



CITY OF HOUSTON

HOUSTON AIRPORT SYSTEM (HAS)

INVITATION TO BID (ITB)

PN 941 SOLICITATION NO.: HHG-INFCOU-2022-020
REPLACE AND UPDATE INFORMATION BOOTHS
AT WILLIAM P. HOBBY AIRPORT

Date Issued: June 24, 2022

Pre-Bid Conference / Site Visit: July 8, 2022, 01:30 P.M., CST, (face-to-face meeting) 7800 Airport Blvd, Houston, TX 77061 in the HOU Conference Room A, located on the Ticketing Level near the Delta check-in counter..

Questions Deadline: July 15, 2022 @ 3:00 P.M., CST

Solicitation Due Date: August 18, 2022 @ 10:30 A.M., CST
City Secretary Office, City of Houston
City Hall Annex, Public Level, Room P101
900 Bagby Street, Houston TX 77002

Solicitation Contact Person: Humberto De La Garza
Sr. Procurement Specialist, Houston Airport System
humberto.delagarza@houstontx.gov

Project Summary: This project will consist in the construction of five information booths at the Hobby Airport. Four booths are replacements, and one booth is new. This project will ensure that the airport is properly equipped to best gain the passengers attention and assist them with needs, ensuring a smoother airport experience

NIGP Code: 91200
MWBE Goal: 0 %

DocuSigned by:
Jerry Adams
0DD350139A6F4C8...

DS
CA
Jerry Adams
Chief Procurement Officer
6/21/2022 | 12:38 CDT

Date



City of Houston - Department of Aviation – Infrastructure Division

**PROJECT MANUAL
100% PERMIT, BID & CONSTRUCTION**

***Replace and Update Information Booths at
William P. Hobby Airport***

**Airport PROJECT No.: PN 941
Architect's PROJECT No.: 20011.07**

VOLUME 1 of 1

Divisions 00 through 33

November 08, 2021



English + Associates Architects, Inc.
1919 Decatur Houston, Texas 77007
713.850.0400 (T)
713.850.0411 (F)

www.english-architects.com

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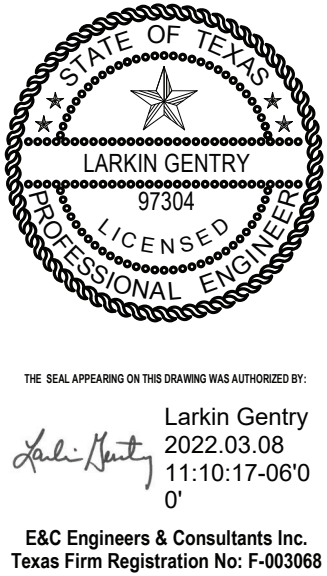
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SECTION 00011
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<p>ARCHITECT</p> <p>ENGLISH + ASSOCIATES ARCHITECTS, INC. 1919 Decatur Street Houston, Texas 77007 713-850-0400</p>	
<p>MEP ENGINEER</p> <p>E&C Engineers & Consultants, Inc. 1010 Lamar Street Suite 650 Houston, Texas 77002 713-580-8800</p>	

<p>IT CONSULTANT ENGINEER</p> <p>PGA Engineers, Inc. 3838 N Sam Houston Pkwy E, Suite 550 Houston, Texas 77032 346-570-2418</p>	 <p>03/08/22</p>

END OF SECTION 00011

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INSTRUCTIONS TO BIDDERS

1.0 *RELATED DOCUMENTS*

- A. Document 00210, Supplementary Instructions to Bidders.
- B. Document 00320, Geotechnical Information.
- C. Document 00330, Existing Conditions.
- D. Document 00410 – Bid Form, Parts A & B.
- E. Document 00495, Post-Bid Procedures.
- F. Document 00520, Agreement.
- G. Document 00700, General Conditions.
- H. Document 00800, Supplementary Conditions.

2.0 *DEFINITIONS*

- A. Definitions set forth in Document 00700, General Conditions, and in other documents of Project Manual, are applicable to Bid Documents.
- B. *Addendum*: Written or graphic instrument issued prior to Bid opening, which clarifies, modifies, corrects, or changes Bid Documents.
- C. *Alternate*: The total amount bid for additions to work, as described in Section 01110, Summary of Work. Each Alternate includes cost of effects on adjacent or related components, and Bidder's overhead and profit.
- D. *Bid*: A complete and properly signed offer to perform the Work in accordance with this Document and Document 00210, Supplementary Instructions to Bidders.
- E. *Bid Date*: Date and time set for receipt of Bids as stated in Document 00210, Supplementary Instructions to Bidders, or as modified by Addenda.
- F. *Bid Documents*: Project Manual, Drawings, and Addenda.
- G. *Bid Supplement*: A Bid submittal that is required in Document 00410, Bid Form.
- H. *Bidder*: Person or firm, identified in Document 00410B, Bid Form, Part B, including its successors, and its authorized representative.

- I. *Code*: Code of Ordinances, Houston, Texas.

- J. *Low Bidder*: Apparent successful Bidder that qualifies as a responsible Bidder and that submits Bid with lowest Total Bid Price.

- K. *Project Manager*: Person designated in Document 00100, Advertisement for Bids, and Document 00220, Request for Bid Information, to represent the City during bidding and post-bid periods.

- L. *Project Manual*: Volume assembled for the Work that includes the bidding requirements, sample forms, Conditions of the Contract, and Specifications.

- M. *Security Deposit*: A certified check, cashier's check, or bid bond in the amount of 10 percent of the Total Bid Price.

- N. *Total Bid Price*: Total amount bid for performing the Work as identified by Bidder in Document 00410B, Bid Form, Part B, which amount includes:

- 1. Stipulated Price;
- 2. Total Base Unit Prices;
- 3. Total Extra Unit Prices;
- 4. Total Cash Allowances; and
- 5. Total Alternates.

3.0 *NOTICE TO BIDDERS*

- A. Chapter 18, Ethics and Financial Disclosure, of the City of Houston Code of Ordinances makes it unlawful for a Contractor to offer any contribution to a candidate for City elective office (including elected officers and officers-elect) during a certain period of time prior to and following the award of the Contract by the City Council. The term "Contractor" includes proprietors of proprietorships, all partners of partnerships, and all officers, directors, and holders of 10 percent or more of the outstanding shares of corporations. A statement disclosing the names and business addresses of each of those persons will be required to be submitted with each bid or proposal; for a City Contract. Bidder shall complete and submit Document 00455, Ownership Information Form, with its Bid to comply with this requirement. See Chapter 18 of

the Code for further information.

- B. Chapter 15, Article VIII, of the City's Code provides that no contract shall be let, nor any other business transaction entered into, by the City with any person indebted to the City or a qualifying entity, if the contractor or transaction comes within the provisions of Section 15-1 (c) of the Code. Exceptions are provided in Section 15-126 of the Code. Bidder shall complete and submit Document 00455, Ownership Information Form, with its Bid to comply with this requirement.

- C. Neither bidder(s) nor any person acting on bidder(s)'s behalf shall attempt to influence the outcome of the award by the offer, presentation or promise of gratuities, favors, or anything of value to any appointed or elected official or employee of the City of Houston, their families or staff members. All inquiries regarding the solicitation are to be directed to the designated City Representative identified on the first page of the solicitation. Upon issuance of the solicitation through the pre-award phase and up to the date the City Secretary publicly posts notice of any City Council agenda containing the applicable award, aside from bidder's formal response to the solicitation, through the pre-award phase, written requests for clarification during the period officially designated for such purpose by the City Representative, neither bidder(s) nor persons acting on their behalf shall communicate with any appointed or elected official or employee of the City of Houston, their families or staff through written or oral means in an attempt to persuade or influence the outcome of the award or to obtain or deliver information intended to or which could reasonably result in an advantage to any bidder. However, nothing in this paragraph shall prevent a bidder from making public statements to the City Council convened for a regularly scheduled session after the official selection has been made and placed on the City Council agenda for action, or to a City Council committee convened to discuss a recommendation regarding the solicitation.

D. Compliance with Certain State Law Requirements.

- 1. *Anti-Boycott of Israel.* Contractor certifies that Contractor is not currently engaged in, and agrees for the duration of this Agreement not to engage in, the boycott of Israel as defined by Section 808.001 of the Texas Government Code.

- 2. *Anti-Boycott of Energy Companies.* Contractor certifies that Contractor is not currently engaged in, and agrees for the duration of this Agreement not to engage in, the boycott of energy companies as defined by Section 809.001 of the Texas Government Code.

- 3. *Anti-Boycott of Firearm Entities or Firearm Trade Associations.* Contractor certifies that Contractor does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, or will not discriminate against a firearm entity or firearm trade association for the duration of this Agreement, as defined by Section 2274.001 of the Texas Government Code.

- 4. *Certification of No Business with Foreign Terrorist Organizations.* For purposes of Section 2252.152 of the Code, Contractor certifies that, at the time of this Agreement neither Contractor nor any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of Contractor, is a company listed by the Texas Comptroller of Public Accounts under Sections 2252.153 or 2270.0201 of the Texas Government Code as a company known to have contracts with or provide supplies to a foreign terrorist organization.

- E. **Zero Tolerance Policy for Human Trafficking and Related Activities.** The requirements and terms of the City of Houston's Zero Tolerance Policy for Human Trafficking and Related Activities, as set forth in Executive Order 1-56, as revised from time to time, are incorporated into this Contract for all purposes. Bidder has reviewed Executive Order 1-56, as revised, and shall comply with its terms and conditions as they are set out at the time of this Contract's effective date. Bidder shall notify the City's Chief Procurement Officer, City Attorney, and the Director of any information regarding possible violation by the Bidder or its subcontractors providing services or goods under this Contract within 7 days of Bidder becoming aware of or having a

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reasonable belief that such violations may have occurred, have occurred, or are reasonably likely to occur.

- F. The requirements of Subchapter J, Chapter 552, Government Code, may apply to this bid and the contractor or vendor agrees that the contract can be terminated if the contractor or vendor knowingly or intentionally fails to comply with a requirement of that subchapter.

G. **Prospective Vendor Responsibility.**

The City will award contracts only to the responsible vendor possessing the ability to perform successfully under the terms and conditions of a proposed procurement. The City's policy is to award contracts only to a prospective vendor whom the City's contracting department has determined to be responsible, considering the following non-exhaustive factors:

- Record of integrity and business ethics, including timely payments to subcontractors/subconsultants, business judgment, reputation, and reliability.
- History of compliance with public policy and applicable laws, or the lack thereof.
- Record of past performance, including but not limited to, poor performance, failure to achieve reasonable progress, or defaulting on existing or previous City of Houston contracts, if any.
- Capacity to perform the required work or provide the required goods or services, which may include having (or having the ability to obtain) adequate financial and technical resources to perform the contract and any necessary equipment, facilities, organization, experience, efficiency, operational control, or technical skills, as applicable.
- Financial responsibility, including the ability to provide adequate bonds and insurance, as applicable.
- History of compliance with prevailing wage and other labor standards requirements.
- Record of failure to make good faith efforts to meet MWBE goals.
- Qualification and eligibility to receive an award under applicable laws and regulations, including any federal rules or regulations (e.g., 2 CFR Part 200).
- Ineligibility due to being suspended or debarred by federal, state, city, or county governmental agencies.

4.0 *BID DOCUMENTS*

- A. The Bid Documents may be obtained at

location specified in Document 00210, Supplementary Instructions to Bidders.

- B. The Bid Documents are made available only for the purpose of bidding on the Work. Receipt of Bid Documents does not grant a license for other purposes.

- C. On receipt of Bid Documents, Bidder shall verify that documents are legible and complete, compare contents of Project Manual with Document 00010, Table of Contents, and compare Index of Drawings with Document 00015, List of Drawings. Bidder shall notify Project Manager if Bid Documents are incomplete.

- D. If City of Houston Standard Specifications or Standard Details are required by the Project Manual, Bidder shall refer to Document 00210, Supplementary Instructions to Bidders for purchase information.

