responsible for reimbursement to the City for overtime site security required for the Plant Access Gate, since this access point is staffed by the City at all times.

1.05 SCHEDULING OVERTIME SECURITY OUTSIDE OF 'NORMAL' OPERATING HOURS

- A. Except for emergencies, advance notice to provide additional hours of service in excess of that described in Paragraph 1.06 above shall be given to the City's Security Contractor by the Contractor, following approval or direction by the City's Project Manager, as follows:

HOURS	NOTICE
Monday - Saturday	At or before 2:00 pm four days before service is required.
Sundays	At or before 2:00 pm four days preceding the weekend.
Holidays	At or before 2:00 pm eight days preceding the holiday.

- B. The following 10 holidays shall be observed: New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving, the Friday following Thanksgiving, Christmas Eve, and Christmas Day.

1.06 MANDATORY BACKGROUND CHECKS AND CITY OF HOUSTON BADGING REQUIREMENTS

- A. All Contractor employees and subcontractors must be a U.S. Citizen or have a legal work permit. Each person must also present a valid unexpired U.S. state driver's license or photo identification card. A U.S. issued resident alien card, with photo,

- passport, or other U.S. state or U.S. federal photo documentation is acceptable to present for identification purposes.
- B. Contractor shall conduct background security checks, to include criminal records and driving records, on all employees at time of hiring and periodically thereafter and provide copies to the City of Houston PWE Security Management Section prior to first day of work for each employee.
 - C. The City of Houston PWE Security Management Section will also conduct a criminal background check on all Contractor and subcontractor employees assigned to work on the East Water Purification Plant No. 1 work site. A copy of the City's "Disclosure and Consent for Release of Information" form must be completed and submitted to the City for each employee of the Contractor and its subcontractors before they are granted access to the East Water Purification Plant No. 1 work site.
 - D. Each employee of the Contractor and its subcontractors will be required to apply for, and receive, a City of Houston identification card/access badge before being granted access to the East Water Purification Plant No. 1 work site. A copy of the City's "Badging/ Access Information Sheet" must be completed and submitted to the City at the time the Contractor or subcontractor employee is photographed for the identification card/access badge. The City of Houston photo identification office is located at 611 Walker Street in Houston, Texas on the 3rd floor of the annex (832-395-5175 phone, 832-395-5187 fax).
 - E. Equipment vendors or manufacturer's representatives who will be required to be on-site for more than four (4) consecutive working days, or cumulatively more than eight (8) working days will be required to comply with background check and badging requirements in Paragraphs 1.09 C. and D. of this Section.
 - F. Identification cards/access badges will only be issued by the City once a background check has been completed for Contractor and subcontractor employees, and clearance has been granted by the City.
 - G. All Contractor employees without current identification card/access badge will be stopped by the security guard and will not be given access to any City of Houston facility. All construction employees must show a valid identification card/access badge at the entrance gate and upon request while working on site.
 - H. The Contractor shall provide the City of Houston PWE Security Management Section a weekly list of current Contractor and subcontractor employees. This list shall be updated immediately by the Contractor as changes occur.
 - I. Each employee must show their access card to enter and exit the site at the guardhouse. Lost cards are disabled and replacement cost is \$50.00.

1.07 CONTRACTOR / SUBCONTRACTOR HARDHAT IDENTIFICATION

- A. Each Contractor employee, including subcontractors, must wear a hard hat with proper identification. Each hardhat shall display a distinctive corporate logo to identify the responsible company.

1.08 VEHICLE IDENTIFICATION/PARKING PASS

- A. The City will provide a construction staging area large enough for parking all Contractor's, Subcontractor's and the City's construction staff vehicles. The workers personal vehicles shall remain in the construction staging parking area during work onsite.
- B. Contract company-owned and/or leased vehicles entering City of Houston PWE facilities must have company logos displayed on both sides of the vehicle. Company logos must be displayed on the body of the vehicle.
- C. Contract personnel utilizing their personal vehicles for company business inside a City of Houston PWE facility must also display company logos. They may display their company logo on each side of their rear side windows. If the vehicle is a pickup truck the logo may be placed in the back glass. The logo must not be smaller than 5" X 8" in size and must be easily read from a distance of not less than 100 feet. Logos must remain on the vehicle while inside the City of Houston PWE facility and may not be removed until the vehicle exits the gate.
- D. All equipment on rubber tires, such as mobile cranes, backhoes, air compressors, welding machines, etc must also display company logos while being operated inside a City of Houston PWE facility.
- E. The Contractor shall provide the Owner with a list of the following information for their vehicles; year, make, model, color, state, license, plate number, company that employs the driver, and the driver's name. Any changes shall be forwarded to the Owner within 24 hours of becoming aware of the need for a change.

1.09 DELIVERIES

- A. All Contractor deliveries shall occur only during scheduled Contractor working hours, including work time scheduled on Sundays, legal holidays and/or outside of the normal working hours specified in the Supplementary Conditions. No unscheduled, after-hour deliveries are permitted without prior approval of the City's Project Manager. No deliveries shall be permitted at any time that the Contractor is not scheduled to work and on-site. Upon arrival of a delivery for the Contractor, the security guard will notify the Contractor's representative to verify the delivery (company, type of material and vehicle information/identification). Once the delivery is confirmed, the vehicle may proceed to the designated area and remain under escort provided by the Contractor until returned to exit gate.

- B. The Contractor shall provide a list of all anticipated deliveries to the City's Project Manager and the City's Security Contractor each Monday morning and/or Friday afternoon with updates provided each day in the morning if required due to scheduling changes.

1.10 VISITOR ACCESS

- A. The Contractor shall provide a list of all anticipated, un-badged site visitors, including drivers license number, to the City's Project Manager and the City's Security Contractor each Monday morning and/or Friday afternoon with updates provided each day in the morning if required due to scheduling changes.
- B. Contractor shall provide the City's Project Manager and the City's Security Contractor with twenty-four (24) hours advance notice of the scheduled arrival of any un-badged visitor, including drivers license number, who is requesting access.
- C. Only un-badged visitors with a material interest in the Work may be granted authorized access to the site, at the discretion of the City's Project Manager and the City's Security Contractor.
- D. In addition to delivery vehicles described in Paragraph 1.12 above, visitors with a material interest in the Work may include manufacturer's representatives, equipment vendors, testing laboratory personnel, and other personnel whom the City's Project Manager and the City's Security Contractor determine have a material interest in the Work.
- E. Visitors who are expected to be on-site for more than four (4) consecutive work days, or eight (8) cumulative work days shall comply with the background check and badging requirements listed in Paragraph 1.09 above. The City's Project Manager and the City's Security Contractor may require repeat visitors who exceed eight (8) cumulative work days on-site to comply with background check and badging requirements prior to granting further authorization to access the site.
- F. No visitor shall be allowed into the work site without a temporary badge issued by the City's Security Contractor.

1.11 CONTRACTOR'S WORK SITE SECURITY

- A. The Contractor must store all equipment and materials only in those areas designated by the City for this purpose. The City is neither responsible nor liable for any equipment, materials, or other property of the Contractor.
- B. The Contractor may choose, at his expense, to provide additional security elements as desired to adequately protect his assets on the job site.

1.12 INTERVIEWING

- A. Contractor shall not conduct any interviews of potential employees on the water treatment plant site. All interviews must be conducted off-site.

1.13 INSPECTIONS AND SUPERVISION

- A. The City's Project Manager and the City of Houston PWE Security Management Section will, at their discretion, inspect the security facilities and review operations and will report, in writing, to the Contractor the results of such inspections. Upon request of the City's Project Manager and/or the City of Houston PWE Security Management Section, the Contractor shall, within two working days of receipt of the report, identify, in writing, the corrective actions to be taken to address any deficiencies or problems with the work noted in the report. The corrective actions shall be implemented by the Contractor immediately upon direction of the City's Project Manager.

1.14 DOCUMENTATION AND REPORTING REQUIREMENTS

- A. The Contractor shall maintain copies of records, including but not limited to, each of the following items using forms approved by the City's Project Manager.
 - 1. A regularly maintained and updated list of all authorized Contractor and Subcontractor personnel and all Contractor and Subcontractor vehicles authorized by the City for use on the site.
 - 2. A list of all scheduled site visitors and deliveries associated with the Contractor's Work.
 - 3. A complete record of all reported incidents of injury, fire, or emergency.
 - 4. A complete record of all reported incidents of theft or vandalism.
 - 5. A complete record of all infractions of the Project Rules and Regulations.

1.15 VEHICLES AND/OR MOBILE EQUIPMENT

- A. Vehicle and mobile equipment, each with drivers, shall be entirely at the risk of Contractor, subcontractors and/or individuals seeking such entry.
- B. All vehicles and equipment requested to be site permitted shall be duly inspected, licensed and covered by insurance as required by the Contract Documents, before Contractor and subcontractors request permission for their entry on site.
- C. Drivers/operators shall be fully and currently licensed and/or certified to drive the type of vehicle or to operate the type of equipment brought on-site.

- D. Drivers shall observe and obey all Texas Laws at all times.
- E. The maximum permissible speed on site is 20 MPH, however, speeds much lower than this may be the maximum safe speeds and it is the direct responsibility of the driver to drive at a safe speed in any area at any given time according to the circumstances existing at that time and place.
- F. The movement and parking of vehicles and equipment on site shall be kept to the minimum necessary to meet construction requirements.
- G. Vehicles not directly associated with the performance of the Work shall not be granted entry to site.
- H. All vehicles and loads shall be subject to search by City security personnel, the City's Project Manager or other authorized personnel at any location on site at any time.
- I. Vehicles may only be driven or parked in construction areas, or access roads only when directly engaged in deliveries to that area and subject to regulations stated herein. No vehicle or mobile equipment shall be left unattended when in construction areas or access roads or in operating plant areas.
- J. No vehicle or equipment shall be parked or placed on any road on site as to hinder or prevent clear passage of other vehicles thereof, unless the requirements of the Work so necessitate, in which case the prior written approval of City's Project Manager for such hindrance shall have been obtained. Comply with Section 01555, Traffic Control and Regulation.
- K. Movement of heavy mobile equipment on plant paved roads shall be performed in a manner which precludes damage to the pavement and related structures. The Contractor shall be wholly responsible for the protection and safety of life and property including roadways, structures and other equipment while such movement is in progress and shall repair all damage caused thereby at no additional cost to the City.

PART 2: PRODUCTS – NOT USED

PART 3: EXECUTION – NOT USED

END OF SECTION

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ATTACHMENT A

Disclosure & Consent for Release of Information



CITY OF HOUSTON

Public Works & Engineering
Public Utilities Division

Disclosure & Consent for Release of Information

Applicant Name: (First, Middle, Last)	Current Address: (Street Address)
(1) Other Name(s) Used: (Like Maiden)	City: State: Zip:
(2) Other Name(s) Used:	(1) Former Address:
Driver's License No. State Issued:	City: State: Zip:
Date of Birth:	(2) Former Address:
Place of Birth: (City, County, State, & Country)	City: State: Zip:

Applicant Instructions: Please read this disclosure and consent form carefully before signing. You will be provided a copy of this form at any time upon request.

DISCLOSURE AND CONSENT CONCERNING CONSUMER REPORTS AND CRIMINAL BACKGROUND CHECKS.

Read carefully. This consent and release has been provided to you for the City of Houston to request a copy criminal background check, employment records, consumer report, or investigative consumer reports in connection with your services as a contractor for the City of Houston.

The Applicant acknowledges that the City of Houston may now, or at any time while providing contract services, verify information within the application. The verifications and/or checks may include but not limited to: driving record, employment records/references, personal references, any educational and licensing institution and to receive any criminal record information pertaining to me which may be in the files of any Federal, State, or Local criminal justice agency in any State of the United States of America. A photocopy or telephonic facsimile (Fax) of this Disclosure and Consent authorization for Release of Information shall be valid as the original. The results of this verification process will be used to determine eligibility to provide contract services to the City of Houston. All results will be kept CONFIDENTIAL. The information obtained will not be provided to any parties other than to designated City of Houston personnel.

CONSENT STATEMENT:

I have carefully read and understand this disclosure and consent form and by my signature consent to the release/copy of criminal background check, employment records, consumer report, or investigative consumer reports, as defined above. I further understand this consent will apply during the course of my services as a contractor to the City of Houston, and that such consent will remain in effect until revoked in a written document signed by me. In the event that I wish to refuse or revoke my consent at any time, I understand that I may do so. I further understand that any and all information contained by the City of Houston may be utilized for the purpose of obtaining a criminal background check, consumer reports or investigative consumer reports requested by the City of Houston and confirm that all such information is true and correct.

I, the undersigned applicant, do hereby certify that the information provided by me is true and complete to the best of my knowledge. I understand that any false statements will be considered as a cause for denied access to any City of Houston property to provide contract services.

I authorize the City of Houston and any of its agents/personnel, to disclose orally and in writing the results of this verification process and/or interview to authorized representatives. I do hereby agree to forever release and discharge the City of Houston, and personnel to the full extent permitted by law from any claims, damages, losses, liabilities, costs and expenses, or any other charge or complaint arising from the retrieving and reporting of information.

Signature: _____

Date: _____

Print Name: _____

ATTACHMENT B

Identification Badge Request Form

CONFIDENTIAL

(This information is provided for Security and Law Enforcement Use only)

IDENTIFICATION BADGE REQUEST FORM

DATE _____

(NOTE : THIS INFORMATION MUST BE COMPLETED BY THE INDIVIDUAL EMPLOYEE
BEING PHOTOGRAPHED FOR THE CITY ID/SECURITY ACCESS BADGE)

EMPLOYEE ID # _____ ENCODED BADGE NUMBER _____
(To be filled in by badging person)

NAME: _____
LAST FIRST MI

DEPARTMENT : _____ DIVISION: _____

JOB CLASSIFICATION: _____
YOUR JOB TITLE

ORGANIZATION NUMBER: _____ WORK PHONE NUMBER (_____)
AREA CODE PHONE NUMBER

JOB LOCATION: _____
WHERE YOU REPORT TO WORK

TEXAS DRIVER'S LIC. NUMBER: _____
TDL OR CDL OR TEXAS ID CARD

SOCIAL SECURITY NUMBER: _____ DATE OF BIRTH: _____

SEX: _____ RACE: _____ DATE OF EMPLOYMENT: _____

HOME ADDRESS: _____

CITY: _____ ZIP CODE: _____ HOME PHONE: _____

EMERGENCY CONTACT
PERSON NAME: _____ RELATION: _____

EMERGENCY CONTACT # (_____) _____ (Not need to be different from your home phone number)
AREA CODE PHONE NUMBER

HEIGHT: _____ WEIGHT: _____ EYES: _____ HAIR: _____

EMPLOYEE/CONTRACTOR SIGNATURE: _____

PRINT AUTHORIZING AUTHORITY'S NAME _____
(Must be Manager or Above)

TITLE _____ (Must be Manager or Above) PHONE # _____ AUTHORIZING AUTHORITY'S
EMPLOYEE ID NUMBER _____

AUTHORIZING AUTHORITY'S SIGNATURE: _____

Section 01562

TREE AND PLANT PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tree and plant protection.
- B. Minimum qualifications of Arborist and Urban Forester.

1.02 MEASUREMENT AND PAYMENT

- A. Payment for Tree Protection, including tree pruning or tree removal, shall be paid as a Lump Sum basis that shall include all items specified in this section unless payment is specified otherwise in this section
- B. Payment for Zero Curb Cutback will be on a per linear foot basis.
- C. Payment for Checker Plate will be on a square foot basis.
- D. Refer to Section 01270-Measurement and Payment for unit price procedures.

1.03 SUBMITTALS

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

1.04 PROJECT CONDITIONS

- A. Preserve and protect existing trees and plants to remain from foliage, branch, trunk, or root damage that could result from construction operations.
- B. Prevent following types of damage:
 - 1. Compaction of root zone by foot or vehicular traffic, or material storage.
 - 2. Trunk damage from equipment operations, material storage, or from nailing or bolting.

3. Trunk and branch damage caused by ropes or guy wires.
4. Root or soil contamination from spilled solvents, gasoline, paint, lime slurry, and other noxious materials.
5. Branch damage due to improper pruning or trimming.
6. Damage from lack of water due to:
 - a. Cutting or altering natural water migration patterns near root zones.
 - b. Failure to provide adequate watering
7. Damage from alteration of soil pH factor caused by depositing lime, concrete, plaster, or other base materials near roots zones.
8. Cutting of roots larger than one inch in diameter.

1.05 DAMAGE ASSESSMENT

- A. When trees other than those designated for removal are destroyed or damaged as result of construction operations, remove and replace with same size, species, and variety up to and including 8 inches in trunk diameter. Trees larger than 8 inches in diameter shall be replaced with an 8 inch diameter tree of the same species and variety and total contract amount will be reduced by an amount determined from the following formula and paid to Tree Fund $0.7854 \times D^2 \times \13.25 where D is diameter in inches of tree or shrub trunk measured 12 inches above grade for that portion of the tree which is greater than 8 inches in diameter. A permit must be applied for and approved by the City of Houston, Urban Forestry Division prior to removal of any tree not scheduled for removal in the tree treatment schedule. Contractor shall contact City of Houston, Urban Forestry, at 832-395-8459 to apply for tree removal permit when needed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pruning Paint: Black latex, water based paint, free of all petroleum products.
- B. Fertilizer: Fertilizer shall be a root stimulant that contains at a minimum the following ingredients: Ectomycorrhizal Fungi, VA Mycorrhizal (VAM) Fungi, Rhizosphere Bacillus spp., Kelp Meal Humic Acid, and Soluble Yucca.

- C. Tree Protection Fencing: Orange, plastic mesh fencing, 4 feet in height with 6 feet high “t” bar posts installed 10 feet on centers as per drawings.
- D. Plastic Root/Soil Protection: Clear polyethylene sheeting, minimum 6 mil, thickness.

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING TREES AND SHRUBS

- A. Site preparation work and/or construction work shall not begin in any area where tree preservation measures have not been completed and approved.
- B. Protect exposed roots and root zone areas from contamination from stabilization materials and concrete using polyethylene.
- C. Cover exposed roots within 4 hours to reduce damage caused by desiccation. Roots may be covered with soil, mulch, polyethylene, or wet burlap to help protect them from drying.
- D. Designate limited areas as concrete washout areas. Locate concrete washout areas away from root zones.
- E. Install root pruning trenching where designated in tree treatment schedule and shown on the tree protection drawings. Trees scheduled for root pruning are called out specifically in the treatment schedule. Trench shall be located 2 ft. from the edge of proposed waterline or sanitary sewer for trees called out for root pruning for water or fittings, or sanitary sewer in the treatment schedule, 2 ft. from edge of proposed storm sewer pipe for trees called out for root pruning for storm in the treatment schedule, 30” back of proposed curb for trees called out for root pruning for street, and at edge of sidewalk for trees called out for root pruning for sidewalk. Root pruning shall not be performed where there is not adequate space to be located sufficiently away from tree to prevent damage. All pruning must be evaluated by Contractor’s Certified Arborist and reviewed and approved by City Forester before being performed. Trench locations shown on tree preservation plan are drawn to scale and should be located in field as drawn on plan. Exact locations shall be approved in the field by engineer and/or project urban forester prior to installation. Trenching depth shall be a minimum of 2 ft. deep and a maximum of 6 inches wide for water, fittings, sanitary sewer, storm, and street. Trenching depth shall be to the anticipated bottom of sidewalk and base material for sidewalk root pruning, roots lower than sidewalk shall not be pruned. All roots shall be cut by trencher, chainsaw, or handsaw to the specified depth. Roots shall be cut cleanly, and or not ripped, torn, or chopped. Trench shall be backfilled and compacted immediately after trenching. Trench shall be installed prior to any clearing and grubbing, excavation for underground, or any other site work.

- F. Install tree protection fencing around each tree to be preserved as indicated in the tree treatment schedule and on the tree protection plan.
1. Each tree to be preserved shall be protected with a tree protection fence. The fencing shall be continuous between posts, shall be pulled taut prior to securing to posts, and shall be firmly attached to the posts with a minimum of 4 wire ties.
 2. All tree protection fencing shall be installed prior to site work or construction activity. The fence shall be placed in a continuous alignment as shown on the tree protection plan. Fences shown on tree protection plan are drawn to scale and shall be installed as drawn, in the field. In general fences shall be placed 30” back of existing curb or edge of pavement where root pruning or zero curb cutback is not specified, and 6” back of root pruning trench where root pruning is specified and immediately back of curb where zero curb cutback is specified. Exact locations shall be approved by the project urban forester and/or engineer in the field. The Fences shall be placed to protect roots, trunks, and foliage. The contractor shall not remove or relocate tree protection fencing and shall not operate within the limits shown without direct approval of the project urban forester. In areas where the proposed waterline is located in the existing road side ditch and where tree protection fencing can not be installed across the ditch, the fencing shall be installed at the top of outside ditch bank and no bore pits, peep holes, service taps, or any excavation should occur in the area immediately in front of the tree protection fencing for trees called out with “bore” in the Tree Treatment Schedule. The “bore” limits shall be the same as the limits of the tree protection fencing.
 3. Storage of equipment or materials will not be allowed inside a fence. Entryways and access into a protected area shall not be provided unless approved by the project urban forester.
 4. Damage to tree fences occurring during the progress of the work shall be repaired immediately at no additional cost to owner. Workmen shall be clearly instructed to exercise caution in performance of work near trees being preserved.
 5. Tree protection fencing shall be removed by contractor, at no additional costs, upon completion of all construction activity in each work zone area. Tree protection fencing materials used in the first two work zone areas shall be removed and utilized in subsequent work zone areas. Materials and labor shall be paid for each linear foot of fencing installed in first two work areas. All fencing installed in subsequent work zone areas shall be paid for labor only.
- G. Boring/Auguring of water lines or sanitary sewer lines
1. Water line or sanitary sewer line shall be bored/augured/ horizontally drilled under

critical root zones areas of trees designated with auger or bore in the tree treatment schedule. The entire area protected with tree protection fencing shall be bored. No bore pits, come through holes, peep holes, push pits, or long or short side service taps shall be allowed in the areas protected by tree protection fencing. The tree protection plan takes into consideration the limits of augering equipment, there should be room for adequately spaced bore pits, peep holes, come through holes, and push pits. Any changes to the location of the tree protection fencing shall be authorized by the project Urban Forester and City Engineer.