5.0 *EXAMINATION OF DOCUMENTS, SITE, AND LOCAL CONDITIONS*

- A. Bidder shall examine Project site, become familiar with local conditions under which the Work shall be performed, conduct appropriate investigations, and correlate personal observations with requirements of the Bid Documents before submitting a Bid.

- B. Bidder shall make site investigations to the extent Bidder deems necessary to ascertain extent of subsurface conditions.

- C. Failure of Bidder to perform the investigations prior to submitting a Bid does not relieve Bidder of responsibility for investigations, interpretations and proper use of available information in the preparation of its Bid.

- D. Bidder shall observe limitations of access to occupied or restricted site as stated in Document 00210, Supplementary Instructions to Bidders.

6.0 *INTERPRETATIONS DURING BIDDING*

- A. Bidder shall immediately submit Document 00220, Request for Bid Information, to Project Manager upon finding errors, discrepancies, or omissions in Bid Documents. Confirmation of receipt of questions by the City is the responsibility of Bidder. Verbal discussions and answers are not binding.

- B. Document 00220, Request for Bid Information, must be received at least 10 days before the Bid Date to allow issuance of Addenda in accordance with Paragraph 7.O.D. Replies, if issued, are by Addenda.

INSTRUCTIONS TO BIDDERS

7.0 *ADDENDA*

- A. Addenda that affect bidding requirements are applicable only through issuance of the Notice to Proceed. Addenda that affect the Contract are a part of the Contract.
- B. BIDDERS WHO SUBMIT A BID ON THIS PROJECT SHALL BE PRESUMED TO HAVE RECEIVED ALL ADDENDA AND TO HAVE INCLUDED ANY COST THEREOF IN THEIR BIDS, REGARDLESS OF WHETHER THEY ACKNOWLEDGE THE ADDENDA OR NOT.
- C. The City will make Addenda available at same location where the Bid Documents may be obtained. The City will notify plan holders of record when Addenda are available. Bidders are responsible for obtaining Addenda after notification.
- D. No Addendum will be issued later than noon on Monday before Bid Date, except Addenda with minor clarifications, withdrawing request for Bids, or postponing Bid Date.

8.0 *SUBSTITUTION OF PRODUCTS*

- A. No substitutions of Products will be considered during the bidding period.

9.0 *PREPARATION OF BIDS*

- A. Bidder shall fill in applicable blanks in Document 00410A&B, Bid Form, Parts A & B, and Bid Supplements. In addition, Bidder shall bid all Alternates. Bidder shall properly sign Document 00410B, Bid Form.
- B. Bidder shall initial all pages, except signature page, of Document 00410B, Bid Form, Part B.
- C. Bidder is responsible for all costs incurred by the Bidder, associated with preparation of its Bid and compliance with Post-bid Procedures.
- D. Bidder may not adjust preprinted price on line items stating "Fixed Unit Price" in the description on the Bid Form.
- E. Bidder may increase, but not decrease, preprinted price on line items stating "Minimum Bid Price" in the description on the Bid Form by crossing out the minimum and inserting revised price on the line above. Bidder **may not** decrease the preprinted price on line items stating "Minimum Bid Price".

- F. Bidder may decrease, but not increase, preprinted price on line items stating "Maximum Bid Price" in the description on the Bid Form by crossing out the maximum and inserting revised price on the line above. Bidder **may not** increase the preprinted price on line items stating "Maximum Bid Price".
- G. Bidder shall insert a price no greater than the maximum preprinted range and no less than the preprinted range for line items stating "Fixed Range Unit Price" in the description on the Bid Form by crossing out prices noted and inserting revised price on the line above.
- H. Bidder may not adjust Cash Allowance amounts.

10.0 *BID SUBMISSION*

- A. City Secretary will receive Bids on Bid Date at location specified in Document 00210, Supplementary Instructions to Bidders.
- B. Bids submitted after Bid Date will be returned to Bidder unopened.
- C. Verbal, facsimile, or electronic Bids are invalid and will not be considered.
- D. Bidder shall submit in person or by mail one copy of the signed Document 00410, Bid Form, Parts A and B, along with required Security Deposit, and required Bid Supplements, in a sealed, opaque envelope. In addition, Bidder shall clearly identify Project, Bid Date and Bidder's name on outside of envelope. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed for postal delivery.

11.0 *BID SECURITY*

- A. Bidder shall submit a Security Deposit with its Bid.
- B. Certified Check or Cashier's Check
 - 1. Bidder shall make check payable to the City of Houston.
 - 2. A check is submitted on the condition that if Bidder is named Low Bidder and fails either to timely and properly submit documents required in Document 00495, Post-Bid Procedures, the City will cash the check in accordance with Paragraph 11.0.E.
- C. Bid Bond
 - 1. The bid bond must be a valid and

INSTRUCTIONS TO BIDDERS

enforceable bond, signed by a surety that complies with other requirements set out by law.

2. The bid bond must name the City of Houston as obligee, and be signed by the Bidder as principal and signed and sealed by the surety.
3. The bid bond must be conditioned such that if Bidder is named Low Bidder and then fails to timely and properly submit documents required in Document 00495, Post-Bid Procedures, surety will be obligated to pay to the City an amount in accordance with Paragraph 11.0.E.

- D. Security Deposits will be retained until after the Contract is awarded or all Bids are rejected.
- E. Low Bidder forfeits Security Deposit if it fails to timely and properly submit documents required in Document 00495, Post-Bid Procedures. The City may claim an amount equal to the difference between the Total Bid Price of the defaulting Bidder and the Total Bid Price of the Bidder awarded the Contract. If Security Deposit is a check, the City will reimburse any remaining balance to the defaulting Bidder.

12.0 SUBCONTRACTORS AND SUPPLIERS

- A. The City may reject proposed Subcontractors or Suppliers.
- B. Refer to Document 00800,– Supplementary Conditions, for MWBE, PDBE, DBE and SBE goals.

13.0 MODIFICATION OR WITHDRAWAL OF BID

- A. A Bidder may modify or withdraw a Bid submitted before the Bid Date by written notice to the City Secretary. The notice may not reveal the amount of the original Bid and must be signed by the Bidder.
- B. Bidder may not modify or withdraw its Bid by verbal, facsimile, or electronic means.
- C. A withdrawn Bid may be resubmitted up to the time designated for receipt of Bids.

14.0 BID DISQUALIFICATION

- A. The City may disqualify a Bid if the Bidder:
 1. fails to provide required Security Deposit in the proper amount;
 2. improperly or illegibly completes

information required by the Bid Documents;

3. fails to sign Bid or improperly signs Bid;
 4. qualifies its Bid; or
 5. improperly submits its Bid.
- B. When requested, Low Bidder shall present satisfactory evidence that Bidder has regularly engaged in performing construction work as proposed, and has the capital, labor, equipment, and material to perform the Work.

15.0 PREBID MEETING

- A. A prebid meeting is scheduled to be held at the place, time, and date listed in Document 00210, Supplementary Instructions to Bidders.
- B. All Bidders, subcontractors, and suppliers are invited to attend.
- C. Representatives of City Engineer will attend.

16.0 OPENING OF BIDS

- A. Bids are opened by the City Secretary and publicly read in City Council Chambers on the Public Level in City Hall Annex at 11:00 a.m. on Bid Date.
- B. Place and date of Bid opening may be changed in accordance with Sections 15-45(c) of the City Code.

17.0 EVALUATION AND CONSIDERATION OF BIDS

- A. Project Manager will tabulate, record and evaluate Bids.
- B. The City may reject all Bids or may reject any defective Bid.

18.0 ACCEPTANCE OF THE BID

- A. The City will send to Low Bidder Document 00498, Notice of Intent to Award. Acceptance by the City is conditioned upon Bidder's timely and proper submittal of documents required in Document 00495, Post-Bid Procedures.
- B. The Bid remains open to acceptance and is irrevocable for the period of time stated in Document 00410A, Bid Form, Part A.

END OF DOCUMENT

Document 00210

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following Paragraphs modify Document 00200 - Instructions to Bidders. Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions, the unaltered portions of the Instructions to Bidders remains in effect.

PARAGRAPH 2.0 – DEFINITIONS:

Add the following sub-Paragraphs to this Paragraph:

- O. *Office of Business Opportunity (OBO)*: All references to Affirmative Action Contract Compliance Division (AACC) set forth in Document 00700 – General Conditions and in other documents of the Project Manual, shall refer to, and include, the Office of Business Opportunity.

PARAGRAPH 3.0 – NOTICE TO BIDDERS

Add the following sub-Paragraph to this Paragraph:

- H. The City will award this contract to a “Local Business”, as that term is defined in Section 15-176 of the City of Houston Code of Ordinances (“the Code”):
 - If the bid of the Local Business is less than \$100,000 and is the lowest responsible bid or is within 5% of the lowest bid received, or
 - If the bid of the Local Business is more than \$100,000 and is the lowest responsible bid or is within 3% of the lowest bid received, and
 - Unless the Director determines that such an award would unduly interfere with contract needs, as provided in Section 15-181 of the Code.

If there is no bid of a Local Business that meets these criteria, the City will award the contract to the lowest responsible bidder.

PARAGRAPH 4.0 – BID DOCUMENTS

Add the following sub-Paragraphs to this Paragraph:

- A. Add the following Paragraph A.1:

- 1. Bid documents may only be obtained electronically at the Houston Airport System’s website:
<https://www.fly2houston.com/biz/opportunities/solicitations/>

D. Add the following Paragraph D.1:

1. Copies of the City Standard Specifications and Details may be acquired at no cost on the Houston Airport System's website (<https://www.fly2houston.com/biz/resources/building-standards-and-permits/>) "HOUSTON AIRPORTS DESIGN STANDARDS"

E. The following plan rooms, whose names, addresses, phone and fax numbers were last updated on June 4, 2013, have been authorized by the City to display Bid Documents for examination:

1. AMTEK Information Services, Inc., 4001 Sherwood Lane, Houston, TX 77092, 713-956-0100, Fax 713-956-5340, Email: planroom@amtekusa.com
2. Virtual Builders Exchange, Inc., (ABC), 7035 West Tidewell, Houston, TX 77092, 832-613-0201, Fax 832-613-0344. Email: Tawny@virtualBx.com
3. I Square Foot, 8450 West Park, Houston, TX 77063, 1-800-364-2059 ext 8059, Fax 866-570-8187. Email: jhouser@isqft.com; contact: Justin Houser, houstonpr@isqft.com
4. Associated General Contractors, (AGC-HHUI), Highway, Heavy Utilities and Industrial Branch, 2400 Augusta St., Suite 305, Houston, TX 77057, Ph: 713-334-7100, Fax: 713-334-7130. Email: Houston@agctx.org (Attention: Mel Simon)
5. Gurrola Reprographics, 6161 Washington Ave., Houston, TX 77007; Ph: 713-861-4277; Fax: 713-861-8635; Email: bhefner@gurrolareprographics.com; contact: Brady Hefner.

F. Add the following sub-Paragraph F.1:

1. **Designation as a Hire Houston First City Business (CB) or Local Business (LB)**

To be designated as a City Business ("CB") or as a Local Business ("LB") for the purposes of the Hire Houston First Program, as set out in Article XI of Chapter 15 of the Houston City Code, a bidder or proposer must submit the **Hire Houston First Application and Declaration** to the Director of the Office of Business Opportunity and receive notice that the application has been processed and the appropriate designation (if any) is awarded, prior to the submission of a bid or proposal. Bidders must show evidence of HHF designation (as applicable) prior to, or accompanying, the submission of a bid or proposal.

The absence of a Hire Houston First designation does not preclude a business from bidding on City of Houston contracts.

Download the HHF Application and Declaration from the Office of Business Opportunity Webpage at the City of Houston e-Government Website, located at:

<http://www.houstontx.gov/obo/hirehoustonfirst.html>

or, delivered to:

Office of Business Opportunity
611 Walker, 7th Floor
Houston, Texas 77002.
Phone: (832) 393-0951
Fax: (832) 393-0646
hirehoustonfirst@houstontx.gov

PARAGRAPH 5.0 – EXAMINATION OF DOCUMENTS, SITE, AND LOCAL CONDITIONS

- D. Add the following sub-Paragraph D.1:
 - 1. Area within contract limits is currently restricted. Access for examination is restricted to times, durations, routes and presence of City authorities, occurring at the conclusion of the Prebid Meeting or as otherwise directed by City Engineer. See Paragraph 15.0 below.

PARAGRAPH 8.0 – SUBSTITUTION OF PRODUCTS

- A. Where Bid Documents specify a specific Product with provision for consideration of substitutions (or equal), requests for prebid approval of substitutions will be considered from Bidders only if received by Senior Procurement Specialist, Supply Chain Management (SCM) 10 work days or more prior to Bid Date.
- B. Requests for substitutions must provide complete information in order to determine acceptability of the Products, in accordance with provisions of Document 00700 - General Conditions and Document 01630 – Product Options and Substitutions.
- C. The City will consider requests for substitutions and, if approved, will issue an Addendum. Bidder shall base its Bid only on substitutions approved in Addenda. Substitutions, not listed in an Addendum, are not allowed.
- D. Bidder shall include in its Bid, costs of substitutions approved by Addenda.

PARAGRAPH 9.0 – PREPARATION OF BIDS

- I. For math errors the City encounters in analyzing Bids, the following guidance will be used:

In the event of a conflict between:

The Bid Price is:

- | | |
|---|---|
| 1. Individual Unit Price and Extension of that Unit Price | Individual Unit Price times Estimated Quantity |
| 2. A Unit Price extension and total of Unit Price Extensions | Sum of all Individual Unit Price Extensions |
| 3. Individual Alternate and total of Alternates | Sum of all Individual Alternates |
| 4. Individual subtotals for Stipulated Price, Base Unit Prices, Extra Unit Prices, Contractor Bonus, Cash Allowances, and Alternates; and the Total Bid Price | Sum of Individual subtotals for Stipulated Price, Base Unit Prices, Extra Unit Prices, Contractor Bonus, Cash Allowances and Alternates |

PARAGRAPH 10.0 – BID SUBMISSION

- A. Add the following sub-Paragraph A.1:

1. Sealed bids, in triplicate, one (1) original marked “Original” and two (2) copies of the bids (also includes two (2) USB drives of all required submittals identified in Document 00410 Section 1.0 Offer) will be received by the City Secretary of the City of Houston, in the City Hall Annex, Public Level, 900 Bagby, Room P101, Houston, Texas 77002, until 10:30 a.m., (CST) on August 18, 2022.

PARAGRAPH 11.0 – BID SECURITY:

1. Bidder shall submit a Security Deposit in the form of:
- Certified Check;
 - Cashier’s Check; or

c. Bid Bond

Bidder should submit just one form of Security Deposit among the three listed above, and such form shall be issued according to Section 11.0.B and 11.0.C.

PARAGRAPH 15.0 – PREBID MEETING

A. Add the following sub-Paragraph A.1:

1. A Prebid Meeting will be held at Houston Airport System ***William P. Hobby Airport, 7800 Airport Blvd Houston TX 77061 in the HOU Conference Room A, located on the Ticketing Level near the Delta check -in counter July 8, 2022 at 1:30 p.m.(CST)***
2. Pre-bid Meeting Questions will be due from bidders at 3:00 p.m. (CST), July 15, 2022.
3. A Site Visit will begin after the Pre-bid Meeting. The meeting and site visit are the only opportunity for bidders to see the site prior to Bid Due Date.

PARAGRAPH 16.0 – OPENING OF BIDS:

A. Place and date of Bid opening may be changed in accordance with Section 15-45© of the City code.

The following Section is added as part of this solicitation:

3.0 – NOTICE TO BIDDERS

F. RESOLVING PROTESTS

1. Protests will be handled in accordance with City of Houston Administrative Policy AP 5-12. <http://www.houstontx.gov/adminpolicies/5-12.pdf>.

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: INFORMATION BOOTHS HOBBY

Project No.: PN. 941

Bidder: _____

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

1.0 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 180 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 00454 - Affidavit of Non-interest
 - Document 00455 - Ownership Information Form
 - 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 – Pay or Play Acknowledgement Form (POP 1-A)
 - Document 00461 – Hire Houston First Affidavit
 - Document 00470 – Bidder's MWSBE Participation Plan (*required unless no MWSBE participation goal is provided in Document 00800 (the "Goal")*).
 - Document 00470D - Bidder's DBE Participation Plan (*required for AIP funded project*)
 - Document 00471 – Bidder's Record of Good Faith Efforts (*required if the goal in Bidder's Participation Plan–Document 00470 is lower than the Goal*).
 - Document 00472 – Bidder's Goal Deviation Request (*required if the goal in Bidder's Participation Plan–Document 00470 is lower than the Goal*).
 - Document 00480 – Form SCM-1 Reference Verification
 - Document 00481 – Non-Collusion Statement
 - Document 00842 – Letter of Intent
 - Others as listed: _____

2.0 CONTRACT TIME

- A.** If offer is accepted, Contractor shall achieve Date of Substantial Completion within 240 days after Date of Commencement of the Work, subject to adjustments of Contract Time as provided in the Contract.

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: \$ _____
 (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	00800	Clean Air Incentive [if applicable according to 9.13.2 of Document 00800]	Ea.	1	____ (1)	[Insert Amount]
				____	____ (1)	[Insert Amount]
<u>TOTAL BASE UNIT PRICES</u>						\$ _____

C. EXTRA UNIT PRICE TABLE:

Item No.	Spec Ref.	Extra Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
[1]		N/A				
<u>TOTAL EXTRA UNIT PRICES</u>						\$ _____

REST OF PAGE INTENTIONALLY LEFT BLANK

E. ALTERNATES TABLE:

Item No.	Spec Ref.	Alternate Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total Price for Alternate in figures
1		N/A				
<u>TOTAL ALTERNATES</u>						\$ _____

REST OF PAGE INTENTIONALLY LEFT BLANK

F. TOTAL BID PRICE: \$ _____
(Add Totals for Stipulated Price, Base Unit Price, Extra Unit Price, Cash Allowance, and All Alternates, if any)

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 the 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.
- (3) Maximum Bid Price determined prior to Bid. Can be decreased by the Bidder, but not increased, by crossing out the Maximum and inserting revised price on the line above. A Bid that increases the Maximum Bid Price may be found non-conforming and non-responsive. **Cannot** be increased by the Bidder.
- (4) Fixed Range Bid Price determined prior to Bid. Unit Price can be adjusted by Bidder to any amount within the range defined by crossing out prices noted and noting revised price on the line above.

Document 00430
BIDDER'S BOND

THAT WE, _____, as Principal,
(Bidder)
("Bidder"), and the other subscriber hereto, _____, as Surety, do hereby
acknowledge ourselves to be held and firmly bound to the City of Houston, a municipal corporation, in the sum of
_____ Dollars (\$_____) (an amount equal to
10 percent of the Total Bid Price, including Cash Allowances and Alternates, if any), for the payment of which sum, well
and truly to be made to the City of Houston and its successors, the Bidder and Surety do bind themselves, their heirs,
executors, administrators, successors, and assigns, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Bidder has submitted on or about this day a proposal offering to perform the following:

(Project Name, Location and Number)
in accordance with the Drawings, Specifications, and terms and conditions related thereto to which reference is hereby
made.

NOW, THEREFORE, if the Bidder's offer as stated in the Document 00410 – Bid Form is accepted by the City, and the
Bidder executes and returns to the City Document 00520 – Agreement, required by the City, on the forms prepared by
the City, for the Work and also executes and returns the same number of the Performance, Payment and Maintenance
Bonds (such bonds to be executed by a Corporate Surety authorized by the State Board of Insurance to conduct
insurance business in the State of Texas, and having an underwriting limitation in at least the amount of the bond) and
other submittals as required by Document 00495 - Post-Bid Procedures, in connection with the Work, within the
Contract Time, then this obligation shall become null and void; otherwise it is to remain in full force and effect.

If Bidder is unable to or fails to perform the obligations undertaken herein, the undersigned Bidder and Surety shall be
liable to the City for the full amount of this obligation which is hereby acknowledged as the amount of damages which
will be suffered by the City on account of the failure of such Bidder to perform such obligations, the actual amount of
such damages being difficult to ascertain.

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

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

ATTEST, SEAL: (if a corporation)
WITNESS: (if not a corporation)

(Name of Bidder)

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS: (SEAL)

(Full Name of Surety)

(Address of Surety for Notice)

(Telephone Number of Surety)

By: _____
Name:
Title:
Date:

By: _____
Name:
Title:
Date:

Document 00450

BIDDER'S STATEMENT OF MBE/WBE/PDBE/DBE/SBE STATUS

This certifies that the status of the Bidder, _____, in
(Bidder's Name)
regard to the City of Houston Code of Ordinances, Chapter 15, Article V, relating to City-wide percentage goals for contracting with Minority and Women-owned Business Enterprises (MWBE) and Disadvantaged Business Enterprises (DBE), Chapter 15, Article VI, relating to City-wide percentage goals for contracting with Persons with Disabilities Business Enterprises (PDBE) and Chapter 15, Article IX, relating to City-wide percentage goals for contracting with a Small Business Enterprise (SBE) is as follows:

1. Bidder (individual, partnership, corporation) is is not a Minority Business Enterprise as certified by the Affirmative Action and Contract Compliance Division.
2. Bidder (individual, partnership, corporation) is is not a Women-owned Business Enterprise as certified by the Affirmative Action and Contract Compliance Division.
3. Bidder (individual, partnership, corporation) does does not declare itself to be a Persons with Disabilities Business Enterprise as defined above.
4. Bidder (individual, partnership, corporation) does does not declare itself to be a Disadvantaged Business Enterprise as defined above.
5. Bidder (individual, partnership, corporation) does does not declare itself to be a Small Business Enterprise as defined above.

Signature: _____

Title: _____

Date: _____

END OF DOCUMENT

Document 00454

AFFIDAVIT OF NON-INTEREST

BEFORE ME, the undersigned authority, a Notary Public in and for the State of Texas,
on

this day personally appeared _____, who
Affiant

being by me duly sworn on his oath stated that he is _____, of
Title

Name of Firm

the firm named and referred to and in the foregoing; and that he knows of no officer,
agent, or employee of the City of Houston being in any manner interested either directly
or indirectly in such Contract.

Affiant's Signature

SWORN AND SUBSCRIBED before me on _____.
Date

Notary Public in and for the State of TEXAS

Print or type name

My Commission Expires: _____
Expiration Date

END OF DOCUMENT

Document 00455

OWNERSHIP INFORMATION FORM

The City of Houston Ownership Information Form is used to gather information to comply with:

- a. The City of Houston Contractor Ownership Disclosure Ordinance ([Chapter 15 of the Code of Ordinances, Article VIII. City Contracts; Indebtedness to City](#));
- b. The City of Houston Fair Campaign Ordinance ([Chapter 18 of the Code of Ordinances](#)); and,
- c. The State of Texas Statement of Residency Requirements ([Tex. Govt. Code Chapter 2252](#)).

Please complete the form, in its entirety, and submit it with the Official Bid or Proposal Form. Except as noted below regarding the Statement of Residency, failure to provide this information may be just cause for rejection of your bid or proposal.

NOTICE OF AFFIRMATIVE ACCEPTANCE OF THE CITY OF HOUSTON FAIR CAMPAIGN ORDINANCE

By submitting a bid or proposal to the City of Houston for a Contract in excess of \$50,000 or for which a request is presented to City Council for approval, all respondents agree to comply with the Chapter 18 of the Code of Ordinances.

Further, pursuant to Section 18-36 of the Code of Ordinances, it shall be unlawful either for any person who submits a bid or proposal to contribute or offer any contribution to a candidate or for any candidate to solicit or accept any contribution from such person for a period commencing at the time of posting of the City Council Meeting Agenda including an item for the award of the Contract and ending upon the 30th day after the award of the Contract by City Council.