H. Hand digging of Service taps and leads

1. Trees called out for Hand dig short side service tap are located in very close proximity to existing short side water meters. Excavating the service tap with machinery would significantly impact the tree and be in violation of the City of Houston's Street Tree Ordinance. These short side service taps shall be excavated with manual labor to expose any roots 1" in diameter and larger. The first 24" of excavation shall be completed manually to expose the roots. Any root 1" in diameter and larger shall remain undamaged, the roots shall not be cut, nor shall the bark and cambium layer be scraped or damaged. Once the roots are exposed, if there is adequate room to utilize a mini-excavator without damaging the roots, the mini-excavator can be utilized to complete the excavation down to the water line. 1" plywood shall be placed on grade to provide root protection in the area of access of the mini-excavator. If roots 1" diameter or larger are cut or damaged, responsible party will be subject to a citation under the Street Tree Ordinance, and may also be required to incur the cost of tree removal and replacement of damaged tree on an inch for inch basis, if required by City of Houston Urban Forestry Division.
2. Trees called out for Hand dig short side or long side service lead are located in very close proximity to existing water meters. Excavating the service lead with machinery would significantly impact the tree and be in violation of the City of Houston's Street Tree Ordinance. Short side leads shall be excavated with manual labor to expose any roots 1" in diameter and larger from the service tap of the meter. Come out hole and excavation required for long service leads shall be excavated with manual labor to expose roots 1" in diameter and larger, from the come out hole to the meter. In each case, all roots 1" in diameter and larger shall remain undamaged, the roots shall not be cut, nor shall the bark and cambium layer be scraped or damaged. If roots 1" diameter or larger are cut or damaged, responsible party will be subject to a citation under the cost of tree removal and replacement of damaged tree on an inch by inch basis, if required by City of Houston Urban Forestry Division.
3. Trees called out for Hand dig sanitary stub up are located in very close proximity to proposed service lead. Excavating the service lead with machinery would significantly impact the tree and be in violation of the City of Houston's Street Tree

Ordinance. Excavation for sanitary stub up shall be completed with manual labor to expose any roots 1” in diameter and larger. The lead shall be bored from face of curb to stub up hole when called out in the tree treatment schedule. Come out and stub up holes shall be excavated with manual labor to expose roots 1” in diameter and larger. In case, all roots 1” in diameter and larger shall remain undamaged, the roots shall not be cut, nor shall the bark and cambium layer be scraped or damaged. If roots 1” diameter or larger are cut or damaged, responsible party will be subject to a citation under the Street Tree Ordinance, and may be required to incur the cost of tree removal and replacement of damaged tree on an inch by inch basis, if required by City of Houston Urban Forestry Division.

4. Long side service taps shall not be located in an area specified to be bored in the tree treatment schedule. Should it be absolutely necessary to locate a long side service tap in an area specified to be bored, the excavation shall be completed as specified in paragraph 1 of this section-Hand digging short side service taps.
5. All water meters and sanitary service leads called out on P&P drawings and visible in the field have been addressed in the Tree Protection Plan. Should any additional meters or lead be found during construction, or in any new meters or leads installed beneath the canopy of any tree, fenced for tree protection, the excavation shall be completed as specified in paragraph 1 and/or 2 of this section and paid for at the unit cost for each included in contract.

I. Pruning of Trees

1. Trees shall be pruned in accordance with the American National Standard for tree pruning, ANSI A300 (Part 1) – 2001 Pruning Revision of ANSI A300-1995 Tree, Shrub and Other Woody Plant Maintenance – Standard Practices. Pruning shall be completed by professional arborists who has received training in proper pruning techniques.
2. Clearance prune designated trees for public streets, sidewalks, and construction areas. Provide minimum 14 feet and maximum of 18 feet of vertical clearance over proposed water trunk lines. Provide minimum of 14 feet and maximum of 16 feet of vertical clearance over proposed street construction, from 24” back of curb on one side to 24” back of curb on the other side. Provide 20’ of vertical clearance over proposed storm sewer up to 38” in size, and 30’ of vertical clearance for storm sewer larger than 38” in size. Pruning to be installed prior to any construction activity. Contractor shall notify property owner prior to trimming or pruning any trees with trunks located on private property. Exceptions will be made for trees determined to be arboriculturally significant by City of Houston Urban Forestry. Pruning of trees identified will be completed with approval and supervision of City of Houston Urban Forestry.

3. All cuts should be made sufficiently close to the parent limb or trunk without cutting into the branch collar or leaving a protruding stub, so that closure can readily start under normal conditions. All lateral cuts shall be made to a lateral that is least 1/3 the diameter of the parent limb. Clean cuts shall be made at all times.
4. Trees shall be pruned in a manner that will not destroy or alter the natural shape and character of the tree. Apply black latex paint to all fresh wounds on Oak (*Quercus*) species immediately after each cut is made.
5. Crown cleaning prune designated trees shall include selective removal of dead, diseased, and/or broken limbs.

J. Tree Removal

1. Trees scheduled for removal shall be sawed down and debris hauled from the site the same day. The stump shall be ground to 6" below grade and excess grindings shall be hauled from the site the same day, so that a pile of grindings is not left where the stump was ground. Enough grindings should be left so that an open hole does not remain.
2. Only those trees called out for removal in the Tree Treatment Schedule shall be removed, or otherwise damaged. Should it be determined that any additional trees must be removed, a permit must be applied for and approved from the City of Houston Urban Forestry Division prior to removal. Contractor shall contact Urban Forestry at 832-395-8459.

K. Root Stimulation

1. Deep root stimulate designated trees. Mix fertilizer with wetting agent per label instructions.
2. Stimulate entire root zone area within the dripline of the tree and continue 10 feet beyond the dripline, leaving out areas of anticipated root loss (construction areas).
3. Mixture shall be injected into the top 10 inches of soil under pressure of 150 to 200 psi as soil conditions warrant.
4. Mix in a tank with agitation capability per label instructions. Inject the mixture on a 2.5 ft. square grid at 4 lbs, actual nitrogen per 1,000 sq. ft.

- L. Regularly water trees which have received root damage, to eliminate additional stress caused by lack of moisture. Water during periods without adequate rainfall. For example, should 1.0" of rain not be received within a week period, the trees should be thoroughly watered.

March through September, water once every two weeks. October through February, water every three weeks. Water thoroughly to saturate the entire root zone area.

- M. Chemically treat tree trunks with evidence of borer activity with the appropriate approved insecticide mixed and applied per the manufacturer's product application recommendations. Trees shall be sprayed within 24 hours after observance of borer activity.
- N. Grading and filling around trees.
 - 1. Maintain existing grade within the dripline of trees, unless otherwise indicated.
 - 2. Where existing grade around trees is above new finish grade, under supervision of project urban forester, carefully hand excavate within the dripline to make transition to new finish grade.
 - 3. Where existing grade is below new finish grade, place clean bank sand in a single layer to make the transition to new grade. Do not compact; hand grade to required elevation. Specifically to areas where proposed curb is higher than existing and backfill will be required.
- O. Demolition, Forming and Pouring Sidewalks (Sidewalk on Grade)
 - 1. Demolition of existing sidewalks, located in or adjacent to the limits of tree protection fencing, shall be completed without disturbing, cutting, or otherwise damaging tree roots and soil located beneath them.
 - 2. The new sidewalk shall be formed at or above the elevation of the existing sidewalk, without disturbing, cutting or otherwise damaging tree roots. Every effort has been made to address tree root and sidewalk elevation issues with information available in the field and on plan and profile sheets. The elevation of every tree root was not available, if tree roots are found to be in conflict with proposed sidewalk, project engineer and urban forester shall be consulted as to how to install sidewalks with minimal impacts to adjacent trees.
 - 3. Checkerplate shall be installed in areas called out only if tree root elevations prohibit construction of ADA compliant sloped concrete sidewalks. Checkerplate shall be installed per detail.
- P. Zero curb cutback
 - 1. Disturbance of tree roots or soil behind the existing and/or proposed curb within root zones of trees designated for zero curb cutback shall be prohibited. If the curb can not be removed without disturbing soil or damaging roots back of curb when using

equipment for demolition, the curb shall be broken using a hand held jackhammer and removed by hand.

2. The exposed roots and soil shall be covered immediately after demolition with 6 mil polyethylene in order to avoid desiccation, and contamination by the lime used for road bed stabilization. The polyethylene shall be placed so that it covers the vertical face of soil back of curb and laid back onto the grade 12 inches back of curb. The polyethylene should remain in place, across the entire area specified for zero curb cutback, from the time the existing curb is demolished until the time when the new curb is formed and backfilled. The polyethylene can be pulled up from the vertical face while the road bed is being graded or mixed, to avoid catching the plastic with machinery, but shall be replaced immediately after equipment has completed. The vertical face shall not be exposed for more than 8 hours in any 24 hour period.
3. There shall be no stabilization back of curb in the zero curb cutback areas, or forming with steel forms. The existing grade and roots back of existing curb shall not be disturbed. This may require forming of the new street with wooden forms with stakes inside forms, which may require leaving the forms in place after the street is poured. Should wooden forms be utilized, the wood shall be at minimum a 2x6. The new curb may require hand finishing, as a slip curb machine may not have adequate clearance without disturbing the roots that are to be protected with the zero curb cutback.
4. Roots extending into the street, or on top of the existing curb, in areas to paved shall be cut and removed by hand prior to disturbance or removal with equipment. Roots shall be pruned flush with the proposed back of curb. Roots one inch in diameter and larger shall be cut in a manner to provide a smooth, clean cut surface. Cuts shall be made with the appropriate pruning shears or pruning saws. Roots shall not be chopped or broken.
5. In areas where proposed curb will be may be lower than existing top of curb and tree roots 2" diameter or larger are present, the soil and roots shall not be graded or laid back. The existing elevation shall be maintained and the curb formed to meet elevation or a short elevation difference roots and top of curb maintained.

Q. Demolition, Forming and Pouring of Drive Way Approaches

1. Demolition of existing driveway approaches located beneath the dripline of any tree shall be completed without disturbing, cutting, or otherwise damaging tree roots and soil located beneath them.
2. The new approach shall be formed at or above the elevation of the existing approach where tree roots 2" diameter or larger are present, without disturbing, cutting or

otherwise damaging tree roots. Maximum drive slopes may be needed at bottom of apron to allow forming of drive over tree roots at top of drive. As with sidewalks, the elevation of every tree roots was not available in design. If tree roots are found to be in conflict with proposed approach, project engineer and urban forester shall be consulted as to how to install drive way with minimal impacts to adjacent trees.

R. Replacement Trees for Tree Removals under Ordinance

1. Location, species, and size of replacement trees are indicated on the drawings. Contractor shall layout individual trees at locations shown on drawings. Contractor shall layout individual trees at locations shown on drawings and be responsible for utility locate requirements. In case of conflicts, notify City Engineer and City Urban Forestry before proceeding with work. Trees shall be laid out and locations approved by City Engineer prior to planting.
2. Trees shall meet and be planted according to City of Houston Standard Specification 02915.

S. Arborist and Urban Forester Qualifications

1. Arborist – Employ qualified arborist acceptable to City’s Parks and Recreation Department to complete all tree treatments. Arborist shall be normally engaged in the field and have a minimum of 5 years experience. Qualifications of the selected arborist shall be submitted for review and approval by the project engineer and City of Houston.
2. Urban Forester – An Urban forester shall be hired to monitor and assist with field layout (exact locations of fencing, root pruning, and zero curb cutback) of the tree preservation program during demolition and construction to ensure tree protection procedures and techniques are practiced as specified to address concerns and conditions which occur in the field. At a minimum, the individual responsible for monitoring and field layout of the tree protection shall have a minimum of 5 years of experience as a consultant, and shall not be affiliated with a tree care contractor in the Houston area. Qualifications of the selected urban forester shall be submitted for review and approval by the project engineer and City of Houston Urban Forestry Department.

END OF SECTION

Section 01576

WASTE MATERIAL DISPOSAL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Disposal of waste material and salvageable material.

1.02 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit copy of approved "Development Permit", as defined in Chapter 19 of Flood Plain Ordinance (City Ordinance Number 81-914 and Number 85-1705), prior to disposal of excess material in areas designated as being in "100-year Flood Hazard Area" within the City. Contact the City of Houston Flood Plain Manager, 3300 Main Street, at (713) 525-7605 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 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.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 SALVAGEABLE MATERIAL

- A. Excavated Material: When indicated on Drawings, load, haul, and deposit excavated material at location or locations shown on Drawings outside limits of 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 Specification Sections.
- E. Coordinate loading of salvageable material on City trucks with Project Manager.

3.02 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 Project when written permission is obtained from property owner. See Paragraph 1.02 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 01580

PROJECT IDENTIFICATION SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project identification sign description.
- B. Project sign installation.
- C. Maintenance and removal of Project sign.

1.02 SYSTEM DESCRIPTION

- A. Sign Construction: Construct signs of new materials in accordance with Standard Detail provided at the Pre-construction Conference.
- B. Appearance: Maintain signs to present a clean and neat look throughout contract duration.
- C. Sign Manufacturer: Experienced professional sign company.
- D. Sign Placement: At locations shown in Drawings unless otherwise specified by Project Manager at pre-construction meeting.
 - 1. Provide one sign at each end of a linear Project involving paving, overlay, sewer line, storm drainage, or water main construction located in rights-of-ways.
 - 2. Provide one sign for site or building construction Contracts
 - 3. Provide one sign at each site for Contracts with multiple sites.
 - 4. Sign Relocation: As work progresses, relocate signs if directed by Project Manager in writing. Include cost for one relocation of post-mounted signs in Contract Price. Subsequent relocations, if directed by Project Manager in writing, will be subject to Change Order.
- E. Skid-mounted signs: Use for projects with noncontiguous locations where work progresses from one location to another. Design skid structure to withstand a 60 mile-per-hour wind load to the face or back of sign using stakes, straps, or ballast. Contractor shall be responsible for security of signs at each site.

PROJECT IDENTIFICATION SIGNS **STANDARD GENERAL REQUIREMENT**

1.03 SUBMITTALS

- A. Submit Shop Drawings under provisions of Section 01330 - Submittal procedures.
- B. Show content, layout, lettering style, lettering size, and colors. Make sign and lettering to scale, clearly indicating condensed lettering, if used.

PART 2 P R O D U C T S

2.01 SIGN MATERIALS

- A. Structure and Framing: Use new sign materials.
 - 1. Sign Posts: 4-inch by 4-inch pressure treated wood posts, 9 feet long for skid mounting and 12 feet long minimum for in-ground mounting.
 - 2. Skid Bracing: 2-inch by 4-inch wood framing material.
 - 3. Skid Members: 2-inch by 6-inch wood framing material.
 - 4. Fasteners:
 - a. Galvanized steel.
 - b. Attach sign to posts with 1/2-inch by 5-1/2 inch button head carriage bolts and secure with nuts and flat head washers.
 - c. Cover button heads with white reflective film or paint to match sign background.
 - d. Use metal brackets and braces and 3/4-inch wood screws to attach sign header.
- B. Sign and Sign Header: 3/4-inch thick marine plywood. Use 4-foot by 8 -foot sheet for the sign and a single piece for the header to minimize joints. Do not piece wood sheets to fabricate sign face.
- C. Paint and Primers: White industrial grade, fast-drying, oil-based paint with gloss finish for structural and framing members, sign, and sign header material surfaces. Paint all sign surfaces prior to adding adhesive applications.
- D. Colors:
 - 1. Sign Background: Reflective white 3M Scotchlite Engineer Grade, Pressure Sensitive Sheeting (White), or approved equal.

2. Border: For red border around area, which designates project name and project amount, use reflective red 3M Scotchlite Engineer Grade, Pressure Sensitive Sheeting (Red), or approved equal.
3. Sign Film: 3M Scotchcal Pressure Sensitive Films, or approved equal for legends, symbols, lettering, and artwork. Match colors to 3M Scotchcal Pressure Sensitive Films.
 - a. Lettering Below Seal: Black
 - b. Lettering Above Project Name: Vivid Blue
 - c. Lettering on Blue Background: White
 - d. Background Behind Project Name: Vivid Blue

E. City Seal: Project Manager will provide City seals to Contractor, as needed.

2.02 SIGN LAYOUT

A. Lettering:

1. Style, Size, and Spacing: Helvetica Regular lettering.
2. Condensed Style: Text may be condensed if needed to maintain sign composition.

B. Composition:

1. Lines with Standard Text
 - a. Top line shall read "BUILDING TOGETHER FOR THE FUTURE".
 - b. Use lower left below City Seal to list names and titles for Mayor, Controller and Council Members. Place as shown on Drawings with indicated size and spacing.
 - c. Center telephone number of the Customer Response Center, "311", near the bottom of the area with the blue background.
2. Lines with Variable Text. Use blue background space for Project name and dollar amount.
 - a. Project Manager will provide Project name and dollar amount of Project for preparation of sign. Center name on one or two lines, and dollar amount immediately below Project name, in area with blue background. Use condensed lettering if necessary.

PROJECT IDENTIFICATION SIGNS **STANDARD GENERAL REQUIREMENT**

2.03 LAYOUT AND COMPOSITION FOR HEADER

- A. City of Houston Seal:
1. A space of approximately 24 inches in diameter is provided for the City seal, the top 6 inches of which extends above the sign on the sign header.
 2. Construct sign header of same material as sign face. Cut material to match curve of the City seal.
 3. Project Manager will provide the seal to be affixed to the sign by sign maker.

PART 3 E X E C U T I O N

3.01 INSTALLATION

- A. Install Project identification signs within seven days after Date of Commencement of the Work.
- B. Erect signs at locations shown in Drawings unless otherwise designated by Project Manager at pre-construction meeting. Position sign so it is fully visible and readable to general public.
- C. Erect sign level and plumb.
- D. If mounted on posts, sink posts 3 to 4 feet below grade and stabilize posts to minimize lateral motion. Leave a minimum of 8 feet of post above existing grade for mounting of sign.
- E. Erect sign so that top edge of sign is at a nominal 8 feet above existing grade.

3.02 MAINTENANCE AND REMOVAL

- A. Keep signs and supports clean. Repair deterioration and damage.
- B. Remove signs, framing, supports, and foundations to a depth of at least 2 feet upon completion of Project. Restore area to a condition equal to or better than before construction.

PROJECT No.: (FILE NO:)	CONTRACT No.:	REVIEWED BY:
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*INSTRUCTIONS TO SIGN MAKER (LIST COMPANY NAME):	
QTY.	ACTION ITEMS:
	Make new sign(s)
	Follow City standards attached
	Provide submittal (drawing) to the City for project sign showing content, layout, lettering style, lettering size, and colors
VARIABLE TEXT	
Line 1	Project Name:
Line 2	Project Amount (rounded to nearest \$1000):
ATTACHMENTS INCLUDED	
QTY.	SEALS / LOGOS
	City of Houston - 24" diameter
	STANDARDS
	Standard Specification Section 01580 - Project Identification Signs
	Standard Detail 01580-03 Construction Sign

(Instructions on reverse.)

PROJECT IDENTIFICATION SIGNS **STANDARD GENERAL REQUIREMENT****INSTRUCTIONS**

Contractor produces this form. Contractor shall insert the information and provide the form to the sign maker with Contractor's purchase order.

List PROJECT No., (FILE No.), CONTRACT No., and name of City's Project Manager REVIEWED BY.

INSTRUCTIONS TO SIGN MAKER:

- Give COMPANY NAME of sign maker.
- Indicate QUANTITY of new signs to be made.
- Direction for sign maker to follow City Standards in making signs.
- Require submittals from sign maker, who provides Shop Drawing of Project sign showing content, layout, lettering style, lettering size, and colors.

VARIABLE TEXT:

- Give PROJECT NAME. Write it out in all caps and suggest line break. Lines are required.
- Give Project amount to be listed on sign. Round off to nearest \$1000.

ATTACHMENTS INCLUDED:

- **Seals**

City provides the quantity of City seals required one for each Project sign.

- **Standards**

Contractor provides set of Standards to sign maker, including (Specification Section 01580 - Project Identification Signs, and Standard Detail No. 01580-03 - Construction Sign.

Section 01610

BASIC PRODUCT REQUIREMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Requirements for transportation, delivery, handling, and storage of Products.

1.02 PRODUCTS

- A. Products: Defined in Document 00700 – General Conditions. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components designated for reuse.
- B. For material and equipment specifically indicated or specified to be reused in the work:
 - 1. Use special care in removal, handling, storage and reinstallation, to assure proper function in completed work.
 - 2. Arrange for transportation, storage and handling of products which require off-site storage, restoration or renovation. Include cost in unit price for related items.
- C. When contract documents require that installation of work comply with manufacturer's printed Instructions, obtain and distribute copies of such instructions to parties involved in installation, including two copies to Project Manager. Maintain one set of complete instructions at job site during installation until completion.
- D. Provide Products from the fewest number of manufacturers as practical, in order to simplify spare parts inventory and to allow for maximum interchangeability of components. For multiple components of the same size, type or application, use the same make and model of component throughout the Work.

1.03 TRANSPORTATION

- A. Make arrangements for transportation, delivery, and handling of Products required for timely completion of the Work.
- B. Transport and handle Products in accordance with manufacturer's instructions.
- C. Consign and address shipping documents to proper party giving name of the Project and its complete street address. Shipments shall be delivered to

Contractor.

1.04 DELIVERY

- A. Arrange deliveries of Products to accommodate short-term site completion schedules and in ample time to facilitate inspection prior to Installation. Avoid deliveries that cause lengthy storage or overburden of limit storage space.
- B. Coordinate deliveries to avoid conflict with the Work and conditions at the site and to accommodate the following:
 - 1. Work of other contractors or the City.
 - 2. Limitations of storage space.
 - 3. Availability of equipment and personnel for handling Products.
 - 4. The City's use of premises.
- C. Have Products delivered to the site in manufacturer's original, unopened, labeled containers.
- D. Immediately upon delivery, inspect shipment to assure:
 - 1. Product complies with requirements of the Contract.
 - 2. Quantities are correct.
 - 3. Containers and packages are intact; labels are legible.
 - 4. Products are properly protected and undamaged.

1.05 PRODUCT HANDLING

- A. Coordinate off-loading of Products delivered to the site. If necessary during construction, move and relocate stored Products at no additional cost to the City.
- B. Provide equipment and personnel necessary to handle Products, including those provided by the City, by methods to prevent damage to Products or packaging.
- C. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging Products or surrounding areas.
- D. Handle Products by methods to prevent over-bending or overstressing.

- E. Lift heavy components only at designated lifting points.
- F. Handle Products in accordance with manufacturer's recommendations.
- G. Do not drop, roll, or skid Products off delivery vehicles. Hand-carry or use Suitable materials handling equipment.