INSTRUCTIONS

1. Please **type** or **legibly print in dark ink** responses. Individuals and entities should disclose their full, legal names (not initials) and all required corporate letters ("Inc", "LLP", etc.).
 - a. If a firm is operating under an assumed name, the following format is recommended:
Corporate/Legal Name DBA Assumed Name.
2. Full addresses are required, including street types ("St", "Rd", etc.) and unit number.
3. Individuals or entities with 10% or more ownership of the corporation, partnership, or joint venture (including persons who own 100%) are required to be disclosed with their full name and full address. All officers and directors are also required to be disclosed with their full name and full address.

PROJECT AND BID/PROPOSAL PREPARER INFORMATION

Project or Matter Being Bid: _____

Bidder's complete firm/company business information

Name: _____

Business Address [No./Street] _____

City / State / Zip Code _____

Telephone Number _____

Bidder's email address

Email Address: _____

STATEMENT OF RESIDENCY

(THE STATEMENT OF RESIDENCY PORTION OF THIS DOCUMENT IS **NOT APPLICABLE** IF THE SOLICITATION INDICATES FEDERAL FUNDS WILL BE USED)

TEX. GOV'T CODE §2252.001(4) defines a "**Resident bidder**" as a bidder whose principal place of business* is in this state, and includes a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

TEX. GOV'T CODE §2252.001(3) defines a "**Nonresident bidder**" as a bidder who is not a resident in this state.

* Principal Place of Business in Texas means that the business entity:

- has at least one permanent office located within the **State of Texas**, from which business activities other than submitting bids to governmental agencies are conducted and from which the bid is submitted; and
- has at least one employee who works in the Texas office.

Based on the definitions above, your business is a:

- TEXAS RESIDENT BIDDER
 NONRESIDENT BIDDER

If you are a Nonresident Bidder, does your home state have a statute giving preference to resident bidders? If so, you must attach a copy of the statute to this Document.

A copy of the State of _____ statute is attached.

NOTE: The State of residency of a bidder is not used in the decision-making criteria for the award of contracts for projects receiving federal funding, whether in whole or in part.

CONTRACTING ENTITY ORGANIZATIONAL ENTITY TYPE

FOR PROFIT ENTITY:

NON-PROFIT ENTITY:

- SOLE PROPRIETORSHIP
- CORPORATION
- PARTNERSHIP
- LIMITED PARTNERSHIP
- JOINT VENTURE
- LIMITED LIABILITY COMPANY
- OTHER (*specify in space below*)

- NON-PROFIT CORPORATION
- UNINCORPORATED ASSOCIATION

LISTING OF ADDRESSES

List all current and prior addresses where the bidder does/has done business or owns property (real estate and/or business personal property) in the city of Houston ("Houston") in the past 3 years from the date of submittal of this form. If within the past 3 years from the date of submitting this form, the bidder does not and has not done business and has not or does not own property (real estate and/or business personal property) in Houston, please state "None" on the first line below.

Address

Address

Address

ATTACH ADDITIONAL SHEETS AS NEEDED.

LISTING OF OFFICERS

LIST ALL OFFICERS OF THE ENTITY, REGARDLESS OF THE AMOUNT OF OWNERSHIP (IF NONE STATE "NONE")

Name _____ Officer	_____
Address	_____
Name _____ Officer	_____
Address	_____
Name _____ Officer	_____
Address	_____
Name _____ Officer	_____
Address	_____
Name _____ Officer	_____
Address	_____
Name _____ Officer	_____
Address	_____

LISTING OF DIRECTORS OR MEMBERS

LIST ALL DIRECTORS OF THE ENTITY, REGARDLESS OF THE AMOUNT OF OWNERSHIP (IF NONE STATE "NONE")

Name _____ Director or Member	_____
Address	_____
Name _____ Director or Member	_____
Address	_____
Name _____ Director or Member	_____
Address	_____
Name _____ Director or Member	_____
Address	_____
Name _____ Director or Member	_____
Address	_____

DISCLOSURE OF OWNERSHIP (OR NON-PROFIT OFFICERS)

Bidders are required to disclose all owners of 10% or more of the Contracting Entity. For non-profit entities, please provide the complete information for the President, Vice-President, Secretary, and Treasurer.

IN ALL CASES, USE FULL NAMES, LOCAL BUSINESS AND RESIDENCE ADDRESSES AND TELEPHONE NUMBERS. DO NOT USE POST OFFICE BOXES FOR ANY ADDRESS. INCLUSION OF E-MAIL ADDRESSES IS OPTIONAL, BUT RECOMMENDED.

ATTACH ADDITIONAL SHEETS AS NEEDED.

Contracting Entity:

Name: _____
Business Address [No./Street] _____
City / State / Zip Code _____
Telephone Number _____
Email Address: _____

DISCLOSURE OF OWNERSHIP (OR NON-PROFIT OFFICERS) *continued.*

Owner(s) of 10% or More (IF NONE, STATE "NONE."):

Name: _____
Business Address [No./Street] _____
City / State / Zip Code _____
Telephone Number _____
Email Address: _____
Residence Address [No./Street] _____
City / State / Zip Code _____

Owner(s) of 10% or More (IF NONE, STATE "NONE."):

Name: _____
Business Address [No./Street] _____
City / State / Zip Code _____
Telephone Number _____
Email Address: _____
Residence Address [No./Street] _____
City / State / Zip Code _____

ATTACH ADDITIONAL SHEETS AS NEEDED.

OPTIONAL: TAX APPEAL INFORMATION

If the firm/company or an owner/officer is actively protesting, challenging, or appealing the accuracy and/or amount of taxes levied with a tax appraisal district, please provide the following information:

Debtor (Firm or Owner Name):	
Tax Account Nos.:	
Case or File Nos.:	
Attorney/Agent Name:	
Attorney/Agent Phone No.:	
Tax Years:	

Status of Appeal [**DESCRIBE**]:

If an appeal of taxes has been filed on behalf of your company, please include a copy of the official form received by the appropriate agency.

REQUIRED: UNSWORN DECLARATION

I certify that I am duly authorized to submit this form on behalf of the firm, that I am associated with the firm in the capacity noted below, and that I have personal knowledge of the accuracy of the information provided herein. I affirm that all the information contained herein is true and correct to the best of my knowledge. I understand that failure to submit accurate information with my submission may result in my submission being considered non-responsive and non-responsible.

Preparer's Signature	Date
<hr/>	<hr/>
Printed name	
<hr/>	
Title	

NOTE: This form constitutes a governmental record, as defined by Section 37.01 of the Texas Penal Code. Submission of a false government record and falsification of a governmental record are crimes, punishable as provided in Section 37.10 of the Texas Penal Code.

Document 00457

Conflict of Interest Questionnaire

Local Government Code Chapter 176 requires Bidders with the City of Houston ("City") to file a Conflict of Interest Questionnaire with the City Secretary of the City of Houston.

The Conflict of Interest Questionnaire is available for downloading on the Texas Ethics Commission's website at: <http://www.ethics.state.tx.us>

The completed Conflict of Interest Questionnaire will be posted on the City Secretary's website. Also you will find a list of the City Local Government Officers on the City Secretary's website.

For your convenience the CIQ form is attached as part of this document. Although the City has provided this document for the Bidders convenience, it is the Bidders responsibility to submit the latest version of the CIQ form as promulgated by the Texas Ethics Commission.

The Failure of any Bidder to comply with this law is a Class C misdemeanor.

END OF DOCUMENT

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 Name of vendor who has a business relationship with local governmental entity.

2 Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 Name of local government officer about whom the information is being disclosed.

Name of Officer

4 Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

Yes No

5 Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

6 Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

Signature of vendor doing business with the governmental entity

Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

- (i) a contract between the local governmental entity and vendor has been executed;
- or
- (ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

- (1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);
- (2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or
- (3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

- (1) the date that the vendor:
 - (A) begins discussions or negotiations to enter into a contract with the local governmental entity; or
 - (B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or
- (2) the date the vendor becomes aware:
 - (A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);
 - (B) that the vendor has given one or more gifts described by Subsection (a); or
 - (C) of a family relationship with a local government officer.



City of Houston Pay or Play Program Acknowledgement Form



It has been determined that the project currently open for bidding meets the criteria of the City of Houston Pay or Play program. This form acknowledges your awareness of the Pay or Play program which is authorized by Ordinance 2007-534. Your signature below affirms that you will comply with the requirements of the program upon contract award and ensure the same on behalf of your subcontractors that may be subject to the Pay or Play Program.

I declare under penalty of perjury under the laws of the State of Texas that if awarded this contract which meets the criteria for the City of Houston's Pay or Play Program, I will comply with all requirements of the Pay or Play Program in accordance with Executive Order 1-7.

Fill out all information below and submit this form with your bid/proposal packet.

Solicitation Number

Signature

Date

Print Name

City Vendor ID

Company Name

Phone Number

Email Address

For more information about the Pay or Play program please visit
<http://www.houstontx.gov/obo/popforms.html>.

Questions about the Pay or Play Program should be referred to the Department POP Liaison; an updated contact list is available on the Office of Business Opportunity website or call the POP Contract Administrator at 832-393-0633.



Hire Houston First Application and Affidavit



Thank you for your interest in the Hire Houston First initiative. It is the policy of the City of Houston as defined in Chapter 15, Article XI, to use the City's spending powers in a manner that promotes fiscal responsibility and maximizes the effectiveness of local tax dollars by ensuring a portion of citizens' tax dollars remain in the local economy for economic benefit of the citizens by utilizing all available legal opportunities to contract with city and/or local businesses.

Businesses interested in becoming eligible to participate in the Hire Houston First initiative must complete this application and sign the attached affidavit. Only businesses that meet the requirements will be eligible to participate in the Hire Houston First initiative. **A completed HHF application is NOT evidence of designation under the Hire Houston First initiative. An applicant's eligibility must be confirmed in writing by the Office of Business Opportunity.**

Definitions:

- A. **City Business** means a business with a principal place of business within city limits.
- B. **Local Area** means eight counties in and surrounding Houston city limits. The counties are Harris, Fort Bend, Montgomery, Brazoria, Galveston, Chambers, Waller, and Liberty.
- C. **Local Business** means a business with a principal place of business in the local area.
- D. **Principal place of business** means the business must be headquartered or have an established place or places of business in the incorporated limits of the city or the local area as applicable, from which 20% or more of the entity's workforce are regularly based, and from which a substantial role in the entity's performance of a commercially useful function or a substantial part of its operations is conducted. A location utilized solely as a post office box, mail drop or telephone message center or any combination thereof, with no other substantial work function, shall not be construed as a principal place of business.
- E. **Headquartered** means the location where an entity's leadership directs, controls, and coordinates the entity's activities.

Application

Please complete the following form/affidavit and submit it to the Office of Business Opportunity, Houston Business Solutions Center located at 611 Walker, Lobby Level, Houston, TX 77002 (832) 393-0954. Applications may be submitted via e-mail to houstonBSC@houstontx.gov or faxed to 832.393.0650. Incomplete applications and affidavits will not be processed. Please answer all questions.

1. **Application Date:** _____

2. **Company is applying as (please check at least one box):**

- City Business (CB) with a principal place of business within the city limits from which a substantial role in the entity's performance of a commercially useful function or a substantial part of its operations is conducted as defined in Chapter 15, Article XI.
- Local Business (LB) with a principal place of business in the local area from which a substantial role in the entity's performance of a commercially useful function or a substantial part of its operations is conducted as defined in Chapter 15, Article XI.

3. **Name of Owner or CEO:** _____ **Name of Company:** _____

FOR OFFICE USE ONLY:

Business Address	Primary Activities	Number of Employees
Business Name: Street Address: City, State: Zip Code: Main Phone Number:		

13. List all company locations OUTSIDE the eight (8) county local area, including headquarters locations, as well as addresses, primary activities and number of employees at each location.

Business Address	Corporate Headquarters?	Primary Activities	Number of Employees
Business Name: Street Address: City, State: Zip Code: Main Phone Number:	YES/NO		
Business Name: Street Address: City, State: Zip Code: Main Phone Number:	YES/NO		
Business Name: Street Address: City, State: Zip Code: Main Phone Number:	YES/NO		
Business Name: Street Address: City, State: Zip Code: Main Phone Number:	YES/NO		
Business Name: Street Address: City, State: Zip Code: Main Phone Number:	YES/NO		

14. What is the total number of employees in the entire company? _____

15. Is the company represented on this application an independent or dependent subsidiary of a company with headquarters located outside the eight county local area? (Check One)

- NOT** a subsidiary of any company
- YES** – An independent subsidiary. Please submit Federal corporate tax returns and any other documentation necessary to show independence from the parent company.
- YES** – A dependent subsidiary. Please answer the following questions:

(a). What is the total number of employees within the (8) county local area inclusive of the company represented on this application and the parent company? _____

(b). What is the total number of all employees inclusive of the company represented on this application and the parent company? _____

Hire Houston First Affidavit

I _____ certify and affirm that my business _____ is not
Name of Company Owner Name of Company
a location utilized solely as a post office box, mail drop or telephone message center or any combination thereof, with
no other substantial work function.

The undersigned swear/affirm that the foregoing information and statements are true and correct with regard to the
employee breakdown of the company's work force, location, and principal place of business. In addition, the
undersigned gives permission to the City of Houston to conduct random audits to ensure compliance with the Hire
Houston First Initiative under Chapter 15, Article XI.

Name of Company Owner

Name of Company

On this day before me appeared (name) _____ with _____ proper
identification, who being duly sworn, did execute the foregoing affidavit and did aver that he or she was properly
authorized to execute this affidavit and did so as his or her free act/deed.

Signature (Owner /Applicant)

Title

Name (Print)

Date

(Seal)

Notary Attest:

Notary Public

Commission Expiration

DOCUMENT 00480

REFERENCE VERIFICATION

1.0 REFERENCES

- 1.1 Contractor must be able to demonstrate that they have sufficient expertise, qualified personnel experienced and that their company has done or currently providing the services of similar size as specified in the statement of work. Contractor must have been actively engaged as an actual business entity in the activities described in the bid document for at least the five (5) years immediately prior to the submission of their bid.
- 1.2 The reference(s) must be included in the space provided below. Additional pages may be added if necessary. References must be included at the time of bid submittal.

LIST OF CURRENT/PREVIOUS CUSTOMERS

- 1. Company Name: _____

Contact Person/Title: _____ Phone No.: _____
E-mail Address: _____
Address: _____

Contract Award Date: _____ Contract Completion Date: _____

Contract Name/Title: _____
Project Description: _____

- 2. Company Name: _____
Contact Person/Title: _____ Phone No.: _____
E-mail Address: _____
Address: _____
Contract Award Date: _____ Contract Completion Date: _____
Contract Name/Title: _____

Project Description: _____

3. Company Name: _____
Contact Person/Title: _____ Phone No.: _____
E-mail Address: _____
Address: _____
Contract Award Date: _____ Contract Completion Date: _____
Contract Name/Title: _____
Project Description: _____

SAMPLE	REFERENCE VERIFICATION
Houston Airport System	
Planning, Design & Construction	
Reference Verification for _____	(Respondent's Company Name)
Name of Company:	
Name of Contact:	
Phone Number of Contact:	
E-Mail Address of Contact:	
QUESTIONS TO BE ASKED BY HOUSTON AIRPORT SYSTEM	
1. When did this company perform work for you?	
2. What type of service did this company perform for you?	
3. Did they perform the work as agreed?	
4. Was the company timely with responding to your needs?	
5. How many instances of services has this company provided for you?	
6. Did company representatives conduct themselves in a professional manner?	
7. Would you do business with this company again?	
Additional Comments:	
Name/Phone Number of Person conducting Reference Verification:	
SIGNATURE: _____ DATE: _____	

Anti-Collusion Statement

The undersigned, as Proposer, certifies that the only person or parties interested in this Proposal as principals are those named herein; that the Proposer has not, either directly or indirectly entered into any Agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the award of this Contract.

Date

Proposer Signature

Document 00495

POST-BID PROCEDURES

1.0 DOCUMENT ADDRESSES

- A. Notice of Intent to Award.
- B. Monitoring Authority
- C. Requirements of Bidder.
- D. Failure of Bidder to comply with requirements.
- E. Notice to Proceed.

2.0 NOTICE OF INTENT TO AWARD

- A. The City will provide written Notice of Intent to Award to Low Bidder.

3.0 DEFINITIONS

- A. The "Monitoring Authority" for this Project is:

Houston Airport System
Office of Business Opportunity
Contract Compliance Section
18600 Lee Road, Suite 131
Humble, Texas 77338

4.0 REQUIREMENTS OF BIDDER

- A. Within 10 work days of receipt of Notice of Intent to Award, Low Bidder shall execute and deliver to Humberto De la Garza, Senior Procurement Specialist (Supply Chain Management) and Monitoring Authority, for the City's approval, documents indicated by an "X" below:

- Document 00501 - Resolution of Contractor
- Document 00520 – Agreement
- Document 00570 – Revised MWSBE Participation Plan *(Only submit if you have changed your MWBE participation plan from the original 00470)*
- Document 00571 – Post-Bid Good Faith Efforts *(Only submit if you could not meet MWBE participation goals from the 00570)*

- Document 00572 – Contractor’s Goal Deviation Request (*Only submit if you could not meet MWBE participation goals from the 00570*)
- Document 00600 - List of Proposed Subcontractors and Suppliers
- Document 00601 - Drug Policy Compliance Agreement
- Document 00602 - Contractor's Drug-free Workplace Policy (*Contractor creates this document.*)
- Document 00604 - History of OSHA Actions and List of On-the-job Injuries
- Document 00605 - List of Safety Impact Positions (*Contractor completes this list. Do not submit if submitting Document 00606.*)
- Document 00606 - Contractor's Certification of No Safety Impact Positions (*Do not submit if submitting Document 00605.*)
- Document 00607 - Certification Regarding Debarment, Suspension, and Other Responsibility Matters (For AIP Grant only)
- Document 00608 - Contractor's Certification Regarding Non-segregated Facilities for Project Funded by AIP Grant (For AIP Grant only)
- Document 00609 – List of Nonroad Diesel Equipment (Do not need to submit if not participating in Clean Air Incentive under Document 00800 Section 9.13.2)
- Document 00610 - Performance Bond (100% of total amount of bid)
- Document 00611 - Statutory Payment Bond (100% of total amount of bid)
- Document 00612 - One-year Maintenance Bond (100% of total amount of bid)
- Document 00613 - One-year Surface Correction Bond (4% of total amount of bid)
- Document 00620 - Affidavit of Insurance
- Document 00621 – City of Houston *Certificate of Insurance (for guidance, see Document 00800, Article 11)*
- Document 00622 - Name and Qualifications of Proposed Superintendent (*Contractor creates this document.*)
- Document 00628 - Affidavit of Compliance with DBE Program (For AIP Grant only)
- Document 00629 - Affidavit for FAA Form 7460-1
- Document 00630 – Agreement to comply with POP Program
- Document 00631 - City of Houston Pay or Play Program – List of Participating Subcontractors
- Document 00632 – EEO Certification by Material Suppliers, Professional Service Providers
- Document 00636 – Certificate of Interested Parties FORM 1295
- Document 00810 – Wage Scale for Engineering Construction; Exhibit B, Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees; Exhibit C, Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees (For AIP Grant only)

- Document 00811 – Wage Scale for Building Construction; Exhibit B, Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees; Exhibit C, Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees (For AIP Grant only)
 - Document 00812 – Wage Scale for Engineering Heavy Construction [For Water and Sewer]; Exhibit B, Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees; Exhibit C, Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees
 - Document 00814 – Wage Scale for Engineering Heavy Construction [For Flood Control]; Exhibit B, Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees; Exhibit C, Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees
 - Document 00820 – Wage Scale for Civil Engineering Construction [For CIP Funded Project]; Exhibit B, Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees; Exhibit C, Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees
 - Document 00821 – Wage Scale for Building Construction [For CIP Funded Project]; Exhibit B, Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees; Exhibit C, Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees
- B. Original forms contained in Document 00805 - Equal Employment Opportunity Program Requirements:
1. Original forms contained in Document 00805 - Equal Employment Opportunity Program Requirements:
 - EEO-3, Certification by Bidder Regarding Equal Employment Opportunity
 - EEO-6, Total Work Force Composition of the Company *or in lieu thereof, a copy of the latest Equal Employment Opportunity Commission's EEO-1 form (This information is required only if the Contractor has a work force of 50 or more people and the Contract is \$50,000 or more.)*
 - EEO-7, Company's Equal Employment Opportunity Compliance Program
 - EEO-26, Certification by Proposed Subcontractor Regarding Equal Employment Opportunity

- C. Designations of Subcontractors and Suppliers, who have been selected by Bidder in Part B - Schedule of Non-MWBE/PDBE/DBE/SBE Subcontractors and Suppliers of Document 00600 - List of Proposed Subcontractors and Suppliers, and accepted by the City, may be changed only with prior notice and acceptance by Project Manager as provided in Conditions of the Contract.
- D. On Bidder's written request, Humberto De La Garza, Sr. Procurement Specialist, may grant an extension of time, not to exceed 5 days, to furnish documents specified in Paragraphs 4.0.A and 4.0.B. If Bidder is required to resubmit documents specified in Paragraph 4.0.A or 4.0.B, Bidder shall do so within time limits provided in the request for resubmission.
- E. Designations of Subcontractors and Suppliers, who have been selected by Bidder in its Participation Plan, and accepted by the City, may be changed only with prior notice and acceptance by the Monitoring Authority as provided in Document 00808 - Minority and Women-owned Business Enterprise (MWBE), Persons with Disabilities Business Enterprise (PDBE) and Small Business Enterprise (SBE) Program.

5.0 FAILURE OF BIDDER TO COMPLY WITH REQUIREMENTS

- A. Should Bidder, on receipt of Notice of Intent to Award, fail to comply with requirements of this Document 00495 within stated time, the City may declare award in default and require forfeiture of the Security Deposit.
- B. After the City's written notice of default to Low Bidder, the City may award the Contract to Bidder whose offer is the next lowest bid, and Security Deposit of Bidder in default shall be forfeited to the City in accordance with provisions of Document 00200 - Instructions to Bidders.

6.0 NOTICE TO PROCEED

- A. Upon the City's execution of the Agreement and delivery to Contractor, SCM will give Document 00551 - Notice to Proceed to Contractor, which establishes Date of Commencement of the Work.

END OF DOCUMENT

Document 00501
RESOLUTION OF CONTRACTOR

(Name of Contractor, e.g., "Biz. Inc.", "Biz LLP")
is a _____,
(Type of Organization, e.g.: Corporation, Limited Partnership, Limited Liability Partnership, Limited Liability Company, etc.)
which is bound by acts of _____,
(Name and Form of Governing Entity, e.g., "Biz Inc. Board of Directors", "Bill Smith, GP",
etc.)
("Governing Entity").

On the ____ day of _____, 20____, the Governing Entity resolved, in
accordance with all documents, rules, and laws applicable to the Contractor, that
_____, is authorized to act as the
(Contractor's Representative)
Contractor's Representative in all business transactions (initial one) ____ conducted in
the State of Texas OR ____ related to this Contract; and

The Governing Entity warrants that the above resolution (a) was entered into
without dissent or reservation by the Governing Entity, (b) has not been rescinded or
amended, and (c) is now in full force and effect; and

In authentication of the adoption of this resolution, I subscribe my name on this
____ day of _____, 20____.

(Authorized Signature for Governing Entity)

(Print or Type Name and Title of Authorized Signatory)

SWORN AND SUBSCRIBED before me on _____
Date

Notary Public in and for the State of Texas

My Commission Expires: _____
Expiration Date

Print or Type Name of Notary Public

INSTRUCTIONS: Contractor must execute a Resolution of Contractor for each
individual authorized to sign Contract Documents related to this Contract. Contractor
may rescind Resolutions of Contractor through a written document in similar form.

END OF DOCUMENT

Document 00520

AGREEMENT

Project: Replace and Update Information Booths Hobby, William P. Hobby Airport
Project Location: 7800 Airport Blvd., Houston Texas 77061
Project No: PN 941.