1.06 STORAGEE OF PRODUCTS

- A. Store and protect Products in accordance with manufacturer's recommendations and requirements of these Specifications.
- B. Make necessary provisions for safe storage of Products. Place Products so as to prevent damage to any part of the Work or existing facilities and to maintain free access at all times to all parts of the Work and to utility service company installations in the vicinity of the Work. Keep Products neatly and compactly stored in locations that will cause minimum inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage in a manner so as to provide easy access for inspection.
- C. Restrict storage to areas available on the site for storage of Products as shown on Drawings or approved by Project Manager.
- D. Provide off-site storage and protection when on-site storage is not adequate. Provide addresses of, and access to, off-site storage locations for inspection by Project Manager.
- E. Do not use lawns, grass plots, or other private property for storage purposes without written permission of owner or other person in possession or control of premises.
- F. Protect stored Products against loss or damage.
- G. Store in manufacturers' unopened containers.
- H. Neatly, safely, and compactly stack Products delivered and stored along the line of the Work to avoid inconvenience and damage to property owners and general public, and maintain at least 3 feet clearance around fire hydrants. Keep public, private driveways and street crossings open.
- I. Repair or replace damaged lawns, sidewalks, streets or other improvements to satisfaction of Project Manager. Total length that Products may be distributed along route of construction at one time is 1000 linear feet, unless otherwise approved in writing by Project Manager.

PART 2 P R O D U C T S - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01630

PRODUCT SUBSTITUTION PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Options for making Product or process selections.
- B. Procedures for proposing equivalent Products or processes, including pre-approved, pre-qualified, and approved Products or processes.

1.02 DEFINITIONS

- A. Product: As defined in Document 00700 – General Conditions. Product does not include machinery and equipment used for production, fabrication, conveying, and erection of the Work. Products may also include existing materials or components designated for reuse.
- B. Process: Any proprietary system or method for installing system components resulting in an integral, functioning part of the Work. For this Section, the word Products includes Processes.

1.03 SELECTION OPTIONS

- A. Pre-approved Products: Construction products of certain manufacturers or Suppliers designated in Specifications as "pre-approved." The City maintains a list of pre-approved products. Pre-approved Products for this Project are designated as pre-approved in Specifications. Products of other manufacturers or suppliers are not acceptable for this Project and will not be considered under the submittal process for approving alternate products.
- B. Pre-qualified Products: Construction products of certain manufacturers or Suppliers designated in Specifications as "pre-qualified." Pre-qualified Products for this Project are designated as pre-qualified in Specifications. Products of other manufacturers or suppliers are not acceptable for this Project and will not be considered under the submittal process for approving alternate products.
- C. Approved Products: Construction products of certain manufacturers or Suppliers designated in Specifications followed by words "or approved equal." Approval of alternate products not listed in Specifications may be obtained through provisions for product options and substitutions in Document 00700 - General Conditions, and by following submittal procedures specified in

Section 01330- Submittal Procedures. The procedure for approval of alternate products is not applicable to pre-approved or pre-qualified products.

- D. Product Compatibility: To the maximum extent possible, provide Products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available, select Product that is compatible with other Products already selected, specified, or in use by the City.

1.04 CONTRACTOR'S RESPONSIBILITY

- A. Responsibility related to Product options and substitutions is defined in Document 00700 - General Conditions.
- B. Furnish information Project Manager deems necessary to judge equivalency of alternate Product.
- C. Pay for laboratory testing, as well as any other review or examination costs, needed to establish equivalency between products in order to obtain information upon which Project Manager can base a decision.
- D. If Project Manager determines alternate product is not equal to that named in Specifications, Furnish one of the specified Products.

1.05 CITY REVIEW

- A. Use alternate Products only when approved in writing by Project Manager. Project Manager's determination regarding acceptance of proposed alternate Product is final.
- B. Alternate Products shall be accepted if Products are judged by Project Manager to be equivalent to specified Product or to offer substantial benefit to the City.
- C. The City retains the right to accept any Product deemed advantageous to the City, and similarly, to reject any product deemed not beneficial to City.

1.06 SUBSTITUTION PROCEDURE

- A. Collect and assemble technical information applicable to the proposed Product to aid in determining equivalency as related to the approved Product specified.
- B. Submit a written request for a construction Product to be considered as an alternate Product.

- C. Submit Product information after the effective date of the Contract and within the time period allowed for substitution submittals given in Document 00700 - General Conditions. After the submittal period has expired, requests for alternate Products shall be considered only when specified Product becomes unavailable because of conditions beyond Contractor's control.

- D. Submit five copies of each request for alternate Product approval. Include the following information:
 - 1. Complete data substantiating compliance of proposed substitution with the Contract.
 - 2. For Products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature with Product description, performance and test data, and reference standards.
 - c. Samples, as applicable.
 - d. Name and address of similar projects on which Product was used and date of installation. Include names of Owner, design consultant, and installing contractor.
 - 3. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 - 4. Itemized comparison of proposed substitution with Product or method specified.
 - 5. Data relating to changes in Construction Schedule.
 - 6. Relation to separate contracts, if any.
 - 7. Accurate cost data on proposed substitution in comparison with Product or method specified.
 - 8. Other information requested by Project Manager.

- E. Approved alternate Products will be subject to the same review process as the specified Product would have been for Shop Drawings, Product Data, and Samples.

PART 2 P R O D U C T S - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Section 01740

SITE RESTORATION

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Restoration of site affected by the Work in public or private property, including pavement, esplanades, sidewalks, driveways, fences, lawns and landscaping.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for restoration of Project site disturbed by utility construction operations is on a linear foot basis. Measurement will be as provided for corresponding utility in each Specification section. No separate payment made for branch pipe, valves and, other associated work for utilities. Measurement for restoration with multiple utilities within the same right-of-way will be on a linear foot basis for only one utility.
2. No separate payment made for facility or roadway projects. Include cost in the surface improvements associated with the facility or roadway construction.
3. Payment includes required site restoration within the right-of-way or easement regardless of size or type of pipe, method of construction, paved or unpaved areas or thickness and width of pavement.
4. No separate payment made for site restoration for service connections under this Section. Include cost in appropriate utility section.
5. Refer to Section 01270 – Measurement and Payment for Unit Price procedures.

- B. Stipulated Price (Lump Sum) Contracts. If Contract is Stipulated Price Contract, include payment for work under this section in total Stipulated Price.

1.03 DEFINITIONS

- A. Phase: Locations identified on the plans and listed in Section 1110 – Summary of Work under Work Sequence.

- B. Site Restoration: Replacement or reconstruction of Site Improvements located in rights-of-way, easements, public property, and private property affected or altered by the Work.
- C. Site Improvement: Includes pavement, curbs and gutters, esplanades, sidewalks, driveways, fences, lawns, irrigation systems, landscaping, and other improvements in existence at the Project site before commencement of construction operations.

1.04 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures.
- B. Schedule of testing, service connections, abandonment, backfill, and site restoration.
- C. Sample of notices to residents outlining their responsibility for maintenance of site improvements adjacent to the Project that are not disturbed by construction operations

1.05 SCHEDULING

- A. Schedule testing, service connections, abandonment, backfill and site restoration immediately following completion of pipe laying work or paving within each block or line segment.
- B. Phased Construction:
 - 1. Commencement of subsequent Phase will follow scheduling of site restoration of prior Phase. Limit work to a maximum of two Phases of the project.
- C. Construction of Projects with no Phases listed in Section 01110- Summary of Work:
 - 1. Complete site restoration prior to disturbing over 50% of total project linear feet or 2,000 linear feet, whichever is greater, of right-of-way or easement.
 - 2. Limit work to a maximum of 50% of total project linear feet or 2,000 linear feet, whichever is greater, of right-of-way and easement. Commence work in additional right-of-way or easement after completion of site restoration.

PART 2 P R O D U C T S

2.01 MATERIALS

- A. Pavement, Sidewalks and Driveways: Materials specified in Section 02951 - Pavement Repair and Resurfacing.
- B. Seeding and Sodding: Sod specified in Section 02922 - Sodding and Seed specified in Section 02921 - Hydromulch Seeding.
- C. Trees, Shrubs and Plantings: Conform to requirements of Section 01562 – Tree and Plant Protection.

PART 3 E X E C U T I O N

3.01 Preparatory Work

- A. Provide cleanup and restoration crews to work closely behind pipe laying and roadway construction crews, and where necessary, during testing, service restoration, abandonment, backfill and surface restoration.
- B. Water Lines: Unless otherwise approved by Project Manager, comply with the following:
 - 1. Once Project Manager approves work within a Phase, immediately begin preparatory work for disinfection effort.
 - 2. No later than three days after completing disinfection preparatory work, submit to City appropriate request for disinfection.
 - 3. If City fails to perform initial disinfection of lines in accordance with Section 2514 - Disinfection of Water Lines, within seven days from submission of appropriate request, and if approved by Project Manager, pipe laying operations may continue beyond approved limits until the City responds.
 - 4. Immediately after transfer of services, begin abandonment of old water lines and site restoration.
- C. Wastewater Lines:
 - 1. Once Project Manager approves work within a Line Segment, immediately begin preparatory work for testing effort.

2. No later than three days after completing preparatory work for testing, initiate testing work.
3. Immediately after transfer of service connections, begin abandonment of old wastewater lines, and site restoration.

D. Street Construction and Paving Projects

1. Once Project Manager approves work within a Line Segment or block, immediately begin preparatory work for testing effort.
2. No later than three days after completing preparatory work for testing, initiate testing work.
3. Immediately after testing begin site restoration.

E. Street Construction and Paving Projects

1. Once Project Manager approves work within a block, immediately begin preparatory work for sidewalk construction, sodding and hydromulching and tree planting.
2. No later than seven days after completing preparatory work, initiate construction.

3.02 CLEANING

- A. Remove debris and trash to maintain a clean and orderly site in accordance with requirements of General Conditions and Section 01576 - Waste Material Disposal.

3.03 LANDSCAPING AND FENCES**A. Seeding and Sodding.**

1. Remove construction debris and level area with bank sand so that new grass surface matches level of existing grass and maintains pre-construction drainage patterns. Level and fill minor ruts or depressions caused by construction operations with bank sand, where grass is still viable.
2. Restore previously existing turfed areas with sod and fertilize in accordance with Section 02922 - Sodding. Sod to match existing turf.

3. Restore unpaved areas not requiring sodding with hydromulch seeding conforming to Section 02921 - Hydromulch Seeding.
- B. Trees, Shrubbery and Plants.
1. Remove and replant trees, shrubs, and plants in accordance with requirements of Section 01562 – Tree and Plant Protection.
- C. Fence Replacement.
1. Replace removed or damaged fencing to equal or better condition than existed prior to construction, including concrete footings and mow strips. Provide new wood posts, top and bottom railing and panels. Metal fencing material, not damaged by the Work, may be reused.
 2. Remove and dispose of damaged or substandard material.
- 3.04 MAINTENANCE
- A. Maintain shrubs, plantings, sodded areas and seeded areas.
- B. Replace shrubs, plantings and seeded or sodded areas that fail to become established.
- C. Refer to Section 01562 - Tree and Plant Protection, Section 02921 - Hydromulch Seeding and Section 02922 - Sodding for maintenance requirements.

END OF SECTION

Section 01770

CLOSEOUT PROCEDURES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Procedures to establish Date of Substantial Completion.
- B. Closeout procedures for final submittals, O&M data, warranties, spare parts and maintenance materials.
- C. Texas Department of Licensing and Regulation (TDLR) inspection for Texas Accessibility Standards (TAS) compliance.

1.02 SUBSTANTIAL COMPLETION

- A. Comply with Document 00700 - General Conditions regarding Date of Substantial Completion when Contractor considers the Work, or portion thereof designated by Project Manager, to be substantially complete.
- B. Insure the following items have been completed when included in the Work, prior to presenting a list of items to be inspected by Project Manager for issuance of a Certificate of Substantial Completion:
 - 1. cutting, plugging, and abandoning of water, wastewater, and storm sewer lines, as required by Contract documents for each item;
 - 2. construction of, and repairs to, pavement, driveways, sidewalks, and curbs and gutters;
 - 3. sodding and hydromulch seeding, unless waived by Project Manager in writing;
 - 4. general clean up including pavement markings, transfer of services, successful testing and landscape;
 - 5. additional requirements contained in Section 01110 - Summary of Work.
- C. Assist Project Manager with inspection of Contractor's list of items and complete or correct the items, including items added by Project Manager, within specified time period.

CLOSEOUT PROCEDURES

CITY OF HOUSTON STANDARD GENERAL REQUIREMENT

- D. Should Project Manager's inspection show failure of Contractor to comply with requirements to obtain Date of Substantial Completion, including those items in Paragraph 1.02 B. of this section, Contractor shall complete or correct the items, before requesting another inspection by Project Manager.

1.03 CLOSEOUT PROCEDURES

- A. Comply with Document 00700 - General Conditions regarding final completion and final payment when the Work is complete and ready for Project Manager's final inspection.
- B. Provide Project Record Documents in accordance with Section 01785 - Project Record Documents.
- C. Complete or correct items on punch list, with no new items added. Address new items during warranty period.
- D. The City will occupy portions of the Work as specified in other sections.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition.
- D. Clean or replace filters of operating equipment.
- E. Clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Clean site; sweep paved areas, and rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and temporary construction facilities from site following final test of utilities and completion of the Work.

1.05 ADJUSTING

- A. Adjust operating equipment to ensure smooth and unhindered operation. Value of this testing and adjusting is five percent of Lump Sum Price in the Schedule of Values for item being tested.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit O&M data as noted in Section 01330 - Submittal Procedures.
- B. Five percent of lump sum amount of each piece of equipment as indicated in Schedule of Unit Price Work or Schedule of Values will be paid after the required O&M data submittals are received and approved by Project Manager.

1.07 WARRANTIES

- A. Provide one original of each warranty from Subcontractors, Suppliers, and manufacturers.
- B. Provide Table of Contents and assemble warranties in a 3-ring/D binder with durable plastic cover.
- C. Submit warranties prior to final progress payment.
- D. Warranties shall commence in accordance with the requirements in Document 00700 - General Conditions.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification sections.
- B. Deliver to a location within the City limits as directed by Project Manager. Applicable items must be delivered prior to issuance of a final Certificate for Payment.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 01785

PROJECT RECORD DOCUMENTS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Maintenance and submittal of record documents and Samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain one record copy of documents at the site in accordance with Document 00700 - General Conditions.
- B. Store record documents and Samples in field office, if a field office is required by the Contract, or in a secure location. Provide files, racks, and secure storage for record documents and Samples.
- C. Label each document "PROJECT RECORD" in neat, large, printed letters.
- D. Maintain record documents in a clean, dry, and legible condition. Do not use record documents for construction purposes. Do not use permit drawings to record Modifications to the Work.
- E. Keep record documents and Samples available for inspection by Project Manager.
- F. Bring record documents to progress review meetings for viewing by Project Manager and, if applicable, Design Consultant.

1.03 RECORDING

- A. Record information legibly with red ink pen on a set of blueline opaque drawings, concurrently with construction progress. Maintain an instrument on site at all times for measuring elevations accurately. Do not conceal work until required information is recorded
- B. Contract Drawings and Shop Drawings: Mark each item to record completed Modifications, or when minor deviations exist, the actual construction including:
 - 1. Measured depths of elements of foundation in relation to finish first floor datum.
 - 2. Measured horizontal locations and elevations of Underground Facilities and appurtenances, referenced to permanent surface improvements.

3. Elevations of Underground Facilities referenced to City of Houston benchmark utilized for the Work.
 4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 5. Dimensions and details of field changes
 6. Changes made by Modifications.
 7. Details not on original Drawings.
 8. References to related Shop Drawings and Modifications.
- C. Survey all joints of water mains at the time of construction. Record on Drawings, water main invert elevation, elevation top of manway, and centerline horizontal location relative to baseline.
- D. For large diameter water mains, mark specifications and addenda to record:
1. Manufacturer, trade name, catalog number and Supplier of each Product actually Installed.
 2. Changes made by Modification or field order.
 3. Other matters not originally specified.
- E. Annotate Shop Drawings to record changes made after review.
- 1.04 SUBMITTALS
- A. At closeout of the Contract, deliver Project record documents to Project Manager.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

Section 02221S

REMOVING EXISTING PAVEMENTS, STRUCTURES, WOOD, AND DEMOLITION DEBRIS

The following supplements modify Specification Section 02221 – Removing Existing Pavements, Structures, Wood, and Demolition Debris. Where a portion of the Specification or Detail is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

1.03 REGULATORY REQUIREMENTS: Add the following Paragraph C:

- C. For removal of asbestos containing materials, or material that could potentially contain asbestos, comply with applicable provisions of OSHA 29 CFR 1926.1101 – Asbestos, OSHA 29 CFR 1926.32 – General Safety and Health Provisions, and EPA 40 CFR 61 Subpart M – National Emission Standard for Asbestos.

3.01 PREPARATION: Add the following Paragraph C:

- C. For removal of asbestos containing materials, or materials that could potentially contain asbestos, comply with the following:
 - 1. Crew members must be trained in accordance with OSHA 29 CFR 1926.1101 – Asbestos.
 - 2. Conduct negative exposure assessment to demonstrate asbestos exposure below permissible exposure limit (PEL) in accordance with OSHA 29 CFR 1926.1101 – Asbestos and EPA 40 CFR 763 – Asbestos.
 - 3. If negative exposure assessment not conducted, or if results are above PEL, provide respiratory protection in accordance with Paragraph 3.02 of this Section.

3.02 PROTECTION: Add the following Paragraph B:

- B. When required, provide respiratory protection in accordance with OSHA 29 CFR 1910.134 – Respiratory Protection, and National Institute of Occupational Safety and Health (NIOSH).

3.03 REMOVALS: Add the following Paragraph G:

- G. Labeling of Asbestos Cement (AC) Pipe:
 - 1. Label leak-tight container with warning statement of hazardous asbestos content in accordance with OSHA 29 CFR 1926.1101 and as noted below.
 - 2. Label waste material with following warning:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

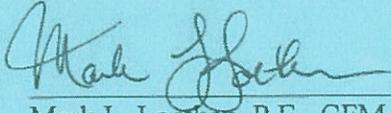
3. Neatly print labels in letters of sufficient size and contrast so label is easily visible and legible.
- 3.05 DISPOSAL: Add the following Paragraph C:

C. For asbestos-containing materials:

1. Comply with 40 CFR Part 61 and 30 TAC Sections 330.137(b) for Industrial Class 1 waste.
2. Inspect load to ensure correct packaging and labeling.
3. Line vehicles with two layers of 6-mil polyethylene sheeting.
4. Remove asbestos-containing waste from site daily.

END OF SUPPLEMENT

Approved by:



Mark L. Loethen, P.E., CFM, PTOE
City Engineer
Department of Public Works & Engineering

11/17/2012

Date

Section 02221

REMOVING EXISTING PAVEMENTS, STRUCTURES, WOOD, AND DEMOLITION DEBRIS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removing concrete paving, asphaltic concrete pavement, brick pavement and base courses.
- B. Removing concrete curbs, concrete curbs and gutters, sidewalks and driveways.
- C. Removing pipe culverts, sewers, and sewer leads.
- D. Removing waterlines and water services lines including asbestos cement pipe per OSHA guidelines.
- E. Removing existing inlets and manholes.
- F. Removing and disposing of pre-stressed concrete beams and drill shafts.
- G. Removing miscellaneous structures of concrete or masonry.
- H. Removing existing bridge.
- I. Removing existing wood and demolition debris.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. Payment for removing and disposing of asphaltic surfacing with or without base, regardless of thickness encountered, is on square yard basis measured between lips of gutters.
 - 2. Payment for removing and disposing of reinforced concrete pavement, with or without asphalt overlay, regardless of its thickness, is on square yard basis measured from back-to-back of curbs. Payment includes concrete pavement, esplanade curbs, curbs and gutters, and paving headers.
 - 3. Payment for removing and disposing of cement stabilized shell base course, with or without asphaltic surfacing, is on square yard basis.
 - 4. Payment for removing and disposing of concrete sidewalks and driveways is on square yard basis.

5. Payment for removing asphaltic pavement surface by milling shall be in accordance with Section 2960.
 6. Payment for removing and disposing of miscellaneous concrete and masonry is on cubic yard basis of structure in place.
 7. Payment for removing and disposing of pipe culverts, sewers, and sewer leads, is on linear foot basis for each diameter and each material type of pipe removed.
 8. Payment for removing and disposing of waterlines and water service lines including asbestos cement pipe is on linear foot basis for each diameter pipe and each material type of pipe removed.
 9. Payment for removing and disposing of existing inlets is on unit price basis for each inlet removed.
 10. Payment for removing and disposing of prestressed concrete piles and drill shafts is on linear foot basis.
 11. Payment for removing and disposing of existing bridge, including piles and abutments to minimum of 4 feet below ground level, is on a lump sum basis.
 12. Payment for removing and disposing of existing manholes is on unit price basis for each manhole removed.
 13. Payment for removing and disposing of miscellaneous wood and demolition debris is on cubic yard basis.
 14. No payment for saw cutting of pavement, curbs, or curbs and gutters will be made under this section. Include cost of such work in unit prices for items listed in bid form requiring saw cutting.
 15. No payment will be made for work outside maximum payment limits indicated on Drawings, or for pavements or structures removed for Contractor's convenience.
 - a. For utility installations: Match actual pavement replaced but no greater than maximum pavement replacement limits shown on Drawings. Limits of measurement will be as shown on Street Cut Pavement Replacement Rules.
 16. Refer to Section 01270 - Measurement and Payment for unit price procedures
- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.1.03 REGULATORY REQUIREMENTS
- A. Conform to applicable codes for disposal of debris.

- B. Coordinate removal work with utility companies.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 P R E P A R A T I O N

- A. Obtain advance approval from Project Manager for dimensions and limits of removal work.
- B. Identify known utilities below grade. Stake and flag locations.

3.02 P R O T E C T I O N

- A. Protect following from damage or displacement:
 1. Adjacent public and private property.
 2. Trees, plants, and other landscape features designated to remain.
 3. Utilities designated to remain.
 4. Pavement and utility structures designated to remain.
 5. Bench marks, monuments, and existing structures designated to remain.

3.03 R E M O V A L S

- A. Remove pavements and structures by methods that will not damage underground utilities. Do not use drop hammer near existing underground utilities.
- B. Minimize amount of earth loaded during removal operations.
- C. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut to minimum depth of 2 inches.
- D. When street and driveway saw cut location is greater than one-half of pavement lane width, remove pavement for full lane width or to nearest longitudinal joint as directed by Project Manager.
- E. Remove sidewalks and curbs to nearest existing dummy, expansion, or construction joint.
- F. Where existing end of pipe culvert or end of sewer is to remain, install 8-inch-thick masonry plug in pipe end prior to backfill in accordance with requirements of Section 02316 - Excavation and Backfill for Structures.

3.04 BACKFILL

- A. Backfill of removal areas shall be in accordance with requirements of Section 02316 - Excavation and Backfill for Structures.

3.05 DISPOSAL

- A. Inlet frames, grates, and plates; and manhole frames and covers, may remain City property. Disposal shall be in accordance with requirements of Section 01576 - Waste Material Disposal.
- B. Remove from site, debris resulting from work under this section in accordance with requirements of Section 01576 - Waste Material Disposal.

END OF SECTION

SECTION 05091

WELDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Specification governs requirements for welding and procedures for the project.
- B. Project to be completed in accordance with plans and specifications.
- C. Welding terms are per definitions given in American Welding Society (AWS) Section 3.3.