The City: THE CITY OF HOUSTON, 900 Bagby Street, Houston, Texas 77002 (the "City")
and

Contractor: _____
(Address for Written Notice) _____

Phone Number: _____

E-mail Address: _____

City Engineer, with respect to Section 4.1.9 and 4.3 thru 4.5 of the General Conditions, is:

Eren Selcen, P.E., – HAS City Engineer, City of Houston Airport. Aviation Department, Infrastructure
Division (or his or her successor)

Address for Written Notice: 111 Standifer Street, Humble, TX

77338 Phone Number: 281-233-1605

Email Address: eren.selcen@houstontx.gov

**City Engineer, City Employee designated by the Director of Department of Aviation to represent
the City Engineer, with respect to all other terms of the General Conditions, is:**

Jeffrey Tennyson (or his or her successor)

Phone Number: 281 233 1640

E-mail Address: jeffrey.tennyson@houstontx.gov

THE CITY AND CONTRACTOR AGREE AS FOLLOWS:

ARTICLE 1

THE WORK OF THE CONTRACT

1.1 Contractor shall perform the Work in accordance with the Contract.

**ARTICLE 2
CONTRACT TIME**

2.1 Contractor shall achieve Date of Substantial Completion within 240 days after Date of Commencement of the Work, subject to adjustments of Contract Time as provided in the Contract.

2.2 The Parties recognize that time is of the essence for this Agreement and that the City will suffer financial loss if the Work is not completed within the Contract Time. Parties also recognize delays, expense, and difficulties involved in proving in a legal or arbitration proceeding actual loss suffered by the City if the Work is not completed on time. Accordingly, instead of requiring any such proof, the Parties agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay the City the amount stipulated in Document 00800 – Supplementary Conditions, for each day beyond Contract Time.

**ARTICLE 3
CONTRACT PRICE**

3.1 Subject to terms of the Contract, the City will pay Contractor in current funds for Contractor's performance of the Contract, Contract Price of \$ _____, which includes Alternates, if any, accepted below.

3.2 The City accepts Alternates as follows:

Alternate No. 1 Not Applicable

**ARTICLE 4
PAYMENTS**

4.1 The City will make progress payments to Contractor as provided below and in Conditions of the Contract.

4.2 The Period covered by each progress payment is one calendar month ending on the 25th day of the month.

4.3 The City will issue Certificates for Payment and will make progress payments on the basis of such Certificates as provided in Conditions of the Contract.

4.4 Final payment, constituting entire unpaid balance of Contract Price, will be made by the City to Contractor as provided in Conditions of the Contract.

**ARTICLE 5
CONTRACTOR REPRESENTATIONS**

5.1 Contractor represents:

5.1.1 Contractor has examined and carefully studied Contract documents and other related data identified in Bid Documents.

- 5.1.2 Contractor has visited the site and become familiar with and is satisfied as to general, local, and site conditions that may affect cost, progress, and performance of the Work.
- 5.1.3 Contractor is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.
- 5.1.4 Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in Contract documents and (2) reports and drawings of a hazardous environmental condition, if any, at the site which has been identified in Contract documents.
- 5.1.5 Contractor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including applying specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract to be employed by Contractor, and safety precautions and programs incident thereto.
- 5.1.6 Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for performance of the Work at Contract Price, within Contract Time, and in accordance with the Contract.
- 5.1.7 Contractor is aware of general nature of work to be performed by the City and others at the site that relates to the Work as indicated in Contract documents.
- 5.1.8 Contractor has correlated information known to Contractor, information and observations obtained from visits to the site, reports and drawings identified in the Contract, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract.
- 5.1.9 Contractor has given City Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract, and written resolution thereof by City Engineer is acceptable to Contractor.
- 5.1.10 Contract documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 6

MISCELLANEOUS PROVISIONS

- 6.1 The Contract may be terminated by either Party as provided in Conditions of the Contract.
- 6.2 The Work may be suspended by the City as provided in Conditions of the Contract.

ARTICLE 7

ENUMERATION OF CONTRACT DOCUMENTS

- 7.1 The following documents are incorporated into this Agreement:
 - 7.1.1 Document 00700 - General Conditions.
 - 7.1.2 Document 00800 - Supplementary Conditions.
 - 7.1.3 General Requirements Division 01.
 - 7.1.4 Technical Specs: Divisions 02 through 17 of Specifications (Division 17 – Telecommunications - may be substituted by the Division 27 under the CSI Masterformat 04 numbering system.)
 - 7.1.5 Drawings listed in Document 00015 - List of Drawings and bound separately.
 - 7.1.6 Addenda which apply to the Contract, are as follows:

- Addendum 1: _____
 - Addendum 2: _____
 - Addendum 3: _____
 - Addendum 4: _____

- 7.1.7 Other documents:

<u>Document No.</u>	<u>Title</u>
[X] 00410B	Bid Form – Part B
[] 00470	Pre-bid MWSBE Participation Plan
[] 00470D	Pre-bid DBE Participation Plan for Project Funded by AIP Grant
[] 00471	Pre-bid Good Faith Efforts
[] 00472	Pre-bid Goal Deviation Request
[X] 00501	Resolution of Corporation (if a corporation)
[] 00570	Post-bid MWSBE Participation Plan
[] 00571	Post-bid Good Faith Efforts
[] 00572	Post-bid Goal Deviation Request
[] 00607	Contractor's Certification Regarding Debarment, Suspension for Project Funded by AIP Grant
[] 00608	Contractor's Certification Regarding Non-Segregated Facilities for Project Funded by AIP Grant
[X] 00610	Performance Bond
[X] 00611	Statutory Payment Bond
[X] 00612	One-year Maintenance Bond
[] 00613	One-year Surface Correction Bond
[X] 00620	Affidavit of Insurance
[X] 00621	City of Houston Certificate of Insurance

- 00628 Affidavit of Compliance with Disadvantaged Business Enterprise (DBE) Program for Project Funded By AIP Grant
- 00630 Agreement to Comply with Pay or Play Program
- 00631 List of Participating Subcontractors (POP-3)
- 00801 FAA Supplementary Conditions (for AIP Only)
- 00804 ARRA requirements (for ARRA grants Only)
- 00805 EEO Program Requirements
- 00806 Disadvantaged Business Enterprise (DBE) Program (For AIP Only)
- 00807 Bidder/Contractor Requirements For Disadvantaged Business Enterprise (DBE) Program (For AIP Only)
- 00808 Bidder Requirements for MWSBE Program
- 00810 Federal Wage Rate - Highway
- 00811 Federal Wage Rate - Building
- 00812 Wage Rate for Engineering Heavy – Water & Sewer Line
- 00814 Wage Rate for Engineering Heavy – Flood Control
- 00820 Wage Rate for Engineering Construction
- 00821 Wage Rate for Building Construction
- 00840 Pay or Play Program
- 00842 Letter of Intent

- 00912 Rider (Contractor Initials: _____)

**ARTICLE 8
SIGNATURES**

8.1 This Agreement is executed in two original copies and is effective as of the date of countersignature by City Controller.

CONTRACTOR:

(If Joint Venture)

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

Tax Identification Number: _____

Tax Identification Number:

CITY OF HOUSTON, TEXAS

APPROVED:

SIGNED:

By: _____

Director, Department of Aviation

By: _____

Mayor

COUNTERSIGNED:

By: _____

City Controller

ATTEST/SEAL:

Date Countersigned:

By: _____

City Secretary

8.2 This Contract and Ordinance have been reviewed as to form by the undersigned legal assistant and have been found to meet established Legal Department criteria. Legal Department has not reviewed the content of these documents.

Legal Assistant

Date

END OF DOCUMENT

Document 00601

DRUG POLICY COMPLIANCE AGREEMENT

I, _____, _____,
Name Title

of _____
Contractor

have authority to bind Contractor with respect to its Bid, Proposal, or performance of any and all contracts it may enter into with the City of Houston; and that by making this Agreement, I affirm that Contractor is aware of and by the time the Contract is awarded will be bound by and agree to designate appropriate safety impact positions for company employee positions, and to comply with the following requirements before the City issues a Notice to Proceed:

1. Develop and implement a written Drug Free Workplace Policy and related drug testing procedures for Contractor that meet the criteria and requirements established by the Mayor's Amended Policy on Drug Detection and Deterrence (Mayor's Drug Policy) and the Mayor's Drug Detection and Deterrence Procedures for Contractors (Executive Order No. 1-31).
2. Obtain a facility to collect urine samples consistent with Health and Human Services (HHS) guidelines and an HHS-certified drug-testing laboratory to perform drug tests.
3. Monitor and keep records of drug tests given and results; and upon request from the City of Houston, provide confirmation of such testing and results.
4. Submit semi-annual Drug Policy Compliance Declarations.

I affirm on behalf of Contractor that full compliance with the Mayor's Drug Policy and Executive Order No. 1-31 is a material condition of the Contract with the City of Houston,

I further acknowledge that falsification, failure to comply with or failure to timely submit declarations or documentation in compliance with the Mayor's Drug Policy or Executive Order No. 1-31 will be considered a breach of the Contract with the City and may result in non-award or termination of the Contract by the City.

Contractor Title

Signature Date

END OF DOCUMENT

Document 00604

HISTORY OF OSHA ACTIONS AND LIST OF ON-THE-JOB INJURIES

Prior to award of the Contract, Low Bidder will be required to file the following with the City:

1. A history of all OSHA actions, advisories, etc., Contractor has received on all jobs worked in any capacity, prime or subcontractor. The history shall be for the two-year period preceding the Bid Date of the Project.
2. A list of all on-the-job injuries, accidents, and fatalities suffered by any present or former employees of Contractor during the same two-year period.
3. If less than the two-year period, give the date Contractor started doing business.

This information must be submitted to the City within the time period stated in Document 00498 - Notice of Intent to Award. An officer of the company must certify in a notarized statement that the information submitted is true and correct.

END OF DOCUMENT

Document 00605

LIST OF SAFETY IMPACT POSITIONS

Contractor is to provide a complete List of Employee Classifications that are considered in a "Safety Impact Position" and the number of employees in each of those classifications.

Employee Classification

Number of Employees

END OF DOCUMENT

00605-1
02-01-2004

Document 00610

PERFORMANCE BOND

THAT WE, _____, as Principal, (the "Contractor"), and the other subscriber hereto, _____, as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Houston (the "City"), a municipal corporation, in the penal sum of \$_____ for the payment of which sum, well and truly to be made to the City, its successors and assigns, Contractor and Surety do bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a Contract in writing with the City for _____, _____, all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein.

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

It is further understood and agreed that the Surety does hereby relieve the City or its representatives from the exercise of any diligence whatever in securing compliance on the part of the Contractor with the terms of the Contract, and the Surety agrees that it shall be bound to take notice of and shall be held to have knowledge of all acts or omissions of the Contractor in all matters pertaining to the Contract. The Surety understands and agrees that the provision in the Contract that the City will retain certain amounts due the Contractor until the expiration of 30 days from the acceptance of the Work is intended for the City's benefit, and the City will have the right to pay or withhold such retained amounts or any other amount owing under the Contract without changing or affecting the liability of the Surety hereon in any degree.

It is further expressly agreed by Surety that the City or its representatives are at liberty at any time, without notice to the Surety, to make any change in the Contract documents and in the Work to be done thereunder, as provided in the Contract, and in

the terms and conditions thereof, or to make any change in, addition to, or deduction from the Work to be done thereunder; and that such changes, if made, shall not in any way vitiate the obligation in this Bond and undertaking or release the Surety therefrom.

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

If the City gives Surety notice of Contractor's default, Surety shall, within 45 days, take one of the following actions:

1. Arrange for Contractor, with consent of the City, to perform and complete the Contract; or
2. Take over and assume completion of the Contract itself, through its agents or through independent contractors, and become entitled to the payment of the balance of the Contract Price.

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

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

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

Any party wishing to file a claim may call the Texas Department of Insurance at 1-800-252-3439 to obtain Surety's address for claims processing.

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

ATTEST, SEAL: (if a corporation)
WITNESS: (if not a corporation)

Name of Contractor

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS:
(SEAL)

Full Name of Surety

Address of Surety for Notice

Telephone Number of Surety

By: _____
Name:
Title:
Date:

By: _____
Name:
Title: Attorney-in-Fact
Date:

This Ordinance or Contract has been reviewed as to form by the undersigned legal assistant and have been found to meet established Legal Department criteria. The Legal Department has not reviewed the content of these documents.

Legal Assistant

Date

END OF DOCUMENT

Document 00611

STATUTORY PAYMENT BOND

THAT WE, _____, as Principal, hereinafter called Contractor and the other subscriber hereto, _____, as Surety, do hereby acknowledge ourselves to be held and firmly bound unto the City of Houston, a municipal corporation, in the sum of \$_____ for the payment of which sum, well and truly to be made to the City of Houston, and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a contract in writing with the City of Houston for _____, all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein;

NOW, THEREFORE, if the said Contractor shall pay all claimants supplying labor and materials to him or a Subcontractor in the prosecution of the Work provided for in the Contract, then, this obligation shall be void; otherwise the same is to remain in full force and effect;

PROVIDED HOWEVER, that this Bond is executed pursuant to the provisions of Chapter 2253, Texas Government Code, as amended, and all liabilities on this Bond shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

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

Any party wishing to file a claim may obtain Surety's address for claims processing on file with the Texas Department of Insurance by calling [1-800-252-3439](tel:1-800-252-3439).

ATTEST, SEAL: (if a corporation)
WITNESS: (if not a corporation)

Name of Contractor

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS:
(SEAL)

Full Name of Surety

Address of Surety for Notice

Telephone Number of Surety

By: _____
Name:
Title:
Date:

By: _____
Name:
Title: Attorney-in-Fact
Date:

This Ordinance or Contract has been reviewed as to form by the undersigned legal assistant and have been found to meet established Legal Department criteria. The Legal Department has not reviewed the content of these documents.

Legal Assistant

Date

END OF DOCUMENT

Document 00612

ONE-YEAR MAINTENANCE BOND

THAT WE, _____, as Principal, hereinafter called Contractor, and the other subscriber hereto, _____, as Surety, do hereby acknowledge ourselves to be held and firmly bound to the City of Houston, a municipal corporation, in the sum of \$_____, for the payment of which sum well and truly to be made to the City of Houston and its successors, the said Contractor and Surety do bind themselves, their heirs, executors, administrators, successors, jointly and severally.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has on or about this day executed a Contract in writing with the City of Houston for _____, _____, all of such work to be done as set out in full in said Contract documents therein referred to and adopted by the City Council, all of which are made a part of this instrument as fully and completely as if set out in full herein.

NOW THEREFORE, if the said Contractor shall comply with the provisions of Paragraph 11.5.1 of the General Conditions, and correct work not in accordance with the Contract documents discovered within the established one-year period, then this obligation shall become null and void, and shall be of no further force and effect; otherwise, the same is to remain in full force and effect.

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

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

ATTEST, SEAL: (if a corporation)
WITNESS: (if not a corporation)

Name of Contractor

By: _____
Name:
Title:

By: _____
Name:
Title:
Date:

ATTEST/SURETY WITNESS:

(SEAL)

Full Name of Surety

Address of Surety for Notice

Telephone Number of Surety

By: _____

Name:

Title:

Date:

By: _____

Name:

Title: Attorney-in-Fact

Date:

This Ordinance or Contract has been reviewed as to form by the undersigned legal assistant and have been found to meet established Legal Department criteria. The Legal Department has not reviewed the content of these documents.

Legal Assistant

Date

END OF DOCUMENT

Document 00620

AFFIDAVIT OF INSURANCE

BEFORE ME, the undersigned authority, on this day personally appeared

_____, who
Affiant

being by me duly sworn on his oath stated that he is _____, of
Title

_____,
Contractor's Company Name

the Contractor named and referred to within the Contract documents; that he is fully competent and authorized to give this affidavit and that the attached original insurance certificate truly and accurately reflects the insurance coverage that is now available and will be available during the term of the Contract.

Affiant's Signature

SWORN AND SUBSCRIBED before me on _____.
Date

Notary Public in and for the State of TEXAS

Print or type Notary Public name

My Commission Expires: _____
Expiration Date

END OF DOCUMENT



City of Houston Pay or Play Program Certification of Compliance



Prime Contractor: _____ Subcontractor: _____

Address: _____

Outline Number: _____ Contract Amount: \$ _____

Project Name: [Legal Project Name] _____

Contracting Department: _____

In accordance with the City of Houston Pay or Play Program authorized by Ordinance 2007-534 and Executive Order 1-7, Prime/Subcontractor agrees to abide by the terms of this Program. This certification is required of all contractors for contracts subject to the program. You must agree either to PAY, PLAY or BOTH for all covered employees. If selecting BOTH, the Contractor/Subcontractor may Pay on behalf of some covered employees and Play on behalf of the remaining covered employees.

The Prime/Subcontractor will comply with all provisions of the Pay or Play Program Requirements and will furnish all information and reports requested to determine compliance of the Pay or Play Program (See Executive Order 1-7 for the terms of the Pay or Play program).

The Prime/Subcontractor may agree to **“Pay”** \$1.00 per hour for work performed by covered employees under the contract with the City. If independent contract labor is utilized the Contractor/Subcontractor agrees to report hours worked by the independent contract laborer and pay \$1.00 per hour for work performed.

The Prime/Subcontractor may agree to **“Play”** by providing health benefits to each covered employee. The health benefits must meet the following criteria:

- The employer contributes no less than 75% of the total premium costs per covered employee per month toward the total premium cost.
- The covered employee contributes, if any amount, no greater than 25% of the total monthly premium costs.

Please select whether you choose to:	Pay	Play	Both

The Prime/Subcontractor will file compliance reports with the City, which will include activity for covered employees subject to the program, in the form and to the extent requested by the administering department. Compliance reports shall contain information including, but not limited to, documentation showing employee health coverage and employee work records.

Note: The contractor is responsible to the City for compliance of covered employees of covered subcontractors.

Please indicate the estimated number of:	PRIME	SUB
Total Employees on City Job		
Covered Employees		
Non-Covered Employees		
Exempt Employees		

I hereby certify that the above information is true and correct.

Please Sign

Date

Please Print Name & Title

Project No. PN 941

Document 00632

CERTIFICATION BY PROPOSED MATERIAL SUPPLIERS,
LESSORS, AND PROFESSIONAL SERVICE PROVIDERS
REGARDING EQUAL EMPLOYMENT OPPORTUNITY

Company Name: _____ \$ _____
(Supplier, Lessor, Professional Service Provider) (Amount of Contract)

Company Address: _____

Company Telephone Number: _____ Fax: _____

E-mail Address: _____

Web Page/URL Address: _____

Company Tax Identification Number: _____

Project Name & No.: _____

Materials/Services Provided: _____

In accordance with Chapter 15 of the City of Houston’s Code of Ordinances, Supplier/Lessor/Professional Service Provider represents to be an equal opportunity employer and agrees to abide by the terms of the Ordinance. This certification is required of all Suppliers/Lessors/Professional Service Providers providing goods or service to this project with agreements \$50,000 or more.

Yes No Supplier agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, or age.

Yes No Supplier agrees that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, national origin, or age.

Yes No Supplier will comply with all provisions of **Executive Order No. 11246** and rules, regulations and applicable orders of the Department of Labor or other Federal Agency responsible for enforcement of applicable equal opportunity and affirmative action provisions and will likewise furnish all information and reports required by the Mayor or Contract Compliance Officers for the purpose of investigation to ascertain and effect compliance with the City of Houston’s Office of Business of Opportunity.

Yes No The Supplier shall file and cause their sub-tier contractors to file compliance reports with the City in the form and to the extent as may be prescribed by the Mayor or Contract Compliance Officers. Compliance reports filed at such times as directed shall contain information including, but not limited to, the practices, policies, programs, and employment policies.

I hereby certify that the above information is true and correct.

COMPANY OFFICER (Signature) DATE

NAME AND TITLE (Print or type)

END OF DOCUMENT

Document 00636

Certificate of Interested Parties

In accordance with Texas Gov't Code §2252.908, the successful bidder must complete Form 1295, Certificate of Interested Parties. Form 1295 is available for downloading on the Texas Ethics Commission's (TEC) website: <https://www.ethics.state.tx.us/forms/1295.pdf>.

The successful bidder must use the application to enter the required information on Form 1295 and print a copy of the completed form, which will include a certification of filing that will contain a unique certification number.

No later than 30 days after the contract's effective date, the City will upload the successful bidder's completed Form 1295. The TEC will post the Contractor's completed Form 1295 within seven business days of receipt.

For your reference, Form 1295 is attached as part of this document.

END OF DOCUMENT

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties.
 Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the goods or services to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO interested Party.

6 **AFFIDAVIT** I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

 Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20_____, to certify which, witness my hand and seal of office.

 Signature of officer administering oath Printed name of officer administering oath Title of officer administering oath

ADD ADDITIONAL PAGES AS NECESSARY

Document 00700

GENERAL CONDITIONS

March 7, 2022 EDITION

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ARTICLE 1 - GENERAL PROVISIONS

1.1 DEFINITIONS

1.1.1 Agreement: Document signed by the Parties and binding the Parties, containing the name of Contractor, title and location of the Project, Original Contract Time, Original Contract Price, enumeration of documents included in the Contract, and other provisions.

1.1.2 Bonds: Performance Bond, Payment Bond, Maintenance Bond, and other Surety instruments executed by Surety. When in singular form, refers to individual instrument.

1.1.3 Business Enterprise: Any business entity registered in a program authorized by 49 C.F.R. § 26 (where applicable) or City Code of Ordinances, Chapter 15, Article II, relating to Equal Opportunity Employment and taking affirmative action to ensure that applicants are employed and employees are treated without regard to race, religion, color, sex, national origin, or age. The term "Business Enterprise" may include any Disadvantaged Business Enterprise ("DBE"), Minority Business Enterprise ("MBE"), Woman Business Enterprise ("WBE"), Small Business Enterprise ("SBE"), Person with Disability Enterprise ("PDBE"), and any Historically Underutilized Business ("HUB").

1.1.4 Business Enterprise Policy: Contract documents and applicable policies relating to Business Enterprises and authorized under 49 C.F.R. § 26 or City Code of Ordinances, Chapter 15, Article V.

1.1.5 Cash Allowance: An estimated sum of money to be used only for a limited class of expenditures such as utility relocation costs, fees for special licenses or permits, or other "pass-through" costs that would be the same for any contractor. Cash Allowances may not be used to purchase goods or services that are not specified in the Contract. The unspecified items must be purchased according to the terms of Article 7.

1.1.6 Change Order: Written instrument prepared by the City and signed by City Engineer and Contractor, specifying the following:

- 1.1.6.1 a change in the Work;
- 1.1.6.2 a change in Contract Price, if any; and
- 1.1.6.3 a change in Contract Time, if any.

The value of a Change Order is the net amount after offsetting all deductions against all additions effected by the Change Order.

1.1.7 City: The City of Houston, a home rule municipality located principally within Harris County, Texas, including its successors and its authorized representatives.

1.1.8 City Engineer: The City Engineer, or the City employee representing the City Engineer, designated in the Agreement and authorized to represent the City, or successors.

1.1.9 Claim: Written demand or written assertion by one Party seeking adjustment of the Contract, payment of money, extension of time, or other relief under the Contract and includes, but is not limited to, claims for materials, labor, equipment, delay, changes, adjustments, substitutions, fees and third party claims. The Party making the Claim has the responsibility to substantiate the Claim.

1.1.10 Conditions of the Contract: General Conditions and Supplementary Conditions.

1.1.11 Construction Manager: Person or firm under contract with the City as its authorized representative to oversee and administer construction of the Work, and who may perform the role of Project Manager and Inspector, as designated by City Engineer in writing.

1.1.12 Contract: The Agreement; documents enumerated in and incorporated into the Agreement, Modifications, and amendments.