1.02 DESIGN REQUIREMENTS

Reference is made to:

- 1. American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Sections VIII and IX.
- 2. American Welding Society (AWS) Standards.
- 3. American Water Works Association (AWWA) Standard D100.
- 4. American Petroleum Institute (API) Standard 653 - Tank Inspection, Repair, Alterations, and Reconstruction.

1.03 SUBMITTALS

Welding procedures and procedure qualification record for each grade of material encountered.

1.04 QUALITY CONTROL

- A. Welder Qualifications:
 - 1. All welders working on the project shall be qualified for the procedures proposed by the tank contractor.
 - 2. This requirement shall govern all welding regardless of the connection to be welded or tacked for welding.

WELDING

3. Certificates for each welder shall be kept at the jobsite for review by the Engineer if requested.
4. A welder may perform welding only in positions and plate thickness for which he has been qualified.
5. Should a welder produce welds with a high reject rate (over 5%), the welder must be either requalified or prohibited from making future welds.
6. Welders will be qualified as outlined in AWWA D100, Section 8.3

B. Welding Procedure:

1. Welding procedures are required for each grade, position, and thickness of material encountered.
2. The Contractor may use procedures that have already been developed for the same material grade upon providing documentation from a recognized laboratory.
3. All procedures as a minimum must comply with AWWA D100 Section 8.2.

C. Welding Records:

1. Contractor is required to keep a record of the work completed. Records to be furnished to Owner upon request.
2. This record may be cumulative but must include data on X-ray locations, welding operator, and type of technique used.
3. Quality control to be per AWWA D100, Section 11.

D. Environmental Conditions:

1. No welding will be permitted when the environmental conditions are not conducive to good welding practice.
2. Specifically, all welding must be shielded from precipitation and winds that could affect the quality of deposited materials.
3. When plates may be damp, such as the early morning, the Contractor may use heat to remove moisture and begin welding work.

E. Welding Safety:

Prior to welding or cutting with a torch on painted surfaces of tanks to be rehabilitated or demolished, the Contractor must test for presence of lead in paint. If lead is found to be present, the Welder must be appropriately protected in accordance with OSHA Standard for Construction Industry, 29 CFR 1926.

1.05 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Item except as indicated below.
- B. The Contractor shall include the cost for this work in contract price bid for work of which this is a component part.
- C. Measure "Extra Welding Repair, All Weld Sizes" by linear foot, complete in place. Pay for "Extra Welding Repair, All Weld Sizes" by unit price per linear foot. No pay for this item unless the work is specifically authorized by the Engineer,
- D. Measure "Extra Welder" and "Extra Welder Apprentice" by manhours. Pay for each by the manhour. No pay for this item unless the work is specifically authorized by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Contractor is to furnish all materials and equipment to complete this item.
- B. All electrodes are to be stored in welding electrode ovens per manufacturer's recommendations.
- C. No electrode shall be used unless they have been in the oven at the manufacturer's recommended temperature for a minimum of 24 hours.
- D. Unused electrodes that were taken out of the oven for use in the day must be placed back in the oven after the work day for use at a later time.

WELDING

PART 3 - EXECUTION

3.01 FABRICATION AND ASSEMBLY

- A. Fabrication and assembly shall be as specified in AWWA D100 as a minimum. (All line tolerances to be per drawings and specifications).
- B. No plates will be used that have been buckled or deformed.
- C. Contractor is to tack weld all plates in each course in a uniform manner before weld out of that course, considering stresses or deformation that may occur in the welding and closure sequence.

3.02 WELD PREPARATIONS

- A. No plates shall be tacked in place for welding unless the weld joint has been prepared per details and designs.
- B. Plates are to be cut and deposits of slag removed by grinding.
- C. In cases where new welds are to join an existing plate, the existing protective coating shall be removed by grinding before welding is begun.
- D. Existing welds to be repaired shall be gouged and cleaned prior to repair.
- E. Weld x-rays to be provided for by the Owner. All welds which do not pass x-ray will be repaired by the Contractor, at no additional expense to the Owner. These welds will be x-rayed again upon completion of repair, at the expense of the Contractor. When more than two radiographs are rejected, additional x-rays can be taken as directed by the Engineer at the Contractor's expense.

END OF SECTION

SECTION 05502

MISCELLANEOUS METALS

PART 1 - GENERAL

1.01 SCOPE

This section covers miscellaneous metal work not covered in other sections of the specifications.

1.02 GENERAL

- A. Determine metal items to be provided under other sections of the specifications.
- B. Verify all dimensions and conditions at site.
- C. Insofar as practicable, miscellaneous work shall be fitted and shop assembled ready for erection.
- D. Shop and field connections shall be welded except where bolted connections are indicated on drawings.
- E. Furnish all necessary bolts, anchors and sleeves required for the support of miscellaneous metal items.
- F. Provide drilled holes and connections in miscellaneous metal work as required for attachment of other miscellaneous metal items.
- G. Jointing and intersections of metal shall be close, tight and secure. Bolted work shall be screwed tight to prevent loosening.
- H. Equipment and welding shall conform to requirements of the American Welding Society Code for Welding and Building Construction, latest edition. Welding not governed by the above shall be performed in accordance with the best modern practice for strength and durability.

1.03 SHOP DRAWINGS

Submit for approval in accordance with Section 01330 prior to fabrication.

MISCELLANEOUS METALS

1.04 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this item.
- B. The contractor shall include the cost of this work in the contract bid price for work of which this is a component part.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel Shapes - ASTM A36-68.
- B. Bolts, Nuts and Washers - ASTM A307-67.
- C. Expansion Bolts - Equal to "WEJ-IT" by WEJ-IT Expansion Products, Inc., Broomfield, Colorado.
- D. Welding Electrodes - ASTM A233-64 T.
- E. Castings - ASTM A48-64.

2.02 PROTECTIVE COATINGS & FINISHES

- A. Paint in accordance with Section 09971 - Painting and Protective Coatings for Potable Water Storage Tanks.
- B. If specified, hot dip galvanize in accordance with ASTM A123.
- C. The exterior finish of aluminum structures (including roof vents, plates, batten bars, hub covers, handrails and roof hatches) shall be "Aluminum Association Nondirectional Textured, M42, Fine Matte Finish".

PART 3 - NOT USED

END OF SECTION

SECTION 09971S

PAINTING AND PROTECTIVE COATINGS FOR
POTABLE WATER STORAGE TANKS

The following supplement modifies Specification Section 09971. Where a portion of the specification is modified or deleted by the Supplementary Specification, the unrelated portions of the Specification shall remain in effect.

1.02 MEASUREMENT AND PAYMENT

Delete paragraph in its entirety and replace with the following:

- A. No separate measurement and payment for work performed under this Section except as indicated in section 1.02 B. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.
- B. Measure "extra epoxy caulking at badly pitted surfaces" by gallons, complete in place. Pay for "extra epoxy caulking at badly pitted surfaces" by unit price bid per gallon.

3.08 INSPECTION, TESTING AND RECORD KEEPING

D. Delete Paragraph D in its entirety and replace with the following:

- D. Subsequent to the second coat application and prior to the third coat, test all tank interior coated surfaces under the direction of the Engineer for nicks, scrapes and/or pinholes in the coating film using a low voltage, wet sponge holiday detector for thin film coating (<20 mils) and high voltage holiday detector for thick film coating (>20 mils). Perform holiday detection in accordance with NACE RP0188-90: "Discontinuity (Holiday) Testing of Protective Coatings." Correct any deficiencies to the satisfaction of the Engineer.

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3.09 FINISH SCHEDULE:

B. Add the following Paragraph 22:

22. Prior to the first coat application, apply a thinned (maximum 50%, but not to exceed manufacturer's published recommendations) coat of the primer into all pitted surfaces using a bristle brush or roller.

END OF SUPPLEMENT

Approved By:

Sonny Do, P.E.
Acting Assistant Director
Water Engineering Section
Engineering and Construction Division

Date

Section 09971

**PAINTING AND PROTECTIVE COATINGS
FOR POTABLE WATER STORAGE TANKS**

PART 1 GENERAL

1.01 SECTION INCLUDES

Surface preparation and application of paints and/or protective coating materials in a safe manner with proper handling and removal and disposal of all waste materials.

1.02 MEASUREMENT AND PAYMENT

There is no separate measurement and payment for work performed under this Specification Section. Include the cost for this work in the contract bid price for work of which this is a component part.

1.03 REFERENCE STANDARDS

A. American Society for Testing of Materials (ASTM)

1. ASTM D 4285, "Standard Test Method for Indicating Oil or Water in Compressed Air"
2. ASTM A 123, "Specification for Zinc (Hot-Dip) Galvanized Coatings on Iron and Steel Products"
3. ASTM A 153, "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
4. ASTM A 385, "Practice for Providing High-Quality Zinc Coatings (Hot-Dip)"
5. ASTM E 376-89, "Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods"
6. ASTM D 4940-89. "Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives"
7. ASTM D 4417-84, "Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel"

B. NACE International "Book of Standards"

1. Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using Replica Tape: RP0287-91

2. Discontinuity (Holiday) Testing of Protective Coatings: RP0188-90
 3. Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit and Shot TM0175-75
- C. NACE International Publication 6A192, "Dehumidification Equipment in Lining Application"
- D. Society for Protective Coatings (SSPC), "Steel Structures Painting Manual, Vol. 1, Good Painting Practice"
- E. Society for Protective Coatings (SSPC), "Steel Structures Painting Manual, Vol. 2, Systems and Specification"
1. Solvent Cleaning: SSPC-SP-1-82
 2. Hand Tool Cleaning: SSPC-SP-2-95
 3. Power Tool Cleaning: SSPC-SP-3-95
 4. Power Tool Cleaning to Bare Metal: SSPC-SP-11-95
 5. White Metal Blast Cleaning: SSPC-SP-5/NACE 1-94
 6. Commercial Blast Cleaning: SSPC-SP-6/NACE 3-94
 7. Brush-Off Blast Cleaning: SSPC-SP-7/NACE 4-94
 8. Near-White Blast Cleaning: SSPC-SP-10/NACE 2-94
 9. Mineral and Slag Abrasives: SSPC-AB 1-91
 10. Visual Standard for Abrasive Blast Cleaned Steel: SSPC-Guide to Vis 1-89
 11. Measurement of Dry Paint Thickness with Magnetic Gages: SSPC-PA 2
- F. NSF International Standard 61 - Drinking Water System Components.
- G. If there is a conflict between cited reference standards and this specification, this specification prevails unless otherwise indicated in the procurement documents.

1.04 SUBMITTALS

Submittals for materials and/or systems proposed for use on this project must conform to requirements included in Section 01330 and include, but not be limited to, those items listed for each product/system below. Provide submittals to the Engineer for review.

A. Paint and Protective Coatings:

1. Manufacturer Technical Data Sheets for all paints, coatings, solvents, detergents and degreasers proposed.
2. Manufacturer Material Safety Data Sheets (MSDS) for all paints, coating and thinners proposed.
3. Color name and/or number with color chart for each specific coating product. Exterior topcoat color shall be City of Houston Barr Blue.
4. Manufacturer's statement of conformance with ANSI/NSF 61 (NSF International) requirements for use on potable water tank interior surfaces.
5. Manufacturer's specific ventilation requirements for products used on interior surfaces. Provide ventilation requirements to ensure adequate evacuation of solvents to prevent solvent entrapment, worker exposure to solvents above the OSHA PEL, and timely coating system cure.

B. Abrasive Blast Products

Use abrasive blast products which conform to the Society for Protective Coatings (SSPC) Abrasive Specification No. 1. "Mineral and Slag Abrasives", except that copper slag is not permitted. Abrasive blast product submittals to include, but not be limited to, the following:

1. Manufacturer's certification or laboratory analysis that the product proposed contains less than 1% free crystalline silica.
2. Laboratory analysis of blast material presenting results of blast material testing as required in SSPC-AB 1, Table 1 requirements for Chemical and Physical Properties of Abrasives, except that the conductivity test for water soluble contaminants in accordance with ASTM D-4940 shall not exceed 500 microsiemens (micromhos).
3. Material Safety Data Sheets.
4. Composition, mesh size, and bulk density.
5. Recommended application nozzle, air requirements, and pressure.

C. Containment System

Include a sample or samples of containment materials including screens, tarpaulins, sheets, films and ground covers. Include manufacturer technical data sheets for the proposed containment system. In addition, include the following:

1. Outrigger/containment structural support system layout and details.
 - a) For ground storage tanks, submit proposed arrangement of scaffolds and/or A-

frames to support containment materials. Do not support containment from existing tank handrails or ladders. The scaffolding must be designed to support the weight of the containment materials and provide a safe working environment for workers.

- b) For elevated storage tanks, submit proposed layout of outrigger system, containment hoisting system, details of proposed method of connection to tank shell, list of structural members including, but not limited to, size of member, maximum allowable wind velocity before system must be lowered to prevent structural damage to the system and/or tank, method of determining wind velocity and proposed location of wind velocity measuring device. The outrigger system layout must be reviewed and sealed by a licensed Professional Engineer registered in the State of Texas.

2. Manufacturer's technical data sheets for the proposed containment system.
3. Manufacturer's certification that proposed containment materials are fire resistant.
4. Provide a minimum shade factor for proposed containment materials of 95%, except for a minimum shade factor of containment materials used with chemical stripping agents of 85%.

D. Chemical Stripping Agents - For Rehabilitation of an Existing Tank

1. Manufacturer's Technical Data Sheet for the materials proposed.
2. Material Safety Data Sheets (MSDS).
3. Proposed method of application.
4. Waste material containment and retrieval system.

E. Dehumidification Equipment

1. Manufacturer and Supplier
2. Support Equipment (i.e. generator)
3. Equipment capacity, sized per NACE Publication 6A192

PART 2 PRODUCTS

2.01 COATINGS

A. Painting and Coatings

1. The following paint/coating manufacturers are known to have products of acceptable quality for this project: ACRO, Raven Lining Systems, Carboline, Sherwin - Williams, Tnemec, Valspar and Devoe (for exterior wash only). Bid based upon the use of products supplied by one of these named manufacturers. These named manufacturers are designated to establish a level of acceptable product quality or manufacturing experience and are not to be construed as the only manufacturers of products acceptable for use on this project. Other manufacturers and products will be considered on an individual basis, and may be submitted for consideration in accordance with Document 00700, Article 3.10, Product Options and Substitutions (excluding 3.10.3), Section 01330, and this Section.
2. Specific products of the named manufacturers acceptable for use and to be bid for this project are contained in Table 1, "Coating Product," included in this section.
3. Use non-lead containing coatings which comply with all laws, regulations and ordinances of the Federal, State, and Local government including V.O.C. regulations.
4. Properly store and handle materials according to manufacturer's requirements and in compliance with applicable government regulations.
5. Color: Generally colors are to be as follows:
 - a. When multiple coats are required, use coatings alternating colors.
 - b. Use white for the interior final coat.
 - c. Use City of Houston Barr Blue for exterior final coat.
6. Obtain all coating materials and required thinners for each tank from the same single source coating manufacturer.
7. The schedule for painting and coating for specific tanks is contained in Table 2 "Surface Preparation and Finish Schedule" included in this Section.

B. Hot Dip Galvanized Surfaces

1. If specified, hot dip galvanize in accordance with ASTM A 123, ASTM A 385 and/or ASTM A 153.
2. The completed galvanized sections to have a minimum of 2 ounces per square foot. Two ounces of galvanizing per square foot equals approximately 3.4 mils.
3. Estimate weight of galvanizing by use of magnetic dry film thickness gage in accordance with ASTM E 376-89.
4. Galvanizing (zinc) in contact with potable water must be NSF classified for contact with potable water.

2.02 EPOXY CAULKING

- A. Use flexible, NSF classified epoxy caulking for use in contact with potable water and compatible with the epoxy lining system used in the tank.
- B. Caulk to be 100% solids, two component, polyamine or polyamide cured.
- C. The coating manufacturer and caulk material manufacturer to confirm, in writing, that the internal epoxy coating system is compatible with the 100% solids epoxy caulk material.
- D. Include in the written confirmation of material compatibility, any conditions for or surface preparation requirements of the epoxy caulk material.
- E. An acceptable product for this Project is "Aquatapoxy A7", manufactured by Raven Lining Systems, Tulsa, Oklahoma.

2.03 CHEMICAL PAINT STRIPPER (For Rehabilitation of an Existing Tank)

- A. Use of chemical paint stripper for removal of exterior paint is allowed, if approved by the Engineer and used in strict accordance with manufacturer's recommendations.
- B. Propose a chemical stripping system such as "Peel Away", manufactured by Dumond Chemicals, Inc. of New York, NY, or approved equivalent.

2.04 CONTAINMENT SYSTEM

- A. Provide a containment system which allows for the containment of the environmentally sensitive waste, dust and paint over spray that will be generated during the blasting and painting operations.
- B. When a tank is to be rehabilitated and the coatings to be removed contain lead, containment to conform at a minimum to the requirements of TNRCC Texas Air Control Board Regulation I, 3 TAC Chapter 111 Sections 131 through 139 and meet the performance requirements of Section 01351 "Environmental Safety and Worker Protection" of this specification.
- C. When chemical stripping agents are used, provide for containment of debris, aerosols, strippings and other emissions or releases. In addition, manage contained waste in accordance with Section 02136 "Waste Material Handling and Disposal" and Contractor waste handling procedure.
- D. Determine by the Engineer, the containment system requirements, if any, for wet abrasive blast or vacuum abrasive blast, and roller applied or brush-on coatings. Use impervious ground coverage as noted in Item 2.05.F.6 at all times.
- E. Containment system proposed by the Contractor must assure the protection of the surrounding environment and must provide sufficient protection to meet: TNRCC Texas Air Control Board regulations for the Control of Air Pollution and Visible Emissions of Particulate Matter; Texas Water Commission regulations applicable to protection of the soil and water; and Sections 01351

"Environmental Safety and Worker Protection" and 02136 "Waste Material Handling and Disposal" of this Specification.

- F. Construct containment system with wind screens of a minimal shade factor as specified in Item 1.07.C of this section, or as required below, with no emission from edges, rips, or tears. The containment system must be designed for the purpose of containing and controlling emissions, debris and protecting the air, ground and soil from contaminants resulting from lead paint removal, surface preparation and painting operations.
1. Containment System to provide a safe working environment and provide for control of emissions as required in Section 01351 "Environmental Safety and Worker Protection" of this Specification.
 2. For rehabilitating an existing tank, employ a Containment System meeting the requirements of an SSPC Class 2 containment, per SSPC Guide 6 (CON), when lead containing paint is to be removed by abrasive blast cleaning methods.
 3. The containment materials must provide for performance which will comply with the following:
 - a) Protection of the environment, including air, water and soil, from abrasive blast media, process water, dust particles and paint debris.
 - b) Air movement within containment.
 - c) Secure edges and seams.
 - d) Permeable to natural lighting, unless alternate lighting is to be provided.
 - e) Tarp overlap to provide for maximum containment of spent debris.
 4. Maintain the containment system free of defects through the course of the project. In the event that emissions or releases occur which exceed the requirements established in Section 01351, "Environmental Safety and Worker Protection," stop work until all defects are repaired.
 5. Prior to installation, the containment system design must be submitted and reviewed by the Engineer. In addition, for work on elevated water storage tanks, design the containment enclosure to be raised and lowered within 15 minutes to prevent damage to the enclosure, the tank, personnel, and excessive loading to the tank and tank appurtenances in the event of high winds and foul weather.
 6. Place membranes that are impervious to the abrasive blast media, paint debris dusts, and process water on the ground around the tank to prevent contamination of the ground storm waters and surface waters due to run-off. Use chemically resistant membranes when chemical stripping is employed. Contain the debris within 30 feet of the base of the tank.
 7. Prior to any changes or modifications in the containment system during the course of the work, submit in writing and review by the Engineer, proposed changes and modifications. Address the operational and technical reasons for containment modifications in the submittal.

- G. Eagle Industries, Reef Industries, or equivalent are acceptable suppliers.

2.05 ABRASIVE BLAST MATERIALS

Mineral and slag abrasive materials are to conform to the requirements of the Society for Protective Coating's Abrasive Specification No. 1, SSPC-AB1. Abrasives are to be Class A, less than 1% crystalline silica. The conductivity of the abrasive (indicative of water soluble contaminants) is not to exceed 500 microsiemen (micromhos) when tested in accordance with ASTM-D4940. Prior to use, provide the Engineer qualifications and conformance testing performed and documented in accordance with Section 5 of SSPC-AB1. Abrasive materials expressly prohibited from use include sand and copper slag.

2.06 PRODUCT HANDLING

Delivery and Storage

- A. Deliver all paints, coatings and related materials to the job site or fabrication shop in original unopened containers with the product name, type and batch number, color, and manufacture date clearly marked on each container.
- B. Store all materials used on the job in a single place provided by the Contractor or designated by the Engineer at the job site. Comply with OSHA requirements, recommendations of the National Fire Protection Association, City Fire Codes, and manufacturer recommendations for on site and fabrication shop storage.
- C. Remove oily or solvent-soaked rags and all waste from the job site every night, and take all necessary precautions to reduce fire hazards to a minimum.
- D. If the storage space was a fixed part of the project, leave clean upon completion of the work. Repair any damage to storage space or its surroundings.

PART 3 EXECUTION

3.01 COATING OPERATION ENVIRONMENTAL REQUIREMENTS

- A. Tank Interior Humidity and Temperature
 1. During abrasive blast cleaning and painting operations, the relative humidity of the interior air is not to exceed fifty percent (50%). Measure relative humidity by a sling psychrometer or other appropriate psychometric measuring equipment.

2. Maintain the interior air temperature and surface temperature of surfaces to be coated between 50°F and 120°F and at least 5°F above the dew point or as otherwise required by the manufacturer. (Note, that for use of Aquatapoxy, the maximum surface temperature is 100°F.)
3. Achieve the required conditions for interior air conditions through the use of dehumidification equipment.
 - a. Submit for review by the Engineer, proposed dehumidification equipment. Provide a minimum of three air changes per hour unless dehumidification equipment manufacturer's calculations substantiate fewer air changes.
 - b. Supply dry, fresh (not recirculated) air within 12 inches of the tank bottom from a system of duct work and blowers with the dehumidification equipment. Operate the ventilation system 24 hrs/day throughout the entire coating cure process.
 - c. Maintain dehumidification until abrasive cleaning operations, coating operations and cure are complete, but not less than ten (10) days.

B. Tank Exterior Humidity and Temperature

1. Do not apply a coating to wet or damp surfaces or in rain, snow, fog or mist.
2. Do not apply any coatings when it is expected that the ambient air temperature will fall below 50°F or within 5°F of the dew point within 6 hours after application of coatings or paints.
3. Do not apply a coating when the relative humidity is above 85%, or as specified in the coating manufacturer's product data sheet. Measure relative humidity and dew point by use of a Sling Psychrometer in conjunction with US. Department of Commerce Weather Bureau Psychrometric Tables. If the above conditions are exceeded, delay coating or painting operations until conditions are favorable.
4. The ambient conditions and surface temperature of the surfaces being coated must be between 50°F and 120°F and at least 5°F above the dew point in accordance with the manufacturer's recommendations. The maximum surface temperature during application of urethane coatings is 100°F.

3.02 WORKMANSHIP

- A. Good workmanship is required for all work as defined by the latest edition of the "Manual of Good Painting Practices" published by the Society for Protective Coatings (SSPC), 40 24th Street, Pittsburgh, Pennsylvania 15222.
- B. These specifications do not cancel or supersede the directions of the manufacturer regarding the warranty or applicability of the product. In instances of variations between manufacturer's

recommendations and this specification, the more stringent requirement governs.

- C. The Contractor to furnish trained personnel experienced in the work to be performed. Contractor to ensure work is performed in accordance with these specification requirements including, but not limited to: surface cleanliness; anchor profile; ambient conditions; film thickness (wet and dry) and holiday detection. Provide and use such inspection instruments, gauges or other equipment as may be required to verify compliance with manufacturer's instructions and these specifications. Assure proper operating condition and calibration of equipment and instrumentation before and after use.
- D. Provide tools and equipment in good working order including moisture traps in air lines to pressure pot and spray gun when air atomization is used. Set moisture trap for continuous bleed during spraying operation. Place moisture traps as close to spray gun as practical. Process air to be free from oil and moisture when tested in accordance with ASTM D 4285.
- E. Do not apply primer closer than four inches (4") to any surface scheduled for subsequent blasting or to be field welded.
- F. Apply a brush stripe coat of primer, subsequent to surface preparation, but prior to full primer coat application to welds, rivets, corners, crevices, and other default to coat surfaces.
- G. Apply all caulk and/or sealant materials smooth and continuous.

3.03 SURFACE PREPARATION

- A. Remove visible deposits of oil or grease prior to surface preparation in accordance with SSPC-SP-1 or other methods approved by the Engineer, remove visible deposits of oil or grease.
- B. Prior to abrasive blast cleaning, remove all surface imperfections such as sharp fins, sharp edges, weld spatter, or burning slag. Grind sharp corners and edges to a smooth round edge with a radius of not less than 1/16 inch.
- C. Abrasive blast cleaned surfaces to meet the requirements of this specification when examined in accordance with Society for Protective Coatings "Guide to SSPC-VIS 1-89". This applies to all exposed surfaces, including difficult to access areas (e.g. behind stiffener rings). When a tank is to be rehabilitated and the coatings to be removed contain lead, acceptable coating removal methods include wet abrasive blast cleaning, water jetting with or without abrasives, vacuum abrasive blast cleaning, and chemical stripping. Certain coating removal methods require subsequent dry abrasive blasting to achieve the specified surface preparation. Should these methods be selected, ensure that no fugitive dust escapes the containment system during dry abrasive blasting. This is to be accomplished by the use of negative air and/or dust collection systems adequately sized to effectively control dust.
- D. For rehabilitation of an existing tank, Moderately Pitted Surface is defined as a surface having pits less than 1/16 inch deep with a frequency of 4 to 5 pits per square foot. Prior to application of the

specified coating system, blast the pitted surface to SSPC-SP10. The first coat may be thinned (not to exceed manufacturer's published recommendations) and applied by stiff bristle brush or roller to all pitted surfaces.

- E. For rehabilitation of an existing tank, Badly Pitted Surface is defined as a surface having pits greater than 1/16 inch deep and less than 1/2 of the metal thickness with a frequency of 8-12 pits per square foot. Prior to application of the specified coating system, blast the pitted surface to SSPC-SP10. Prior to applying the specified system, fill the pits with an epoxy caulk seam sealer applied by putty knife or stiff bristle brush.
- F. Prior to painting, remove dust by vacuuming from all prepared interior surfaces to be coated.
- G. Subsequent to achieving the specified surface preparation and prior to coating application, interior wetted surfaces must be free from surface contaminants, visible and non-visible, to a level of less than $7\mu\text{g}/\text{cm}^2$ as sodium chloride. Surfaces will be tested by the City's laboratory for evidence of surface contaminants including soluble iron and salts such as chlorides. A minimum of one test for every 2500 square feet of shell and floor area will be performed. Ensure tank interior is dust free at the time of the test and that the surfaces to be tested are clean.
- H. Prepared exterior surfaces may be vacuumed or cleaned by an alternative method acceptable to the Engineer. (For rehabilitation of an existing tank, note that use of compressed air during lead paint removal operations is only allowable under full containment.)
- I. Prepared and approved surfaces must be coated before contamination, including rust bloom. Surfaces shown to be contaminated or exhibiting rust are to be recleaned to the requirements of the specifications at Contractor's expense.
- J. Repair abraded or otherwise damaged areas of existing paint using comparable materials and procedures, as approved by the Engineer.
- K. Treat areas of visible mildew with an approved mildewcide, compatible with the coating system to be applied.

3.04 CHEMICAL STRIPPER (For Rehabilitation of an Existing Tank)

- A. After application of chemical stripper and prior to recoating of the exterior surface of the tank, evaluate the anchor profile and surface cleanliness. If the surface cleanliness and anchor profile meet specification requirements, recoating of the tank can be performed. If surface cleanliness and/or anchor profile do not meet the requirements of this specification, prepare the surface in the manner specified to obtain the required anchor profile and freedom from surface contaminants.
- B. For caustic based strippers, use pH paper to check the tank surface after removal of the chemical stripper and existing coating system. Failure to properly clean and neutralize the surface can result in an alkaline residue remaining on the tank surface. If the surface pH is not neutral (pH of 7.0 to 7.5), flush the surface with potable water or approved neutralizing agent until a neutral surface pH is achieved.

- C. Notify the Engineer a minimum of 48 hours in advance of the initiation of the chemical stripper removal process in order for the Engineer to be present. The manufacturer's representative is required to be on site during the initial removal process.
- D. Install tarpaulins or similar containment materials on the ground surface immediately under and adjacent to the area of the tank where the coating system is to be removed as described in Contractor's submittals and acceptable to the Engineer. Install the tarps in a watertight manner as to completely contain all materials and liquids from chemical stripper application, removal, neutralization and rinsing of the tank surface. Consider all resulting waste hazardous and handle as such. Extend the watertight tarps a minimum of twenty feet beyond the outer perimeter of the tank.
- E. Apply chemical strippers to the tank surface in accordance with the manufacturer's recommendations for coverage, contact time, removal and surface cleaning.
- F. For caustic based strippers, unless an inhibitor is recommended by the chemical stripper manufacturer and acceptable to the coating manufacturer, wash the surface after neutralization.

3.05 COATING APPLICATION

- A. Apply coating to the standards represented in the SSPC Painting Manual, Volume 1, "Good Painting Practices" and manufacturer's recommendations for paint application procedures.
- B. Use coating application equipment consistent with the coating manufacturer's recommendations. Supply air free from oil and moisture when tested in accordance with ASTM D 4285.
- C. All mixing and thinning of coatings to be in accordance with manufacturer's recommendations.
- D. Only compatible solvents recommended by the coating manufacturer will be used for thinning and clean up.
- E. Strictly adhere to the re-coat intervals recommended and supplied by the coating manufacturer.
- F. Do not coat any cleaned surface if "rust bloom" or recontamination has occurred. The Engineer to approve cleaned surfaces prior to application of coating.
- G. The Engineer spot checks surfaces to ensure conformance. At Contractor's expense, re-prepare surfaces not found to meet specifications.
- H. All painted surfaces to be free from all dust, dirt and contamination before succeeding coats are applied. The Engineer to approve each coat of paint before succeeding coats are applied.
- I. All environmental (ambient) conditions to satisfy manufacturer's recommendations before coatings are applied.

- J. All coats to be free of runs, drips, sags and holidays or other discontinuities. The finish is to be uniform.
- K. Dry film thicknesses of all coats to conform to minimum and/or maximum thicknesses required by these specifications. Measure all dry film thicknesses in strict accordance with SSPC-PA2.
- L. Interior – Prior to application of primer and prior to application of intermediate coat, brush stripe coat all welds, rivets, corners, edges, crevices and uniformly pitted surfaces. Brush stripe coat rough pits, depressions, and crevices to work in coatings. Do not thin stripe coats in excess of that recommended by the manufacturer.

For rehabilitation of an existing tank:

- 1. Fill weld “deep pits” and grind flush at the direction of the Engineer. Payment to be at the unit price bid for "Extra 6-inch Diameter Floor Patches".
 - 2. Moderately and badly pitted surfaces may exceed specified limits on the anchor profile. The primer coat dry film thickness must be sufficient to adequately cover the anchor profile.
- M. Exterior - All welds, rivets, corners, edges and irregular surfaces are to be stripe coated as part of the first coat application. Brush stripe coat pits, depressions and crevices to work in coating. Apply coating by brush or roller, using manufacturers’ recommended thinner (if applicable) for the application method selected. **NO SPRAY PAINTING ON EXTERIOR SURFACES AT TANK SITES WILL BE PERMITTED WITHOUT THE USE OF CONTAINMENT SCREENS AND APPROVAL OF ENGINEER.**
- N. When more than one coat is to be applied, each coat should have a distinguishable color from the preceding and following coats. Note that stripe coating is considered to be part of the first coat application.
- O. Exterior surface preparation and priming of all metal tank appurtenances to be in accordance with this specification. Intermediate and finish coatings to be the same as those of adjacent surfaces.
- P. Pipe and Fittings
 - 1. For elevated tanks, prepare the external surface of new and existing piping and fittings within the "dry" tank pedestal with the same surface preparation and coating system as the interior of the tank pedestal.
 - 2. Prepare new above ground piping and fittings with the same surface preparation and coating system as specified for tank exterior.
 - 3. Prepare existing above ground piping and fittings connected directly to the tank with the same surface preparation and coating system as specified for tank exterior. Limit this to

exposed portions of piping at inlets/outlets and to the nozzle of the adjacent tank on interconnect lines. Additional limits of yard piping are indicated on the plans.

- Q. Prepare and coat inaccessible interior surface of roof plate and rafters as follows:
1. For new tank construction, prepare inaccessible surfaces, such as interior surface of roof plate and rafters, with specified surface preparation. Prime coat prior to erection. Apply a minimum of two additional full coats prior to final placement. Surface preparation and prime coat application may be conducted off-site. Follow inspection of shop blasting and painting in accordance with this specification. Follow the recoat intervals recommended by the manufacturer.
 2. For repair of existing tanks, prepare all inaccessible interior surfaces of roof plate and rafters to be installed with specified surface preparation and a minimum of two full coats prior to final placement.
- R. Jack the roof plate/rafter interfaces, which are not accessible for surface preparation and coating work, off the rafters to facilitate blasting and coating the tops of rafters and the roof plate. Move wedges used to hold the roof plate off the rafters as required so that all areas between the rafters and roof plate are blasted and coated.
- S. For wet surfaces, including immersion and condensation zones, maintain a constant positive flow of dehumidified air, with adequate circulation across the finish coat for a period of ten (10) days, minimum. Evacuate solvent from the bottom of the tank. Forced or induced airflow may be required. Any accelerated curing procedure must be recommended in writing by the manufacturer and approved by the Engineer.
- T. Repair damaged areas in galvanized coating as follows:
1. Interior surfaces require a NSF approved cold galvanizing component.
 2. Mechanical exterior damage to be prepared by hand tool (SP-2) or power tool (SP-3) spot cleaning and to be spot coated with an organic zinc coating approved by the Engineer.
 3. Prepare damaged areas exhibiting red rust to bare metal (SP-11) and coat with an inorganic zinc coating approved by the Engineer.
- U. Coatings work will be permitted during daylight hours only unless arrangements or permission has been granted in writing.

3.06 PROTECTION OF SURFACES

- A. Unless otherwise specified, painting will not be required on the following items:
1. Exposed surfaces of Aluminum

2. Polished or finished Stainless Steel
3. Nickel, Monel, Copper, Bronze, Lead or Brass
4. Rubber and plastic including Fiberglass Reinforced Plastics
5. Chromium plated surfaces

- B. If Contractor applies paint to or causes damage to surfaces to be protected or unspecified surfaces, removal of coating, repair or replacement of item is required.
- C. Protect all surfaces, which are not to be painted, from overblasting, spraying, over spray, spatters, or spillage of paint.

3.07 PAINT SYSTEM IDENTIFICATION

- A. Tank Label:

Stencil (or use ready-to-apply decals) the information below to the side of the tank near the flush clean-out door for GST and the access door for EST about 3 feet from the ground after completion of the painting operation. Letters are to be 0.75 inches in height, the color is to be black and material is to be compatible with finish coat:

1. Date of coating application. Completion [month/year]
2. General Contractor, Painting Contractor
3. Interior coating system supplier and product number(s). Surface Preparation, Prime Coat, Intermediate Coat, Finish Coat, Caulking
4. Exterior coating system supplier and product number(s). Surface Preparation, Prime Coat, Intermediate Coat, Finish Coat

3.08 INSPECTION, TESTING, RECORD KEEPING

- A. Schedule and coordinate work with the Engineer to allow for expeditious inspection by the City or designated representative, including the use of ladders, scaffolds, lighting and swingstages to provide regular access for inspections.
- B. All surfaces ready to receive a coating must be approved by the Engineer before the application of the next succeeding specified coat. If the Contractor proceeds without such approval, he may, at the direction of the Engineer, be required to remove and/or recoat all such work at no additional cost to the City.
- C. Measure wet film thickness at least once every thirty (30) minutes to make certain that proper

film thickness is being achieved. More frequent checks may be required by the Engineer at his direction.

- D. Test all tank interior coated surfaces under the direction of the Engineer for nicks, scrapes and/or pinholes in the coating film using a low voltage, wet sponge holiday detector for thin film coating (<20 mils) and high voltage holiday detector for thick film coating (>20 mils). Perform holiday detection in accordance with NACE RP0188-90: "Discontinuity (Holiday) Testing of Protective Coatings." Correct any deficiencies to the satisfaction of the Engineer.
- E. Record temperature, humidity, and dew point on a log including date and time reading obtained. Obtain a minimum of three such readings on days of coating application. The format for these records is presented in Table 3, "Daily Coating Summary Report" included in this Section. Enter the records into a Windows compatible file such as Quatro Pro or Excel and submit a hard copy with monthly pay requests for those months when coatings are applied. Furnish the Engineer with a 3-1/2" disk containing the complete coating summary report for the project at the end of the project, or in the interim, if requested.
- F. Paint films showing sags, checks, blisters, teardrops, curtains, fish eyes, or fat edges will not be accepted. Entirely remove films exhibiting any of these defects and recoat the surface at no additional cost to the City.
- G. Inspect blasted steel surfaces by the Engineer using SSPC-Vis 1-89, "Visual Standard for Abrasive Blast Cleaned Steel", or NACE TM-0175-75 for new steel.
- H. Demonstrate surface profile conformance to the specifications by obtaining average results of a minimum of ten (10) equally spaced anchor profile determinations per 1000 square feet. Employ at the discretion of the Engineer, ASTM D 4417 "Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel" Method A, B or C. ASTM D 4417 Method C shall be employed to resolve any dispute. The average reading to be between 2.0 mils and 3.0 mils. Any individual profile point less than 1.5 mils or greater than 4.0 mils will be cause for rejection of the anchor profile. Rejected areas are to be reblasted to correct profile.

3.09 FINISH SCHEDULE

- A. A list of the tanks to be coated is presented in Table 2, "Surface Preparation and Finish Schedule" at the end of this section. Table 2 contains the required pre-cleaning procedures, the degree of surface preparation and coating system schedule for the interior and exterior of the various tanks.
- B. Utilize the following legend for TABLE 2 "Surface Preparation and Finish Schedule":
 - 1. Prior to abrasive blasting, degrease oily residue using steam cleaner and/or water blaster. Check with black light and reclean if necessary. Check the pH of the surface for neutrality if an emulsifying type degreaser is used.
 - 2. Prior to abrasive blasting, perform Solvent Cleaning (SSPC-SP-1-82) to remove oil, grease and other detrimental foreign contaminants for interior and/or exterior surfaces.

3. Power Tool Clean (SSPC-SP-3-82) any new welds, flame cut surfaces, buckshot and/or weld splatter associated with tank repairs, modifications and other new work.
4. Perform Near White Blast Cleaning (SSPC-SP10 - NACE No. 2) of all interior tank surfaces unless otherwise noted in the Finish Schedule. Achieve an AVERAGE of 2.0 mils to 3.0 mils with no individual reading greater than 4.0 mils or less than 1.5 mils for anchor profile on abrasive blasted surfaces.
5. Perform Near White Blast Cleaning (SSPC-SP10 - NACE No. 2) to the exterior surfaces. Achieve an AVERAGE of 2.0 mils to 3.0 mils with no individual reading greater than 4.0 mils or less than 1.5 mils for anchor profile on abrasive blasted surfaces.
6. Perform Commercial Blast (SSPC-SP6 - NACE No. 3) on all exterior surfaces. Achieve an AVERAGE of 2.0 mils to 3.0 mils with no individual reading greater than 4.0 mils or less than 1.5 mils for anchor profile on abrasive blasted surfaces.
7. Perform Brush-Off Blast (SSPC-SP7 - NACE No. 4) on all exterior surfaces to remove poorly adhering coatings, mildew, dirt, soil and other detrimental foreign contaminants. Use of TSP or equal will improve cleaning effectiveness.
8. Spot Repair by hand sanding and/or power tool cleaning any pinholed coatings, damaged coatings and/or rust spots. All repair areas are to be feathered into adjacent painted areas using the appropriate paint system specified for the applicable interior or exterior of the tank.
9. Three (3) Coat Interior Polyamide Epoxy Paint System having ANSI/NSF 61 approval for potable water service. Each coat in alternating colors.
 - a) The total coating system to have a nominal dry film thickness of 10 mils to 16 mils.
 - b) Each primer and intermediate coats to have a nominal 3 to 5 mils DFT. Finish coat to have a nominal 4 to 6 mils DFT.
 - c) All DFT measurements are to be performed in accordance with SSPC-PA2 and represent the DFT, corrected for magnetic base readings.
10. Two (2) Coat Interior Polyamide Epoxy Paint System having ANSI/NSF 61 approval for potable water service. Each coat a different color.
 - a) The total coating system to have a nominal dry film thickness of 7 mils to 11 mils.
 - b) Primer coat to have a nominal dry film thickness of 3 to 5 mils, and for the finish coat, 4 to 6 mils.
 - c) All DFT measurements are to be performed in accordance with SSPC-PA2 and represent the DFT corrected for magnetic base readings.
11. Interior Epoxy Caulk Material to be EPA and FDA approved for potable water service such as Raven Lining Systems A-7. Apply caulk material to surfaces which have received

- a Near White Metal Blast (SSPC SP-10 - NACE No. 2). Apply caulk in a smooth and continuous manner, overlapping material at least one inch on each side of seam to be caulked. Caulk to be at least 30 mils thick at centerline of seam. After material has cured but prior to application of any coating, lightly scarify the surface of the caulk material. Caulk material is not to be applied to continuous weld seams except as required to fill deep weld undercuts. The 1.0 inch overlap does not apply for deep pit repairs or undercuts.
12. Three (3) Coat Exterior Epoxy/Epoxy Urethane Paint System. Intermediate color to compliment topcoat color selected by the City.
- a) The total coating system to have a nominal dry film thickness of 9 to 12.5 mils.
 - b) Primer coat to have a nominal dry film thickness (DFT) of 3 to 4.5 mils. Intermediate coat to have a nominal 4.5 to 6 mils DFT. Finish coat to have a nominal 1.5 to 2 mils DFT.
 - c) All field coats to be brush or roller applied. **SPRAY APPLICATION ON SITE REQUIRES APPROVAL OF CITY AND USE OF CONTAINMENT SCREENING.**
 - d) All DFT measurements are to be performed in accordance with SSPC-PA2 and represent the DFT adjusted for magnetic base readings of abrasive blast cleaned steel.
13. Two (2) Coat Exterior Epoxy /Urethane Paint System. Intermediate color to compliment topcoat color selected by the City.
- a) Total coating system to have a nominal dry film thickness of 6 to 8 mils.
 - b) Primer coat to have a nominal 4.5 to 6 mils DFT. Finish coat to have a nominal 1.5 to 2 mils DFT.
 - c) All field coats to be brush or roller applied. **SPRAY APPLICATION ON SITE REQUIRES APPROVAL OF CITY AND USE OF CONTAINMENT SCREENING.**
 - d) All DFT measurements are to be performed in accordance with SSPC-PA2 and shall represent the DFT adjusted for magnetic base readings of abrasive blast cleaned steel.
14. Two (2) Coat Exterior Silicone Alkyd Paint System
- a) Prime all blasted and repaired areas with one coat of Alkyd Primer having a nominal DFT of 3 to 4.5 mils.
 - b) Apply full Silicone Alkyd Finish Coat having a nominal DFT of 2.5 to 4 mils.
 - c) Total coating system to have a nominal 5.5 to 8.5 mils DFT.
 - d) All field coats to be brush or roller applied. **SPRAY APPLICATION ON SITE REQUIRES APPROVAL OF CITY AND USE OF CONTAINMENT SCREENING.**
 - e) All DFT measurements are to be performed in accordance with SSPC-PA2 and represent the DFT adjusted for magnetic base readings for abrasive blast cleaned steel.
15. Interior 100% Solids, Plural Component Paint System having ANSI/NSF 61 approval for potable water service.

- a) Total coating system to have a minimum nominal dry film thickness of 20 to 25 mils.
 - b) Apply coating in one or two coats, as recommended by the manufacturer.
 - c) All DFT measurements are to be performed in accordance with SSPC-PA2 and shall represent the DFT corrected for magnetic base readings.
 - d) Application to be in strict accordance with the manufacturer's published requirements.
 - e) The use of dehumidification may be waived by the City when this system is utilized. Maintain surface cleanliness to ensure no coatings are applied over contaminated, rust blooms or otherwise discolored surfaces as specified elsewhere in these documents. Use ventilation equipment as required by the manufacturer to maintain a safe working environment.
16. Non-Skid Walk-way
- a) GST – Provide three-foot wide safety/skid resistant roof walkway. Coating to be compatible with specified external prime coat coating system and applied to a properly cleaned surface. Spread crushed walnut shells or aluminum oxide on intermediate coat while still tacky to achieve a coarse textured finish. After this coat has cured, sweep all loose shells or grit from surface and apply finish coat. Finish coat paint color to be a contrasting shade to the roof color. For galvanized tanks, do not blast but clean according to SP-1. Apply one coat of wash primer, then apply skid resistant material.
 - b) EST – Provide safety/skid resistant walkway, as above, inside the handrail area on the tank roof.
17. Concrete Surfaces
- a) Prior to application of specified system, pressure wash all surfaces to remove all dirt, laitence efflorescence and other non-cementitious material.
 - b) Prepare concrete, masonry units, brick and plaster surfaces by removing efflorescence, chalk, dust, dirt, grease and oils and by roughening the surfaces as required to remove glaze. High pressure water, 4,000 psi minimum at 2.5 gallons/minute minimum, with or without abrasive injection, will be used to remove poorly adherent or "powdery" existing paint.
 - c) Determine the alkalinity and moisture content of the surfaces. Where the alkalinity exceeds the paint manufacturer's recommendations for application of the paint, correct the condition in accordance with the paint manufacturer's recommendations. Do not apply paint to surfaces while the surface moisture content exceeds the paint manufacturer's moisture content limitations
18. Continuous tank ventilation system must be able to prevent the vapor concentration from reaching the TLV (threshold limit values) of exposure to the solvent(s) used in accordance with the TLV values published by the American Conference of Governmental Industrial Hygienists, 1991-1992 edition.

19. Inspect galvanized sheets for white rust deposits prior to erection. Clean any white rusted areas by the use of a water and scrub brush technique. Measure the coating thickness in accordance with ASTM E 376-69. Any thickness less than 3.0 mils may be cause for rejection of the plate.
20. On ground storage tanks with aluminum domes, apply 20 mils of Ameron 487 elastomeric polyurethane coating, or equivalent, to the top of the wind girder, exterior shell of the tank under the aluminum flashing at the wind girder, and lap 6" over the top edge of the shell inside the tank.
21. Apply 20 mils DFT nominal/16 mils minimum Corrocote II PW, 100% solids as manufactured by Madison Chemical Industries. Surface preparation to be in accordance with Manufacturer's published instructions.

3.10 SCHEDULING

- A. Perform painting work according to the contract construction schedule as required in Section 01330 - Submittal Procedures.
- B. Scheduling not to supersede temperature, humidity or other environmental requirements for coatings application included in these specifications.
- C. Coordinate work of other trades and provide conditions for neat, clean, dust-free work.

3.11 SITE CLEAN-UP

The Contractor to maintain the construction site in a neat and orderly manner throughout the duration of the project.

TABLE NO. 1
"COATING PRODUCTS"

<u>Coating System</u>	<u>Coating Manufacturer</u>	<u>Primer Coat</u>	<u>Intermediate Coat</u>	<u>Finish Coat</u>
<u>Tank Interior</u>				
3 Coat Polyamide/ Polyamine Epoxy	ACRO	4460	4460	4460
	CARBOLINE	891	891	891
	VALSPAR	32 SERIES	32 SERIES	32 SERIES
	TNEMEC	SERIES 20	SERIES 20	SERIES 20
	SHERWIN-WILLIAMS	TANK CLAD HS	TANK CLAD HS	TANK CLAD HS
2 Coat Polyamide Epoxy	ACRO	4460		4460
	CARBOLINE	891		891
	VALSPAR	32 SERIES		32 SERIES
	TNEMEC	SERIES 20		SERIES 20
	SHERWIN-WILLIAMS	TANK CLAD HS		TANK CLAD HS

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2 Coat 100% Solids Plural Component RAVEN AQUATAPOXY A-6

Tank Exterior

3 Coat Epoxy/ Epoxy Polyurethane	ACRO CARBOLINE VALSPAR TNEMEC SHERWIN-WILLIAMS	4422 893 32 SERIES SERIES 20 Recoatable Epoxy Primer	4460 890 or 893 32 SERIES SERIES 20 Macropoxy 646	4429 134 HS or 134 HG V40 SERIES SERIES 74 HI-SOLIDS Polyurethane
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3 Coat Silicone Alkyd	ACRO CARBOLINE VALSPAR TNEMEC SHERWIN-WILLIAMS	1144 RUSTARMOR 29 U-13 F-28 SERIES 37H KEM BOND HS	2214V SUBSIL 30 HS 20-W-9 SERIES 2H STEELMASTER 9500	2215V SUBSIL 30 HS 21 SERIES SERIES 82 STEELMASTER 9500
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2 Coat Silicone Alkyd	ACRO CARBOLINE VALSPAR TNEMEC SHERWIN-WILLIAMS	1104 RUSTARMOR 29 13-R-89 SERIES 37 H KEM BOND HS		2215V SUBSIL 30 HS V-20 SERIES SERIES 82 STEELMASTER 9500
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Coating System

<u>Coating Manufacturer</u>	<u>Primer Coat</u>	<u>Intermediate Coat</u>	<u>Finish Coat</u>
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Skid Resistant Epoxy/ Polyurethane	ACRO CARBOLINE VALSPAR TNEMEC SHERWIN-WILLIAMS	4422 890 32 SERIES SERIES 20 Recoatable Epoxy Primer	4460 890 32-SERIES SERIES 20 Macropoxy 646	4429 134 HS V-40 SERIES 74 HI-SOLIDS Polyurethane
------------------------------------	--	---	--	--

Skid Resistant Silicone Alkyd	ACRO CARBOLINE VALSPAR TNEMEC SHERWIN-WILLIAMS	1104 RUSTARMOR 29 V-13 F-28 SERIES 37H KEM BOND HS	2214V RUSTARMOR 29 20-W-9 SERIES 2H STEELMASTER 9500	2215V SUBSIL 30 HS 21 SERIES SERIES 82 STEELMASTER 9500
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Special Service

Pitted Surfaces Internal	RAVEN LINING SHERWIN-WILLIAMS	AQUATAPOXY A-6 Steel Seam Trowel Grade		AQUATAPOXY A-6
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Concrete Surfaces

Internal	ACRO CARBOLINE VALSPAR SHERWIN-WILLIAMS	4460 891 32 SERIES TANK CLAD HS	4460 891 32-SERIES TANK CLAD HS	4460 891 V-40 TANK CLAD HS
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CITY OF HOUSTON
STANDARD SPECIFICATION

**PAINTING AND PROTECTIVE
COATINGS FOR POTABLE
WATER STORAGE TANKS**

Exterior Above Grade	ACRO CARBOLINE VALSPAR SHERWIN-WILLIAMS	4453 3359 CRETE/GARD II METALATEX	4460 3359 CRETE/GARD II METALATEX	4429 3359 CRETE/GARD II METALATEX
Interior Flexible Caulking	RAVEN LINING	AQUATAPOXY A-7		

TABLE NO. 2
SURFACE PREPARATION AND FINISH SCHEDULE

Tank	INTERIOR			EXTERIOR			
	Surface Preparation	Paint System	Additional Work Items	Surface Preparation	Paint System	Additional Work Items	Comments

Notes:

1. See Table 1 "Coatings Products" for allowable coating manufacturers and products.
2. See Paragraph 3.09 B. "Finish Schedule" for description of items listed in this table.

**TABLE NO. 2
SURFACE PREPARATION AND FINISH SCHEDULE**

Tank	INTERIOR			EXTERIOR			
	Surface Preparation	Paint System	Additional Work Items	Surface Preparation	Paint System	Additional Work Items	Comments
East Water Purification Plant No. 1 GST-3	1, 2, 3, 4	9		1, 2, 3, 5	12	16a	
East Water Purification Plant No. 1 GST-4	1, 2, 3, 4	9		1, 2, 3, 5	12	16a	
East Water Purification Plant No. 1 GST-7	1, 2, 3, 4	9		1, 2, 3, 5	12	16a	
East Water Purification Plant No. 1 GST-8	1, 2, 3, 4	9		1, 2, 3, 5	12	16a	

	INTERIOR (Wet/Dry)			EXTERIOR			
	Surface Preparation	Paint System	Additional Work Items	Surface Preparation	Paint System	Additional Work Items	Comments
East Water Purification Plant No. 1 Valve Pit A				1, 2, 3, 5	12		
East Water Purification Plant No. 1 Valve Pit B				1, 2, 3, 5	12		

Notes:

1. See Table 1 "Coatings Products" for allowable coating manufacturers and products.
2. See Paragraph 3.09 B. "Finish Schedule" for description of items listed in this table.

**TABLE NO. 3
DAILY COATING SUMMARY REPORT**

DAILY COATING SUMMARY

WATER PROJECT NO. _____
PLANT SITE: _____
CONTRACTOR: _____

SAMPLE REPORT

ENGINEER: _____

LOCATION	SURFACE PREP.			COATING MATERIAL			COATING THICKNESS			ENVIRONMENTALS				COMMENTS	
	OPERATION	NACE-2	PROFILE	MATERIAL	METHOD	BATCH NO.	SPEC.	RANGE	METHOD	DRY BULB	WET BULB	REL HUMIDITY	DEW POINT		SURF TEMP
<u>DISTRICT 1 WP</u>															
GST 1 Interior Floor															
12/15/99	B&P	X	2.3	ACRO 4460	AIRLESS	11122 11216C	3-5	8-12	WFT	69	63	72	59	67	SLING
GST 1 Interior Shell															
12/8/99	B&P	X	2.4	ACRO 4422	AIRLESS	11114 11114A	3-4	6-8	WFT	60	54	68	49	62	SLING
GST 1 Interior Roof															
12/1/99	B&P	X	2.3	ACRO 4460	AIRLESS	11122 11216C	3-5	8-12	WFT	69	63	72	59	67	SLING
GST 1 Exterior Roof															
12/21/98	B&P	X	2.5	ACRO 4422	AIRLESS	11114 10927A	3-4	3-6	DFT	65	53	44	42	66	SLING
GST 1 Exterior Shell															
12/28/98	B&P	X	2.5	ACRO 4422	AIRLESS	11114 10927A	3-4	3-6	DFT	65	53	44	42	66	SLING

END OF SECTION

Section 10001

BAFFLE CURTAIN SYSTEM

PART 1 GENERAL

1.01 SCOPE

- A. Provide a diversion Baffle Curtain System as detailed which is custom fabricated and includes all related hardware to properly install the baffles and attach them to the ceiling, floor, and wall in the welded steel ground storage tank. The system will be designed to withstand chlorine, extreme temperatures, rips abrasion and hydraulic shock.
- B. The curtains shall be custom designed for the specific length, depth of the tank to achieve the desired flow pattern. The position of the baffle will be maintained by a ¹/₄ inch stainless steel cable enclosed in a two-ply hem around the perimeter of each curtain. No gluing or stitching of material will be required. All welds will be 2 inch wide. All materials will be NSF 61 approved.

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Fabrication and for layout drawings:
 - a. Submit, for Engineer's approval, shop drawings, showing curtain sheet layout with proposed size, number, position, and sequence of placing all factory-fabricated sheets and indicating the location of all field joints and the direction of shop joints on each sheet. Shop drawings shall also show complete details and/or methods for anchoring the baffle to the tank, making field joints, supports, seals at structures, etc.
 - b. Technical data concerning physical and chemical properties of Material.

1.03 STORAGE AND PROTECTION

- A. Materials shall be stored and protected from ultraviolet light exposure, precipitation, or other inundation, mud, dirt, puncture, cutting, or any other damaging or deleterious conditions.

1.04 QUALITY ASSURANCE

- A. If required, the manufacturer shall provide written certification to the Engineer, that all of the equipment furnished complies with all applicable requirements of these specifications, and have been in use in similar applications for a minimum of five years.

1.05 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for baffle fabrications under this section. Include payment as part of the work in appropriate sections.
- B. Refer to Section 01270 — Measurement and Payment
- C. Stipulated Price (Lump Sum). If the contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The Baffle listed as the standard for quality is the Clearwell Curtain as manufactured by ThermaFab, Inc. 87 Pascon Court, Gaston, S.C., 29053, Phone: 866-960-5853.
- B. All others must be pre-approved, and have at least 20 years of experience in the manufacture of Clearwell curtains for water treatment applications.

2.02 CONSTRUCTION MATERIALS

A. MATERIAL:

1. 2-ply construction with scrim fabric totally encapsulated between two (2) layers of polypropylene compound.
2. Furnish a flexible, durable, watertight composite material free of pinholes, blisters, holes, and contaminants which will not delaminate in a water environment.
3. The baffle curtain material shall be 8130 XR-3PW Elvaloy based coated polyester reinforced geomembrane as manufactured by the SEAMAN Corporation. Wooster, Ohio. The Material should have NSF61 approval and the following physical specifications.

Base (Type)	Polyester
Fabric (Weight)	6.5 oz./sq.yd.
Finished Coated Weight (ASTM D751)	30+/- 2oz./sq.yd.
Trapezoid Tear (ASTM D1117)	35/35 lbs. min
Grab Yield Tensile (ASTM D751)	550/550 lbs. min
Adhesion-Dielectric Weld (ASTM D751)	10 lbf/ in
Hydrostatic Resistance (ASTM D751)	800 psi. min.
Bursting Strength (ASTM D 751 Ball Tip)	650 lbs. min.(800 lbs. typical)
Dead Load (Mil-T-52983 E Modified)	210 lbs. min. @ room temp 105 lbs. @ 160° F.

4. Material shall be NSF certified for use in public drinking water supply system.

B. CEILING CONNECTION

1. Baffle shall be secured to the ceiling with stainless steel plates on 48 inch centers on the top (both sides of baffle) with 3/8 inch stainless steel bolts for attaching the top of the baffle to the ceiling as shown on the drawing. Anchor bolts, hardware, and fasteners shall be 316 SS.

C. FLOOR AND WALL CONNECTION

1. Baffle shall be secured to the floor and walls with a 2 inch x 2 inch x 1/4 inch stainless steel clip (provided by Other) bolted through a #4 stainless steel grommet with a 3/8 inch nut and bolt every 12 inches on center. Provide 3/8 inch polypropylene rope in a double hem on the ends of the baffle, behind the stainless steel clip on the floor and walls. Anchors shall be 316 SS.

D. ROOF CONNECTION

1. Baffle shall be secured to the dome with 2 inch x 2 inch x 1/4 inch stainless steel clip (provided by Other) with 1/4 inch stainless steel cable and 1/4 inch stainless steel cable clamps to suspend the baffle from the roof.

2.03 FABRICATION

- A. Design for the specific length and depth of the tanks as shown on the Contract Drawings.
- B. Factory fabricate all membrane components for the baffles. Field seaming will not be permitted.
- C. Provide a 2-inch wide 2-ply hem on all edges of the baffle curtains for anchoring purposes.
- D. Grommets shall be #4 Stainless Steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Membrane curtains shall be installed in the positions shown on the Contract Drawings.
- B. Install in accordance with the manufacturer's drawings, instructions and Recommendations.

3.02 PROTECTION

- A. Protect baffle system from damage until work has been accepted. Repair damage to baffles at no additional cost to the City.

3.03 WARRANTY

- A. Submit manufactures warranty for 12 months from date of substantial completion.

END OF SECTION

SECTION 13202S

REHABILITATION OF WELDED STEEL
WATER STORAGE TANKS

The following supplement modifies Specification Section 13202. Where a portion of the specification is modified or deleted by the Supplementary Specification, the unrelated portions of the Specification shall remain in effect.

1.02 MEASUREMENT AND PAYMENT:

A. Delete Paragraph A in its entirety and replace with the following:

- A. No separate measurement and payment for work performed under this Section except as indicated in section 1.02 B through 1.02 G. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.

F. Delete Paragraph F in its entirety and replace with the following:

- F. Measure "extra 6-inch diameter floor and roof patches including welding in place and grinding smooth" by each patch. Pay for "extra 6-inch diameter floor and roof patches including welding in place and grinding smooth" by unit price bid per each.

G. Add the following Paragraph G:

- G. Measure "Crow's Nest" by each. Pay for "Crow's Nest", including materials, labors, welding and installation by the unit price bid per each.

END OF SUPPLEMENT

Approved By:

Sonny Do, P.E.
Acting Assistant Director
Water Engineering Section
Engineering and Construction Division

Date

SECTION 13202

REHABILITATION OF WELDED STEEL
WATER STORAGE TANKS

PART 1 GENERAL

1.01 SECTION INCLUDES

Fabricate materials and make repairs to steel water storage tanks.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Section except as indicated in section 1.02 B and 1.02 C. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.
- B. Measure "extra shell plates, all sizes, all thickness, including removal and disposal of old plates" by pounds, complete in place. Pay for "extra shell plates, all sizes, all thickness, including removal and disposal of old plates" by unit price bid per pound.
- C. Measure "extra floor plates, all sizes, all thickness, including sand fill, including removal and disposal of old plates and underlying fill" by pounds, complete in place. Pay for "extra floor plates, all sizes, all thickness, including sand fill, including removal and disposal of old plates and underlying fill" by unit bid per pound.
- D. Measure "extra roof plates, all sizes, all thickness, including removal and disposal of old plates" by pounds, complete in place. Pay for "extra roof plates, all sizes, all thickness, including removal and disposal of old plates" by unit price bid per pound.
- E. Measure "extra roof rafters, and clips including removal and disposal of old members" by pounds. Pay for "extra structural members, roof rafters, and all supporting structures, all shapes, all sizes including removal and disposal of old members" by unit price bid per pound.
- F. Measure "extra 6-in. diameter floor patches including welding in place and grinding smooth" by each patch. Pay for "extra 6-in. diameter floor patches including welding in place and grinding smooth" by unit price bid per pound.

1.03 REFERENCES

- A. AWWA D 100 - Standard for Welded Steel Tank for Water Storage
- B. AWWA B 300 – Standard for Hypochlorites
- C. AWWA C 207 – Standard Specification for Steel Pipe Flanges
- D. AWS B 3.0-77 – Standard for Welding Procedures and Performance Qualification
- E. API 650 – Standard for Welded Steel Tank for Oil Storage
- F. API 653 – Standard for Tank Inspection, Repair, Alteration and Reconstruction
- G. ASTM A 307 – Standard for Carbon Steel Bolts and Studs
- H. ASTM C 509 – Standard Specifications for Elastomeric Cellular Performed Gasket and Sealing Material

1.04 SUBMITTALS

- A. Submittal Drawings and Calculations:
 - 1. Dimensioned, easily readable, and adequately referenced.
 - 2. Plan view, elevation view, and sectional views as necessary.
 - 3. Location, size, and type of all wall and roof penetrations.
 - 4. Location and size of all piping, connections, and appurtenances.
 - 5. Fabrication details and details of all connections.
 - 6. Aluminum dome drawings and calculations, prepared and sealed by a Professional Engineer licensed in the State of Texas.
 - 7. Material specifications (ASTM designation) and code or standards references.
 - 8. Describe AWS welding procedure proposed for full penetration welds. Indicate welding process, degrees of bevel and root dimension.
- B. Test Reports: Furnish mill test reports.

C. Aluminum Dome

1. Drawings describing the completed structure and all its components shall be submitted, complete with materials of construction and typical details, and accompanied by a Certificate of Design.
2. Records certifying the satisfactory inspection of all welds of aluminum structural components shall be submitted prior to delivery of the fabricated materials.

1.05 DESIGN REQUIREMENTS

- A. Design, fabricate, erect, and test in accordance with "AWWA Standard for Welded Steel Tanks for Water Storage" (AWWA D100), except as modified herein. Minimum plate thickness and size of structural members are shown on the drawings.
- B. Design in accordance with Section 14 of AWWA D100 will **not** be acceptable.
- C. Comply with applicable OSHA Rules and Regulations.
- D. Modifications and repairs shall conform to American Petroleum Institute=s (API) Standard 653 - Tank Inspection, Repair, Alteration, and Reconstruction, where possible.
- E. Aluminum Dome Retrofit Design:
 1. The dome supports are to be attached directly to the top of the tank. Attachment points utilizing slide bearing, low friction pads are not acceptable.
 2. The entire dome structure shall be designed to sustain the loads specified herein, with allowable stresses as defined in AWWA D100.
 3. The load cases to be considered shall be those described below unless more severe loads are specified by the purchaser.
 - a. Dead Load - the dead load shall be defined as the weight of the structure and all material permanently attached to and supported by the structure.
 - b. Live Load - The uniform live load shall be 15 psf.
 - c. Unbalanced Live Load - An unbalanced load of one half of the uniform load applied to one half of the roof with no live load on the other half.
 - d. Wind Load - Wind pressure shall be designed for a wind load velocity of 110 mph from any direction. Horizontal pressures shall be considered to act concurrently with vertical pressures.
 - e. Load Combinations - The loads described above shall be applied to the dome

cover in the following combinations.

1. Dead Load
 2. Dead Load and Uniform Live Load
 3. Dead Load and Unbalanced Live Load
 4. Dead Load and Wind Load
 5. Dead Load, Uniform Live Load and Wind Load
 6. Dead Load, Unbalanced Live Load and Wind Load
- f. Temperature- The load combinations listed above shall be considered for a temperature change of 100 degrees F below the installation temperature and 100 degrees F above the installation temperature, and for a material temperature range of 40 degrees F below to 160 degrees F above zero.
- g. Panel Design Load - In addition to the above mentioned loads and load combinations, the aluminum panels shall be designed for a 250 pound load distributed over one square foot at any location and a plus or minus 60 psf load distributed over the entire area of any given panel. These loads are to be taken as acting separately, from one another and not simultaneously with other design loads.
- h. The dome designer shall be responsible for coordinating the design requirements for supporting the fixed domed roof on the existing tank shell, including the wind girder to be added. Consideration shall be given to vertical, radial and lateral forces from the fixed domed roof. Load eccentricities shall be considered. The type of connection between the roof and tank shell shall be fixed.
- i. Provide a positive seal at the roof/shell junction to close the gap at the top of the shell.
- j. The exterior wind girder shall be designed to not trap water or create any difficulties to clean and/or coat. All welds shall be seal welded.
- k. No earthquake load required.

F. Aluminum Dome Description (for tanks to receive retrofit):

1. The dome roof shall be clear-span from the periphery structure. The frame shall consist of aluminum structural members with the joints arrayed on the surface of a sphere. The arrangement of members shall result in a pattern of triangular spaces. These spaces shall

be closed with light gauge aluminum panels. The members shall be joined by means of bolting their flanges to aluminum gusset plates.

All metal components of the aluminum dome structure shall be aluminum or 300 series stainless steel. No galvanized, painted, or plated steel shall be used anywhere in the dome above the mounting bracket base plates. Dissimilar materials in the supporting structure shall be isolated from the aluminum dome by means of a compatible elastomeric gasket.

2. The entire structure shall be designed as a watertight system under all design load conditions. The design shall prevent water pooling at the joints through the use of a flanged hub cover.
3. The aluminum closure panels shall be attached continuously along their edges to the structural members by means of clamping bars which engage the panels in an interlocking joint. This clamping bar shall also secure an elastomeric weather seal gasket which shall form a continuous watertight seal along the panel edges. The use of panel attachment fasteners which penetrate both the panel and the flange of the structural member will not be accepted.
4. The exterior finish of aluminum geodesic domes shall be "Aluminum Association Nondirectional Textured, M42, Fine Matte Finish".
5. Acceptable aluminum dome manufacturers are:
 - a. Conservatek - Conroe, Texas
 - b. Temcor - Torrance, California
 - c. Ultraflote - Houston, Texas

1.06 QUALITY ASSURANCE

- A. Conduct performance tests to qualify welders and welding operators in accordance with AWS B3.0-77.
- B. Quality control for all welding shall be in accordance with AWWA D100:
 1. Field inspection by means of radiographs will be performed by the Owner at his direction and his cost.
 2. Radiographs will be performed as recommended by AWWA D100, Section 11.
 3. All areas found to be defective shall be repaired by the Contractor at his expense.
 4. Any retesting to check repaired areas will be paid for by the Contractor.

- C. Water required for additional leak test shall be at Contractor's expense.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structural and Other Metals: As per AWWA D100 and Aluminum Association "Specifications for Aluminum Structures".
- B. Accessories as shown on Plans include:
1. Exterior tank ladder, cage, roof hatch, vents, cathodic protection, interior ladder, handrails, drain penetrations, overflow and drain piping.
 2. Inlet, outlet, drain piping, and overflow pipe with funnels to be as shown on plans.
 3. Roof Vents:
 - a. Configuration and materials of construction as shown on plans. Vents are to be located between rafters.
 - b. Screens (16 mesh) are to be installed on all vents. Screens for all vents to be AISI 316 Stainless Steel with 50% opening area and stainless steel bands.
 4. Safety Handrails: Provide in accordance with plans.
 5. Overflow Assembly: Size and configuration per plans and welded per AWWA D100.
 6. Shell Clean Out Fittings: Provide flush type shell clean out fittings as shown on plans. Design and installation to be per AWWA D100 and API 650.
 7. Roof Hatches:
 - a. Install roof hatches as shown on plans. Roof hatches are to be located between rafters or aluminum dome grid support beams. Hatches are to be constructed from .09" aluminum.
 - b. All roof hatches shall be provided with a hinged cover and hasp for locking. The hatch opening shall have a curb at least 4-inches high, and the cover shall have a downward overlap of at least 2 inches.
 8. Piping Connections, Sumps and Drains:
 - a. Provide piping connections, sumps, and drains as shown on plans.

- b. For shell or roof penetrations less than 3 inches diameter, use 3000# half or full forged steel couplings for piping connections unless shown otherwise on Plans.
 - c. For shell or roof penetrations 3 inches in diameter or larger, use flanged nozzles. Reinforce shell or roof plate as required by AWWA D100 and API 650. All flanges to be flat face in compliance with AWWA C207, Class D.
 - d. Flush type drains and openings, where shown on plans, shall be designed and installed in accordance with API 650.
9. Foundation Sealant: Pad joints to be sealed with Gulf State No. 210 Mastic Sealant or equal.
10. Personal Safety Equipment
- a. For each tank constructed, provide two DBI/SALA model 2000 full-body, buckle-type harnesses (size XL), two DBI/SALA model L3300DP shock-absorbing lanyards, three foot length, and two safety climb connectors.

C. MATERIALS FOR ALUMINUM DOME:

The following is a summary of approved materials and/or materials specifications. All aluminum alloys shall be as defined by the Aluminum Association and published in the ALUMINUM STANDARDS AND DATA.

1. Bolts and Fasteners - All bolts and fasteners shall be 6061-T6 or 7075-T73 aluminum, or Series 300 stainless steel.
2. Plates and Sheets - Plate and sheet material shall be aluminum alloy 3003-H16, 3105-H154, 6061-T6 or 5052-H32; Aluminum Association M42, Fine Matte finish as fabricated. Structural gussets shall be 0.375" nominal minimum thickness. Aluminum sheet material shall be 0.050" thickness.
3. Structural Shapes - Aluminum structural shapes shall be alloy 6061-T6. The aluminum structural members shall be a minimum of 6" deep.
4. Miscellaneous Shapes - Miscellaneous aluminum shapes shall be allow 6061-T6 or 6063-T5.
5. Gaskets - All gaskets shall be Neoprene conforming to ASTM C509 or silicone, resistant to ozone and shielded from exposure to ultraviolet light.
6. Sealant - All sealants shall be resistant to ozone and ultraviolet light, and conform with Federal Specification TT-S-00230C.

7. Supports - The hinge pin assembly shall be constructed of 300 series stainless steel. No coatings are required on these pieces. The top mount gusset plate assembly shall be normal carbon steel. All points of connection between these plates and between the pieces and the tank shell shall be seal welded. This interface detail shall be coordinated between the dome manufacturer and the tank manufacturer.
 8. Safety Equipment for each dome (or approved equal):
 - a. Two DBI/SALA model 2000 full-body, buckle-type harnesses (size XL).
 - b. Two DBI/SALA model L3300DP shock-absorbing lanyards, three foot length.
 - c. Four DBI/SALA model LS1441 rope grabs for 5/8" dia. nylon rope.
 - d. Four lengths of 5/8" dia nylon safety rope. Two ropes to be used to repel from center roof bollard to wind girder and two ropes 25' in length.
 - e. Four DBI/SALA model L338 wire rope grabs for 3/8" dia. SST cable.
 - f. Three 3/8" dia. SST cables; one from platform to center bollard, two from center bollard to roof vents (secure cable at both ends).
 9. Dome Patch Kit:
 - a. 10- 6" x 6" patches (to be constructed from excess panel material)
 - b. Caulk (as required for the above patches)
 - c. Rivets (as required for above patches)
- D. Temporary Closures:
1. All material required for the closure and protection of tank inlet and outlet piping that is not to be removed shall be furnished and properly installed by the Contractor.
 2. Blind flanges for temporary closures to be per AWWA C207, Class B. Bolting to be per ASTM A307, Grade B. Gaskets to be 1/8-inch red rubber, full face and factory cut.
 3. Disinfectant to be calcium hypochlorite meeting the requirements of the AWWA "Standard for Hypochlorites" (AWWA B300).
 4. Water for flushing or disinfection of plant piping systems to meet the Texas Department of Health Standard for potable water.
 5. Chlorine neutralizing chemical (e.g. sulfur dioxide, sodium bisulfite, sodium sulfite, etc.), if required for residual reduction for heavily chlorinated water, are to be of grade and

analysis approved by the City.

PART 3 EXECUTION

3.01 JOINT FABRICATION

- A. Tank Shell: Butt Welds.
- B. Roof and Bottom: Lap Weld.
- C. Roof Framing: As specified by aluminum dome manufacturer for aluminum roof and tank designer for steel tanks.

3.02 FIELD ERECTION

- A. Tank Rehabilitation Items:
 - 1. Contractor shall fabricate and install ladders, cages, roof hatches, vents, cathodic systems, level sensing equipment and other appurtenances that may be shown on the plans.
 - 2. Roll plates, top angle, and wind girder to curvature of tank, and handle and deliver materials so that they maintain shape and are not crimped or have "broken back."
 - 3. Assemble and weld plates to maintain proper curvature.
 - 4. Where partial replacement of roof plates is called for on the plans the Contractor shall sweep blast the entire area. When sweep blasting is complete the Engineer will inspect the roof and identify the areas of the roof that are to be replaced.
 - 5. Where partial replacement of the rafters is called for on the plans the Contractor shall sweep blast all the rafters. When the sweep blasting is complete the Engineer will inspect the rafters and identify which rafters are to be replaced.
 - 6. Where patching of floors is required, the Engineer will inspect the floor for pitting and metal loss after the substrate has been blasted. The Engineer will identify all pitted areas to be patched with a minimum 6" diameter steel plate patch. The patch is to be welded all around and ground smooth prior to application of the specified coating. If the Contractor identifies pitted or corroded areas during his blasting operation, he shall notify the Engineer immediately.
- B. Aluminum Dome
 - 1. No equipment shall be supplied or installed by any manufacturer not regularly engaged in the manufacturing and production of domes in the size and character herein specified. The manufacturer must have installed and had in satisfactory use for a period not less than

ten (10) years at least five (5) domes of the same type as units specified herein.

2. All work shall be executed by skilled mechanics, with supervision experienced in the erection of domes. The dome shall be erected plumb and level and in proper alignment. The dome erector shall provide satisfactory evidence of the successful installation of at least five (5) domes of the same type as specified herein.
3. The aluminum dome roof shall be leak tested utilizing a low pressure soap bubble test procedure as follows:
 - a. Test Setup and Equipment
 - i. Blind or otherwise cover any vents, hatches, piping inlets/outlets, etc. in the dome or tank
 - ii. Connect a compressor to the hose bib in the tank shell.
 - iii. Locate a manometer near the hose bib or other convenient location, to verify the internal pressure achieved during the test.
 - iv. Pressurize the interior of the tank and maintain between 1/2-inch and 1-inch water column positive pressure throughout the test.
 - v. Carry out the soap bubble test, described below.
 - b. Test Procedure
 - i. Apply a soap solution to the strut caps, hub covers, and splices between aluminum sheeting, as well as at hatch frames and other joints that may be subject to allowing rainwater infiltration into the tank interior.
 - ii. Observe the treated joints for bubble formation.
 - iii. If soap bubbles form at a given point, that joint will be cleaned, prepped, repaired, and retested by applying additional soap solution.
 - iv. The interface of the dome flashing with the tank windgirder will not be tested, as rainwater will not tend to infiltrate the tank at this location.
 - c. Acceptance Criteria

Joints along the exterior surface of the dome which do not evidence any soap bubble formation shall be deemed water-tight.

C. Cleanliness:

1. Provide proper sanitary waste facilities.
2. Only healthy personnel may enter tank.
3. If necessary, Owner's physician will judge physical fitness of all persons entering tank.
4. Keep interior of tank and accessories clean and free from foreign matter.

3.03 EXTERIOR PIPING AND VALVES

General handling and preparation of exterior piping and valves will be done in accordance with Section 02662 - Piping, Valves, Fittings and Accessories for Water Storage Tanks.

3.04 DISPOSAL OF WASTE MATERIAL

The City will remove from service and drain or cause to be drained the water from the existing tank prior to release to the Contractor for rehabilitation. Water and deposits left in the tank subsequent to draining are to be removed and disposed of by the Contractor. All waste disposal to be in accordance with Section 01576 - Waste Material Disposal and 02136 - Waste Material Handling and Disposal.

END OF SECTION

SECTION 16111

CONDUIT, FITTINGS, AND BODIES

PART 1 GENERAL

1.01 REFERENCES

- A. American National Standards Institute (ANSI).
 - 1. ANSI C80.1: Rigid Steel Conduit - Zinc Coated.
 - 2. ANSI C80.4: Fittings for Rigid Metal Conduit.
- B. Federal Specifications
 - 1. W-C-58C: Conduit Outlet Boxes, Bodies Aluminum and Malleable Iron.
 - 2. W-C-1094: Conduit and Conduit Fittings Plastic, Rigid.
 - 3. WW-C-566C: Flexible Metal Conduit.
- C. National Electrical Manufacturers Association (NEMA).
 - 1. NEMA TC2: Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
 - 2. NEMA TC3: PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- D. National Fire Protection Association (NFPA), ANSI/NFPA 70 - National Electrical Code (NEC).
- E. Underwriters' Laboratories (UL).
 - 1. UL 1: Flexible Metal Electrical Conduit.
 - 2. UL 6: Rigid Metal Electrical Conduit.
 - 3. UL 514B: Fittings for Conduit and Outlet Boxes.
 - 4. UL 651: Schedule 40 and 80 Rigid PVC Conduit.
 - 5. UL 651A: Type EB and A Rigid PVC Conduit and HDPE Conduit.

CONDUITS, FITTINGS, AND BODIES

6. UL 886: Electrical Outlet Boxes and Fittings for Use in Hazardous Locations.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Section except as indicated in section 1.02 B. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.
- B. Measure “extra ¾ inch galvanized conduit” by linear foot. Pay for “extra ¾ inch galvanized conduit” by unit price per linear foot.

1.03 SUBMITTALS

- A. Manufacturer's cut sheets, catalog data
- B. Code compliance certificate
- C. Conformance certificate

1.04 QUALITY ASSURANCE

- A. Tests
 1. Rigid steel conduit shall pass the bending, ductility, and thickness of zinc coating tests described by ANSI C80.1.
 2. Flexible conduit shall pass the tension, flexibility, impact, and zinc coating test described by UL 1.
 3. Nonmetallic conduit and fittings shall pass the test requirements of NEMA TC2, UL 651 and 651A and Federal specification W-C-1094A.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Rigid Steel Conduit.
 1. Allied Tube and Conduit.
 2. Triangle Wire and Cable, Inc.
 3. Wheatland Tube Company.

B. Rigid Aluminum Conduit

1. Allied Aluminum
2. Indalex

C. PVC Rigid Conduit

1. Cantex
2. Carlon Industries, Inc.
3. Robroy Industries, Inc.

D. Conduit Fittings and Bodies

1. Appleton Electric
2. Crouse-Hinds
3. Killark Electric Manufacturing Company
4. O-Z/Gedney

E. Liquidtight Flexible Conduit

1. Anamet, Inc.
2. Electriflex Company
3. Triangle Wire and Cable, Inc.

2.02 MATERIALS AND EQUIPMENT

A. Conduit and Fittings

1. Rigid Steel Conduit and Fittings

- a. Rigid steel conduit and rigid steel conduit bends, nipples, bodies, etc., shall be hot-dipped galvanized and shall comply with the latest ANSI C80.1, UL 6, Federal Specification WW-C-581D, and NEC Article 346-15.
- b. Mild steel tubing shall be used for conduit, nipples, and couplings, and shall be free of defects on both the inner and outer surfaces.

- c. Fittings and bodies and covers for rigid steel conduit shall be steel or cast-iron and shall comply with ANSI C80.4, UL 514B, and Federal Specification W-C-58C.
2. Rigid Aluminum Conduit and Fittings
 - a. Rigid Aluminum Conduit, bends, nipples, bodies, etc., shall be manufactured from aluminum alloy 6063-T1 and shall comply with the latest ANSI C80.5 requirements.
 - b. Fittings for Rigid Aluminum Conduit shall be cast aluminum with cast aluminum attached to the conduit fitting by stainless steel captive screws.
3. Flexible and Liquidtight Flexible Metal Conduit and Fittings
 - a. Use liquidtight flexible metal conduit manufactured in accordance with UL 1 and Federal specification WW-C-566C.
 - b. Fittings used with liquidtight flexible metal conduit shall be the PVC-coated type and of such design as to thoroughly ground the conduit to the fittings, and through it to the box or enclosure to which it is attached.

Flexible couplings and fittings for use in hazardous areas shall comply with UL 886, NEC Article 501-4 (a&b), and Federal Specification W-C-586C.
4. PVC Conduit and Fittings. Use PVC conduit, bends, and fittings, which comply with NEMA TC2, W-C-A, and NBC Article 347-17 for above ground and underground installation. Conduit shall be schedule 40, for underground installations.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ensure that the conduit system to be installed is sized properly for the cable and wire requirements.
- B. Verify the actual physical conduit route from the conduit plan drawings and prepare the conduit support system.
- C. Verify the equipment locations to which the conduit will be connected and determine detail requirements for connections.

3.02 INSTALLATION

- A. Install Schedule 80 PVC conduits in chlorine and sulfur dioxide rooms.
- B. Install Rigid Aluminum Conduits (RAC) above grade.
- C. Install Schedule 40 PVC conduits in duct banks or encased in concrete slabs. For stub-ups, use PVC-coated rigid aluminum conduit elbows.
- D. Run exposed conduit parallel or perpendicular to walls, ceilings or main structural members. Group multiple conduits together where possible. Conduit shall not interfere with the use of passageways, doorways, overhead cranes, monorails, equipment removal areas or working areas. In no case shall conduit routing present a safety hazard or interfere with normal plant operating and maintenance procedures. A minimum overhead clearance of 8'-0" shall be maintained in passageways.
- E. Installation and support of conduit shall be from steel or concrete structures. Furnish necessary Type 316 stainless steel strut, conduit straps, clamps, fittings, and hardware for support of conduit in accordance with standard practices.
- F. Identify conduit at termination points like MCC, light fixtures, control panels, receptacles, and junction boxes.
- G. Not more than 3 equivalent 90 degree bends will be permitted between outlets. Provide bonded expansion fittings at building expansion joints.
- H. Install conduit runs so that they are mechanically secure, mechanically protected from physical harm, electrically continuous, and neat in appearance. The interiors of conduit shall provide clean, smooth raceways through which conductors may be drawn without damage to the insulation. Make threaded connections wrench tight.
- I. Cut conduit square with a power saw or a rotary type conduit cutter designed to leave a flat face. Do not use plumbing pipe cutters for cutting conduit. Ream the cut ends of conduit with a reamer, designed for the purpose to eliminate rough edges and burrs. Threads shall be cut with standard conduit dies providing 3/4 inch taper per foot, allowing the proper length so that joints and terminals may be made up tight and the ends of the conduit not deformed. Keep dies sharp and use a good quality threading oil continuously during the threading operation. Remove metal cuttings and oil from the conduit ends after the threads are cut and paint threads before connections are made. Use non-corrosive Carbozinc No. 11 as manufactured by the Carboline Company, coal tar enamel or zinc rich epoxy primer on the threads of steel conduit before connections are made.
- J. Make up changes in direction of conduit using elbows or fittings. Do not use pull boxes to make direction changes unless specifically designated otherwise.

CONDUITS, FITTINGS, AND BODIES

- K. Field fabricated bends shall be free of indentations or elliptical sections. The radius of the bend shall not be less than 6 times the smallest diameter of the raceway.
- L. Protect all conduit terminations from mechanical injury. Prevent the entry of moisture and foreign mater into the conduit system shall be prevented by properly capping terminations.
- M. Avoid trapped runs of conduit, if possible. When they are necessary, provide drainage using a "tee" conduit equipped with a drain. Conduit is likely to pass through areas with a temperature differential of 20 degrees F or more. Seal penetrations with a proper seal fitting at the wall or barrier between such areas. For conduit passing through walls separating pressurized areas from non-pressurized areas, install sealing fittings at the wall on the non-pressurized side.
- N. Fit all conduit crossing building or structure expansion joints with approved expansion fittings, except that fittings will not be required when conduit crossing an expansion joint is supported on trapeze hangers in such a way that at no time will the conduit be under stress due to expansion. Install bonding jumpers around expansion joint fittings.
- O. Where conduit terminates in sheet metal enclosures and where no threaded hubs are provided, fit the conduit with double locknuts and bushings. Sheet metal enclosures located outside or in any other wet, damp or corrosive areas shall be furnished with threaded hubs. Restrict side penetrations to the lower one third of the enclosure.
- P. Provide flexible metallic conduit where necessary to allow for movement or to localize sound or vibration, at transformers, at motors and any other rotating equipment unless shown otherwise on Drawings.
- Q. Seal all openings or holes where conduits pass through walls or floors. When passing thru a firewall or floor, use a fire-rated seal. Exterior walls require environmental seals to stop air flow through conduits.
- R. Unless otherwise indicated on the Drawings, install expansion fittings every 300 feet within a straight conduit run and where conduit crosses building expansion joints, using bonding straps to ensure ground continuity.
- S. Parallel runs of conduit may be supported by structural steel racks. When two or more racks are arranged one above the other, provide vertical separation of not less than 12 inches between racks, unless otherwise indicated on the Drawings. Space conduits on the racks at least enough to provide 1/4-inch clearance between hubs on adjacent conduits at terminations and to allow room for fittings.
- T. Fill conduit racks no more than 75 percent of their capacity, providing usable space for future conduit. To ensure this, conduits leaving the rack horizontally shall be offset up

or down so that future conduits may be installed in the space remaining. Construct conduit racks to permit access for wire or cable pulling at all pull points, even when future conduits are added to fill the racks.

- U. Where conduit racks are supported on rods from beam clamps or by some other non-rigid suspension system, install rigid supports at no more than 50-foot intervals to give lateral stability to the rack.
- V. Conduit racks or hangers must in no way interfere with machinery (or its operation), piping, structural members, process equipment, or access to anticipated future equipment. Refer to architectural, structural, equipment layout and piping drawings to ensure that this requirement is met. Label high voltage conduit with the circuit phase-to-phase voltage by means of a firmly attached tag or label of approved design at each conduit termination, on each side of walls or barriers pierced and at intervals not exceeding 200 feet along the entire length of the conduit.
- W. Support conduit sizes 2 inches and larger at spacings not exceeding 10 feet and conduit sizes 1-1/2 inches and smaller at spacings not exceeding 8 feet.
- X. The means of fastening conduit to supports shall be: by one hole malleable iron conduit straps secured by wood screws to wood and by bolts with expansion anchors to concrete or masonry; by "Korn" clamps or U-bolts to other surfaces. Use "clamp backs" when strapping conduits to walls, column faces, or other such surfaces.
- Y. Support conduit runs with conduit clamps, hangers, straps and metal framing channel attached to structural steel members. Conduits of 1-1/2 inch size or less may be supported by one-hole conduit straps on concrete, tile or steel work, but for larger size conduit, 2- hole straps shall be used. Use clamps of galvanized malleable iron for rigid galvanized conduit and PVC coated or stainless steel for PVC coated conduit. Metal framing channel and straps used for PVC coated conduit shall be type 316 stainless steel.

END OF SECTION

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Section 16120

600-VOLT INSULATED WIRE

PART 1: GENERAL

1.01 SECTION INCLUDES

- A. Specifications for 600-volt insulated wire for power and controls.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Section. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.

1.03 RELATED SECTIONS

- A. Section 16195 - Electrical Identification.

1.04 REFERENCES

- A. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), NFPA 70 - National Electrical Code (NEC), Article 310 - Conductors for General Wiring
- B. Underwriter's Laboratories (UL)
 - 1. UL 83: Thermoplastic Insulated Wires and Cables
 - 2. UL 1063: Machine Tool Wires and Cables
- C. American Society for Testing and Materials (ASTM)
 - 1. ASTM B3: Soft or Annealed Copper Wires
 - 2. ASTM B8: Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
- D. Insulated Cable Engineers Association (ICEA), ICEA S-61-402: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-5)

600-VOLT INSULATED WIRE

1.05 SUBMITTALS

A. Submit the following under the provisions of Section 01330 - Submittal Procedures.

1. Manufacturer's cut sheets, catalog data
2. Instruction for handling and storage
3. Dimensions and weight
4. Conformance certificate

1.06 QUALITY ASSURANCE

A. Tests. Cable shall meet all the requirements of Part 6 of ICEA S-61-402.

B. Conformance Certificate and Quality Assurance Release. Submit a conformance certificate signed by the person responsible for product quality. The certificate shall specifically identify the purchased material or equipment; such as by the project name and location, purchase order number, supplements, and item number where applicable, including materials and services provided by others. The certificate shall indicate that requirements have been met and identify any approved deviations.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Ship wire and cable on manufacturer's standard reel sizes unless otherwise specified. Where cut lengths are specified, mark reel footage accordingly. Each reel shall contain one continuous length of cable. Provide impact protection by wood lagging or suitable barrier across the traverse of the reel. Provide moisture protection by using manufacturer's standard procedure or heat shrinkable self-sealing end caps applied to both ends of the cable.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. American Insulated Wire Corporation
- B. Carol Cable Company, Inc.
- C. General Cable Company

- D. Houston Wire and Cable
- E. Okonite Company
- F. Rome Cable Company
- G. Triangle Wire and Cable, Inc.

2.02 600-VOLT INSULATED WIRE

- A. Design. Provide insulated wire designated as XHHW-2 single conductor type and UL 83 and UL 1063 listed, rated 600 volts and certified for continuous operation at maximum conductor temperature of 90 degrees C in dry locations and 90 degrees C in wet locations while installed in underground duct, conduit or in control panels.
- B. Conductors. Provide conductors which are Class B, concentric-stranded, annealed uncoated copper with physical and electrical properties complying with ASTM B3 and B8 and Part 2 of ICEA S-61-402.
- C. Insulation. Each conductor shall be insulated with cross linked synthetic polymer. The insulation thickness shall match the dimensions listed in Table 310-13 of the National Electrical Code (NEC) for type XHHW-2 wire. Contract Drawing “STD-E-3” indicates that control wiring is to have THHN insulation. Disregard this requirement and provide XHHW-2 insulation for control wiring.
- D. Wire Marking
 - 1. Wire marking shall be in accordance with National Electrical Code (NEC) Article 310-11 and shall be printed on the wire insulation at 2-foot intervals.
 - 2. The printing method used shall be permanent and the color shall sharply contrast with the jacket color.
- E. Single conductor color coding for power conductors follows. When colored insulated conductors are not available, wrap color tape around ends of conductors.

<u>System Voltage</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Neutral</u>
120/240 Volt 1Ph/3w	Black	Red		White
208/120 Volt 3Ph/4w	Black	Red	Blue	White
120/240 Volt 3Ph/4w	Black	Orange	Blue	White
480/277 Volt 3Ph/4w	Brown	Purple	Yellow	Grey
Ground		Green		

600-VOLT INSULATED WIRE

2.03 600-VOLT INSULATED MULTI-CONDUCTOR CABLE

- A. Multi-conductor cable shall consist of an assembly of individual XHHW-2 insulated wires with an overall flame retardant PVC jacket over the multi-conductor assembly. The PVC jacket minimum thickness shall be 45 mils.
- B. Cable Marking
 - 1. Wire marking shall be in accordance with National Electrical Code (NEC) Article 310-11 and shall be printed on the wire insulation at 2-foot intervals.
 - 2. The printing method used shall be permanent and the color shall sharply contrast with the jacket color.

2.04 POWER CONDUCTOR SIZES NO. 12 AND 10 AWG

- A. Dry Locations
 - 1. Minimize splices
 - 2. Use twist type pressure connectors which screw-on conductors to splice wires. Connectors shall be factory insulated for 600 volts and rated for 105 degrees C.
 - 3. Use Buchanan B-CAP wire connectors or 3M Scotchlok spring connectors.
- B. Wet Locations
 - 1. Minimize splices
 - 2. Splice conductors with copper (not CU/AL) crimp type compression sleeves. Cover splices with heat shrink sleeves, Raychem Type WCSM (tubing type sleeves) or Raychem Type CRSM (split sleeve with stainless steel closure spline).

2.05 POWER CONDUCTORS NO. 8 AWG AND LARGER

- A. All locations
 - 1. Minimize splices.
 - 2. Splice conductors with copper (not CU/AL) crimp type compression sleeves. Cover splices with heat shrink sleeves, Raychem Type

WCSM (tubing type sleeves) or Raychem Type CRSM (split sleeve with stainless steel closure spine).

3. Terminate power conductors no. 8 AWG and larger with copper crimp type compression lugs. Conductors 4/0 AWG and larger shall be terminated with long barrel two-hole lugs.

2.06 CONTROL WIRES

A. Dry Locations

1. Do not splice control wires unless there is not other way to make the installation.
2. Terminate all control wires on terminal blocks in junction boxes, terminal cabinets, control cabinets and in equipment. Use insulated crimp type tin-plates copper terminals with locking fork ends (upturned leg ends) to terminate control wires on terminal blocks.

B. Wet Locations

1. Do not splice control wires unless there is no other way to make the installation.
2. Splice conductors with copper (not CU/AL) crimp type compression sleeves. Cover splices with heat shrink sleeves, Raychem Type WCSM (tubing type sleeves) or Raychem Type CRSM (split sleeve with stainless steel closure spine).

PART 3: EXECUTION

3.01 PREPARATION

- A. Complete the cable raceway systems and underground duct banks before installing cables.
- B. Verify sizing of raceways and pull boxes to ensure proper accommodation for the cables.
- C. Check the length of the cable raceway system against the length of cable on the selected reel.
- D. Clean conduits of all foreign matter before cables are pulled.

600-VOLT INSULATED WIRE

3.02 INSTALLATION

A. Wiring Methods

1. Use XHHW-2 wire for lighting, power and control wiring where conductors are enclosed in raceways like in above ground conduit systems or in underground duct banks.
2. Do not use solid conductors.
3. Use conductors not smaller than No. 12 AWG stranded for lighting circuits.
4. Use conductors not smaller than No. 14 AWG for control circuits, unless specifically directed otherwise on the Contract Drawings.
5. Splice conductors only where absolutely necessary. Splices must be minimized. Use the longest conductor lengths possible to reduce the number of splices.
6. Splices associated with taps for lighting and control circuits are allowed.
7. Make splices in accessible junction boxes.

B. Wire and Cable Identification

1. Provide wire and cable tags for control wiring as indicated in Specification Section 16195, Electrical Identification.
2. Provide color coding tape on power wire and cables without colored insulation or jackets.

C. Single Conductors in Conduit and Duct bank

1. Install cables in accordance with the manufacturer's instructions and the National Electrical Code (NEC), Chapter 3 - Wiring Methods and Materials. Do not exceed maximum wire tension, maximum insulation pressure and minimum bending radius.
2. Pull cables into conduits using Polywater J pulling lubricant.

D. Tests

1. In general, test insulation integrity of the wiring system before terminating.

2. Make sure to disconnect sensitive electronic equipment before testing insulation.
3. Use a 500 VDC megohmmeter and perform a megger insulation test on every conductor in accordance with the operating instructions. Provide a test report for conductors size 4/0 AWG and larger. Tests for conductors size 250 kcmil and larger shall be witnessed by a City Engineer designated representative.

E. Termination

1. After the 600-volt wiring system has been tested with satisfactory results, reconnect wire.

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Section 16126

INSTRUMENTATION CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for instrumentation cable.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Section. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.

1.03 RELATED SECTIONS

- A. Section 16195 – Electrical Identification.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - 1. ASTM B3: Soft or Annealed Copper Wires.
 - 2. ASTM B8: Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft.
 - 3. ASTM B33: Tinned Soft or Annealed Copper Wire for Electrical Purposes.
- B. Institute of Electrical and Electronics Engineers (IEEE), IEEE 383-2.5: IEEE Standard for Type Test of Class IE Electric Cables, and Field Splices.
- C. Insulated Cable Engineers Association (ICEA).
 - 1. ICEA S-61-402: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-5).
 - 2. ICEA S-66-524: Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-7).

3. ICEA S-68-516: Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (NEMA WC-8).

D. Underwriters' Laboratories (UL).

1. UL 44: Rubber Insulated Wires and Cables.
2. UL 83: Thermoplastic Insulated Wire and Cables.

E. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), NFPA No. 70 - National Electrical Code (NEC), Chapter No. 3 - Wiring Methods and Materials, Article 725 - Class 1, Class 2, and Class 3 Remote Control, Signaling, and Power-Limited Circuits.

1.05 SUBMITTALS

A. Submit the following under the provisions of Section 01330 – Submittal Procedures:

1. Completed manufacturer's data sheets, cut sheets, and catalog data.
2. Installation, terminating and splicing procedure (including bending radius and pulling tension data).
3. Instruction for handling and storage.
4. Dimensions and weight.

1.06 QUALITY ASSURANCE

A. Tests

1. Cable shall be tested at the factory to confirm that the cable complies with requirements of ICEA Section 7.7.9 of S-66-524 or 7.5.9 of S-68-516.
2. Where applicable, the cable shall meet the requirements of the vertical tray flame test as described in IEEE 383-2.5.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Ship cable on manufacturer's standard reel sizes unless otherwise specified. Where cut lengths are specified, mark reel footage accordingly. Each reel shall contain one continuous length of cable. Provide impact protection by wood lagging or suitable barrier across the traverse of the

reel. Provide moisture protection by manufacturer's standard procedure or heat shrinkable self-sealing end caps applied to both ends of the cable.

PART 2 PRODUCTS

2.02 MANUFACTURERS

- A. Alpha Wire Corporation
- B. Belden Division, Cooper Industries, Inc.
- C. Cablec Continental Cables Company
- D. General Cable Company
- E. Houston Wire and Cable
- F. Manhattan Electric Cable Corporation
- G. Okonite Company
- H. Southwire Corporation

2.03 MATERIALS AND EQUIPMENT

- A. Design. Provide cable with the following design characteristics. The cable shall consist of multiple conductors. The cable assembly shall be UL listed, flame, oil and sunlight resistant, and certified for continuous operation in wet or dry locations while installed in underground duct or conduit. Each conductor shall be individually insulated. Pairs and triads shall have conductors which are twisted together with a drain wire, shielded, and covered with a jacket. Multi-pair/triad cables shall consist of the required number of electrically isolated, shielded pairs or triads, which are bundled together and covered by a PVC overall jacket.
- B. Conductors. Provide conductors which are Class B, concentric stranded, annealed tinned copper whose physical and electrical properties comply with ASTM B3, B8 or B33.
- C. Insulation. Each conductor shall have 600-volt PVC insulation. The minimum insulation thickness shall not be less than 15 mils of PVC with a 4 mil nylon jacket with an overall 90 degree C rating.
- D. Drain Wire. Provide drain wire which is Class B, seven-stranded, tin-coated copper in accordance with ASTM B3, B8, or B33. The drain wire

shall not be less than two AWG sizes smaller than the insulated conductor's size, except for multiple pair triad drain wires, which shall not be less than the insulated conductor size.

- E. Shielding. Provide shielding consisting of laminated, nonburning, mylar-backed aluminum tape applied helically around a twisted pair or triad with the aluminum side in continuous contact with the drain wire. Wrap the tape around each twisted pair or triad with a 25 percent minimum overlap.
- F. Jacket. The pair or triad outer jacket shall be a minimum of 60 mils of PVC.
- G. Conductor Identification. Use individual conductors in single-pair and single-triad cables which are color coded black and white; and black, white and red, respectively. Multi-pair triad cables shall have one conductor in each pair or triad colored white, and all other conductors shall be color coded in sequence.
- H. Cable Marking. Print cable marking information on the jacket of each cable at 2-foot intervals. Use a permanent printing method with color sharply contrasting the jacket color.

2.04 TERMINATIONS

- A. Terminate instrument cables on terminal blocks in junction boxes, terminal cabinets control cabinets and in equipment. Use insulated crimp type tinned copper terminals with locking fork ends (upturned leg ends) to terminate instrument cables on terminal blocks.
- B. Instrument cables shall not be spliced in underground pull boxes.

2.05 CABLE IDENTIFICATION

- A. Provide cable tags for instrument cables as indicated in Specification Section 16195, Electrical Identification.

PART 3 EXECUTION

3.01 PREPARATION

- A. Complete cable raceway systems, underground duct banks and cable support systems before installing cables.
- B. Verify sizing of raceways and pullboxes to ensure proper accommodation for the cables.

- C. Check the length of the cable raceway system against the length of cable on the selected reel.
- D. Do not install or work on PVC insulated or jacketed cables in temperatures below 32 degrees F.
- E. Clean conduits of foreign matter before cables are pulled.
- F. Provide at least 25 percent spare pairs or triads.

3.02 INSTALLATION

A. Cable in Conduit and Duct bank

1. Install cables in accordance with the manufacturer's instructions and NEC Article 725 - Class 1, Class 2, and Class 3 Remote Control, Signaling and Power Limited Circuits. Do not exceed maximum wire tension, maximum insulation pressure and minimum bending radius.
2. Pull cables into conduits using Polywater J lubricant to reduce friction. Lubricants must not be harmful to the conductor insulation or cable jacket.

B. Cable in Tray. (Not Used)

C. Termination

1. Do not splice conductors. Use insulated crimp type tin-plated copper terminals with locking fork ends (upturned leg ends) to terminate cables to terminal blocks.
2. For shielded control cable, terminate the shield and ground at one end only, preferably at the control panel end for instrument and communication cable and at the supply end for electronic power cables.
3. Mark wiring on both ends with circuit numbers or loop tag numbers. Heat shrink wire tags after wire terminals have been installed.

D. Tests

1. Before connecting the cables, test insulation integrity and conductor continuity.
2. Use a 500 VDC megohmmeter and perform the cable insulation test in accordance with the operating instructions.

INSTRUMENTATION CABLE

- E. Termination. After the 600-volt instrument cable has been tested with satisfactory results, the cable shall be terminated at both ends to the designated terminal points.

END OF SECTION

Section 16131

DEVICE, PULL, AND JUNCTION BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specifications for device, pull, and junction boxes.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Section. The Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.

1.03 REFERENCES

- A. American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA).
 - 1. FB1 - Fittings and Support for Conduits and Cable Assemblies
 - 2. 250 - Enclosures for Electrical Equipment (1000 volts maximum)
- B. American National Standards Institute/National Fire Protection Association (ANSI/NFPA), NFPA70 - National Electrical Code (NEC) - Article 370 - Outlet Device, Pull and Junction Boxes, Conduit Bodies and Fittings.
- C. Underwriters Laboratories (UL):
 - 1. 50 - Safety Cabinets and Boxes
 - 2. 508 - Safety Industrial Control Equipment
 - 3. 514B - Safety Fittings for Conduit and Outlet Boxes
 - 4. 886 - Safety Outlet Boxes and Fittings for Use in Hazardous Areas

1.04 SUBMITTALS

- A. Submit the following under provisions of Section 01330 – Submittal Procedures:

1. Manufacturer's cut sheets, catalog data
2. Instruction for handling and storage
3. Installation instructions
4. Dimensions and weights

1.05 DELIVERY, STORAGE AND HANDLING

- A. Pack and crate boxes to permit ease of handling and to provide protection from damage during shipping, handling and storage.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Stainless Steel Boxes

1. Hoffman Industrial Products
2. Pauluhn Electric Manufacturing Company
3. Hennessy
4. Tanco
5. Tejas
6. Circle A.W.

B. Cast Device Boxes

1. Appleton Electric Company
2. Crouse-Hinds, Division of Cooper Industries
3. Killark Electric Manufacturing Company

2.02 MATERIALS AND EQUIPMENT

A. Stainless Steel Boxes

1. Provide UL-approved junction boxes and pull boxes manufactured from Type 316 stainless steel sheet metal and meeting requirements of NEMA 4X for corrosive and wet area, NEMA 250 and NEC Article 370.
2. Provide boxes with a Type 316 stainless steel continuous hinge, closure hasps and all- stainless steel hardware.
3. Furnish the door with neoprene gasket and provision for padlock.

B. Device Boxes

1. Provide UL-approved boxes designed and manufactured to house electrical devices like receptacles and switches, and in conformance with NEMA FB1 and NEC Article 370.
2. Supply boxes that are cast aluminum or 316 stainless steel, suitable for corrosive and wet atmosphere.

C. Hardware

1. Mounting Hardware: Type 316 Stainless steel
2. Conduit Connectors: Watertight as manufactured by Myers Hubs, or equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Review the drawings and determine how many boxes of each kind are required and check if supplied quantity is sufficient.

3.02 INSTALLATION

- A. Boxes described in this specification shall be used both in dry and wet, corrosive areas, both inside and outside locations.
- B. Install boxes in accordance with NEC Article 370 in locations indicated on the Contract Drawings.
- C. Install junction and pull boxes in readily accessible places to facilitate wire pulls, maintenance and repair.
- D. Plug unused conduit openings.

DEVICE, PULL, AND JUNCTION BOXES

- E. Make conduit connections to sheet metal boxes with watertight conduit connectors.

END OF SECTION

Section 16195

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specification for electrical identification including:

1. Nameplates and labels
2. Wire and cable markers
3. Conduit markers
4. Cable tray markers
5. Underground warning tape
6. Warning labels

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment for work performed under this Section. Contractor shall include the cost for this work in the contract bid price for work of which this is a component part.

1.03 REFERENCES

A. American National Standards Institute/National Fire Protection Association (ANSI/NFPA)

1. No. 70 - National Electrical Code (NEC)
 - a. Article 110 - Requirements for Electrical Installation
 - b. Article 430 - Transformers and Transformer Vaults

B. City of Houston Building Code.

C. Other applicable Codes and Standards as referenced in other Sections.

D. Underwriters Laboratories. U.L. Standards No. 224 - Extruded Insulated Tubing.

1.04 SUBMITTALS

A. Submit the following under the provisions of Section 01330 – Procedures:

1. Manufacturer's cut sheets and catalog data
2. Description of materials used
3. Label or nameplate dimensions
4. Engraving or imprint legends
5. Instruction for handling and storage
6. Installation instructions

1.05 DELIVERY, STORAGE AND HANDLING

A. Pack materials to permit ease of handling and to provide protection from damage during shipping, handling and storage.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Almetek Industries Incorporated
- B. Brady U.S.A. Incorporated
- C. Ideal Electric Company
- D. Raychem Corporation
- E. 3M Electrical Products Division
- F. Thomas & Betts
- G. Tyton Corporation

2.02 MATERIALS AND EQUIPMENT

- A. Nameplates and Labels

1. Provide an identification nameplate for each item of electrical equipment engraved with the equipment name. Use the description shown on the Contract Drawings.
2. For nameplates, use 3-ply phenolic material engraved to show black lettering on a white background. Size the nameplates approximately 1 inch wide and 3 inches long for 3 lines of 3/16 inch - 16 letters with a 0.8 condensed factor.
3. Generally, provide large pieces of equipment with engraved nameplates; provide additional nameplates at pushbuttons and other local devices. Provide identification for all other electrical equipment, device or enclosure not furnished with readily noticeable tag, nameplates or other means of identification.
4. Install nameplates on the front cover of transformers stating the transformer service location number or identification number, the panelboard or device served, and main breaker feeding the transformer (MCC No.), and the drawing number on which the transformer schematic is shown.
5. Furnish equipment, such as motor starters, safety switches, welding receptacles and circuit breakers, with 1" x 3" plastic nameplates stating description of item served.
6. Provide nameplates for motors giving the driven equipment description, and the MCC number. Nameplates shall be mounted adjacent to motors.
7. Install nameplates on the outside and inside of doors to circuit breaker panelboards (i.e., lighting, instrument or receptacle panels). State the panelboard name, the drawing number on which the panelboard schedule shows, and the main breaker feeding the panel (MCC No. or Power Panel name).
8. Type panelboard directories and insert them inside panelboard doors.
9. Place a large nameplate approximately 3"x5" on control panels, relay panels, junction boxes and similar enclosures with electrical devices mounted inside. The large nameplates shall identify the enclosure.
10. Provide a nameplate on MCC motor starter doors duplicating motor nameplate data.

11. Provide warning label on front and inside actuator controllers in accordance with NEC. Identify controller as having two (2) sources of electric power if such is the case.

B. Wire and Cable for Control Wiring Tags

1. Use pre-printed tubular heat-shrink type wire and cable tags. Place a tag at each end of each wire and cable for all control wiring.
2. Select tags manufactured so that the heat-shrink process makes the imprint permanent and solvent-resistant.
3. Use tags that are self-extinguishing, conforming to U.L. Standard No. 224 for print performance, heat shock and flammability.
4. Provide tag material that is flexible, radiation cross-linked polyolefin with 3 to 1 shrink ratio, rated 600 volts, and white in color.
5. See Contract Drawing “STD-E-3” for additional requirements.
6. Cable in cable tray shall be marked at each end and at every cable tray drop out to a motor, control panel, or switchgear.

C. Conduit Tags

1. Provide conduit tags made of stainless steel, approximately 2 inches x 1 inch x 19-gage.
2. Stamp the conduit number or conduit identification on the tag.
3. Punch tags for tie fasteners. Fasten tags to the conduits with stainless steel braided wire.

D. Underground Warning Tape

1. Provide detectable warning tape made of 4 mil thick polyolefin film, 3 inches wide, suitable for direct burial and resistant to alkalis, acids and other common soil substances.
2. Use red tape with black legend printed in permanent ink.

E. Warning Labels

1. Place OSHA safety labels on enclosures and boxes 100 cubic inches or more containing electrical equipment or terminations.

2. Provide OSHA color codes for the labels. Use labels made from 4 mil vinyl with pressure sensitive adhesive backing.
3. The warning label caption is DANGER - 480 VOLTS for 480 volt systems. For voltages higher than 600 volts, provide warning labels with "DANGER - HIGH VOLTAGE - KEEP OUT".
4. Labels shall be 5 inches x 3-1/2 inches for small equipment and 10 inches x 7 inches for large equipment and electrical room doors.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces where adhesive labels will be applied.
- B. Drill holes for nameplates to be fastened with stainless screws.
- C. Prepare the cable ends for termination and conductor markings.
- D. Identify conduits at terminating points and select conduit tag marking as indicated on the Contract Drawings.

3.02 INSTALLATION

- A. Install nameplates and labels in accordance with the manufacturer's instructions and the Contract Drawings.
- B. Apply wire and cable tags in accordance with manufacturer's instructions using a heat gun with properly sized nozzle for the application. Tag the wires and cables at both ends.
- C. Tag conduits at junction boxes, pull boxes control panels, transformers, switchgear and similar location and at other termination points.
- D. Identify cable trays at the time of installation with the alphanumeric number shown on the Contract Drawings. Label cable trays on the outside rail.
- E. Place the tray identifier at each point where the tray designation changes and at 200 foot intervals in between, but not less than two per run.
- F. Identify underground conduits, cables or duct banks using the underground delectable warning tape. The underground grounding grid, including laterals, shall be identified with underground delectable warning

tape. Install one tape per trench at 12 inches below grade or as indicated on the Contract Drawings. For wide trenches or duct banks, install one warning tape per 18-inch width.

- G. Apply the 5 inch by 3-1/2 inches warning labels to disconnect switches, panelboards, terminal boxes, and similar devices in accordance with manufacturer's instruction and the Contract Drawings. Apply the 10 inch x 7 inch warning labels to larger control panel enclosures, motor control centers and to entrance doors to rooms containing electrical power and control equipment.

END OF SECTION