1.1.13 Contract Price: The monetary amount stated in the Agreement adjusted by Change Order, and increases or decreases in Unit Price Quantities, if any.

1.1.14 Contract Time: The number of days stated in the Agreement to substantially complete the Work, plus days authorized by Change Order.

1.1.15 Contract Year: a twelve (12) month period during the term of the contract commencing on the Effective Date of this Agreement and each anniversary thereof.

1.1.16 Contractor: Person or firm identified as such in the Agreement including its successors and its authorized representatives.

1.1.17 Date of Commencement of the Work: Date established in Notice to Proceed on which Contract Time will commence. This date will not be changed by failure of Contractor, or persons or entities for whom Contractor is responsible, to act.

1.1.18 *Date of Substantial Completion:* Date that construction, or portion thereof designated by City Engineer, is certified by City Engineer to be substantially complete.

1.1.19 *Design Consultant:* Person or firm, under contract with the City, to provide professional services during construction and its authorized representatives. If a Design Consultant is not employed for services during construction, Project Manager will perform duties of Design Consultant designated in the Contract in addition to usual duties of Project Manager.

1.1.20 *Drawings:* Graphic and pictorial portions of the Contract that define the character and scope of the Work.

1.1.21 *Extra Unit Price:* Unit Prices, which may be required for completion of the Work. These Unit Prices and Unit Price Quantities are in the Contract and are included in Original Contract Price.

1.1.22 *Furnish:* To supply, pay for, deliver to the site, and unload.

1.1.23 *General Requirements:* The sections of Division 01 Specifications that specify administrative and procedural requirements and temporary facilities required for the Work.

1.1.24 *Inspector:* City's employee or agent authorized to assist with inspection of the Work.

1.1.25 *Install:* Unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, clean, protect, and similar operations.

1.1.26 *Legal Holiday:* Day established by the City Council as a holiday.

1.1.27 *Major Unit Price Work:* An individual Unit Price item,

1.1.27.1 whose value is greater than five percent of Original Contract Price,

1.1.27.2 whose value becomes greater than five percent of Original Contract Price as the result of an increase in quantity, or

1.1.27.3 whose value is \$100,000, whichever is least.

1.1.28 *Mayor's Office of Business Opportunity:* any reference to, or use of, the "Office of Affirmative Action" shall mean the Mayor's Office of Business Opportunity, or any such future name to which it is changed.

1.1.29 *Minor Change in the Work:* A written change in the Work, ordered by City Engineer, that does not change Contract Price or Contract Time, and that is consistent with the general scope of the Contract.

1.1.30 *Modification:* Change Order, Work Change Directive, or Minor Change in the Work.

1.1.31 *Notice of Noncompliance:* A written notice by City Engineer to Contractor regarding defective or nonconforming work that does not meet the Contract requirements, and that establishes a time by which Contractor shall correct the defective or nonconforming work.

1.1.32 *Notice to Proceed:* A written notice by City Engineer to Contractor establishing Date of Commencement of the Work.

1.1.33 *Original Contract Price:* The monetary amount originally stated in the Agreement.

1.1.34 *Parties:* Contractor and the City. When in singular form, refers to Contractor or the City.

1.1.35 *Pollutant:* Any materials subject to the Texas Solid Waste Disposal Act.

1.1.36 *Pollutant Facility:* Any facility regulated by the State of Texas to protect the health and environment from contamination by Pollutants, including without limitation, landfills, oil and gas production and storage facilities, wastewater facilities, waste injection wells, and storage tanks (including drums).

1.1.37 *Product:* Materials, equipment, or systems incorporated into the Work or to be incorporated into the Work.

1.1.38 *Product Data:* Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by Contractor to illustrate a Product.

1.1.39 *Project:* Total construction, of which the Work performed under the Contract may be the whole or a part, and which may include construction by the City or by separate contractors.

1.1.40 *Project Manager:* City Engineer's authorized representative for administration of the Work. Titles used within the City's departments may be different than those used in this definition.

1.1.41 *Provide:* Furnish and Install, complete, ready for intended use.

1.1.42 Samples: Physical examples that illustrate Products, or workmanship, and establish standards by which the Work is judged.

1.1.43 Shop Drawings: Drawings, diagrams, schedules, and other data specially prepared for the Work by Contractor, Subcontractor or Supplier, to illustrate a portion of the Work.

1.1.44 Specifications: Divisions 01 through 16 of the documents that are incorporated into the Agreement, consisting of written General Requirements and requirements for Products, standards, and workmanship for the Work, and performance of related services.

1.1.45 Stipulated Price: Single lump sum amount stated in the Contract for completion of the Work, or for designated portion of the Work.

1.1.46 Subcontractor: Person or firm that has direct or indirect contract with Contractor or with another Subcontractor to perform a portion of the Work and its authorized representatives.

1.1.47 Superintendent: Employee of Contractor having authority and responsibility to act for and represent Contractor.

1.1.48 Supplementary Conditions: Part of Conditions of the Contract that amends or supplements General Conditions.

1.1.49 Supplier: Manufacturer, distributor, materialman, or vendor having a direct agreement with Contractor or Subcontractor for Products, or services and its authorized representatives.

1.1.50 Surety: Corporate entity that is bound by one or more Bonds, and is responsible for completion of the Work, including the correction period, and for payment of debts incurred in fulfilling the Contract. Surety shall include co-surety or reinsurer, as applicable.

1.1.51 Underground Facilities: Pipes, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments and encasements containing such facilities that exist below ground level.

1.1.52 Unit Price: An amount stated in the Contract for an individual, measurable item of work, which, when multiplied by actual quantity incorporated into the Work, amounts to full compensation for completion of the item, including work incidental to it.

1.1.53 Unit Price Quantities: Quantities indicated in the Contract that are approximations made by the City for contracting purposes.

1.1.54 Work: Entire construction required by the Contract, including all labor, Products, and services provided by Contractor to fulfill Contractor's obligations. The Work may constitute the whole or a portion of the Project.

1.1.55 Work Change Directive: A written change in the Work, ordered by City Engineer, that is within the general scope of the Contract and consisting of additions, deletions, or other revisions. A Work Change Directive will state proposed basis for adjustment, if any, in Contract Price or Contract Time, or both.

1.2 EXECUTION, CORRELATION, AND INTENT

1.2.1 Execution of the Contract by Contractor is conclusive that Contractor has visited the Work site, become familiar with local conditions under which the Work will be performed, and fully informed itself as to conditions and matters which can affect the Work or costs. Contractor further agrees that it has carefully correlated personal observations with requirements of the Contract.

1.2.2 The Contract and Modifications have been read and carefully considered by Contractor, who understands and agrees to their sufficiency for the Work. The Contract may not be more strongly construed against the City than against Contractor and Surety.

1.2.3 Contractor shall include all items necessary for proper execution and completion of the Work.

1.2.4 Reference to standard specifications, manuals, or codes of a technical society, organization, or association, or to laws or regulations of a governmental authority, whether specific or implied, mean the latest edition in effect as of date of receipt of bids, except as may be otherwise specifically stated in the Contract.

1.2.5 No provision of any referenced standard, specification, or manual changes the duties and responsibilities of the City, City Engineer, Contractor, or Design Consultant from those set forth in the Contract. Nor do these provisions assign to Design Consultant any duty or authority to supervise or direct performance of the Work or any

duty or authority to undertake any actions contrary to provisions of the Contract.

1.2.6 Organization of Specifications into divisions, sections, and articles and arrangement of Drawings does not control Contractor in dividing the Work among Subcontractors or in establishing the extent of work to be performed by any trade.

1.2.7 Unless otherwise defined in the Contract, words which have well-known construction industry technical meanings are used in the Contract in accordance with these recognized meanings.

1.3 OWNERSHIP AND USE OF DOCUMENTS

1.3.1 Drawings, Specifications, and other documents prepared by the City or by Design Consultant are instruments of service through which the Work to be executed by Contractor is described. Contractor may retain one Contract record set.

1.3.2 Neither Contractor, Subcontractor, nor Supplier will own or claim a copyright to documents contained in the Contract or any part of the Contract.

1.3.3 Documents contained in the Contract, prepared by the City or by Design Consultant, and copies furnished to Contractor, are for use solely with respect to the Work. They may not be used by Contractor, Subcontractor or Supplier on other projects or for additions to the Work, outside the scope of the Work, without the specific written consent of City Engineer, and Design Consultant, when applicable.

1.3.4 Contractor, Subcontractors, and Suppliers are granted a limited license to use and reproduce applicable portions of the Contract appropriate to and for use in execution of their work under the Contract.

1.4 INTERPRETATION

1.4.1 Specifications are written in an imperative streamlined form and are directed to Contractor, unless noted otherwise. When written in this form, words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

1.4.2 In the interest of brevity, the Contract frequently omits modifying words such as "all" and "any" and articles such as "the" and "an", but an absent modifier or article is not intended to affect interpretation of a statement.

ARTICLE 2 - THE CITY

2.1 LIMITATIONS OF THE CITY'S OFFICERS AND EMPLOYEES

2.1.1 No officer or employee of the City may authorize Contractor to perform an act or work contrary to the Contract, except as otherwise provided in the Contract.

2.2 DUTIES OF THE CITY

2.2.1 If a building permit is required, the City will process an application for, and Contractor shall purchase the building permit before Date of Commencement of the Work.

2.2.2 The City will make available to Contractor a reproducible set of Drawings. Additional copies will be furnished, on Contractor's request, at the cost of reproduction.

2.2.3 When necessary for performance of the Work, the City will provide surveys describing physical characteristics, legal limitations, legal description of site, and horizontal and vertical control adequate to lay out the Work.

2.2.4 Information or services that the City is required to provide under the Contract will be provided by the City with reasonable promptness to avoid delay in orderly progress of the Work.

2.2.5 The Contract imposes no implied duty on the City. The City does not warrant any plans or specifications associated with the Contract.

2.2.6 Except as expressly stated in this Article, the City owes no duty to the Contractor or any subcontractor.

2.3 AVAILABILITY OF LAND AND USE OF SITE

2.3.1 The City will furnish, as indicated in the Contract, rights-of-way, land on which the Work is to be performed, and other land designated in the Contract for use by Contractor unless otherwise provided in the Contract.

2.3.2 Contractor shall confine operations at site to those areas permitted by law, ordinances, permits, and the Contract, and may not unreasonably encumber site with materials or equipment.

2.3.3 In addition to land provided by the City under Section 2.3, Contractor shall provide all land and access to land that may be required for use by

Contractor for temporary construction facilities or for storage of materials and equipment, and shall indemnify the City during its use of the land as stated in Section 3.25.

2.4 *THE CITY'S RIGHT TO STOP THE WORK*

2.4.1 If Contractor fails to carry out the Work in accordance with the Contract, or fails to correct work which is not in accordance with requirements of the Contract as required in Sections 12.1 and 12.2, the City may, by Notice of Noncompliance, order Contractor to stop the Work or any portion of the Work until the cause for the order has been eliminated. However, the right of the City to stop the Work will not give rise to a Claim for delay or to a duty on the part of the City to exercise this right for the benefit of Contractor or any other person or entity, except to the extent required by Section 6.2. If Contractor corrects the defective or nonconforming work within the time established in Notice of Noncompliance, City Engineer will give written notice to Contractor to resume performance of the Work.

2.5 *THE CITY'S RIGHT TO CARRY OUT WORK*

2.5.1 If Contractor fails to carry out work in accordance with the Contract, and fails within the period established in a Notice of Noncompliance to correct the nonconforming work, the City may, after expiration of the required period, correct the deficiencies without prejudice to other remedies the City may have, including rights of the City under Section 14.1.

2.5.1.1 When the City corrects deficiencies, City Engineer will issue an appropriate Change Order and deduct from payments then or thereafter due Contractor the cost of correcting the deficiencies, including compensation for Design Consultant's and Construction Manager's additional services and expenses made necessary by such default, neglect, or failure. This action by the City and amounts charged to Contractor are both subject to prior approval of City Engineer. If payments, then or thereafter due Contractor, are not sufficient to cover these amounts, Contractor shall pay the difference to the City.

2.5.2 Notwithstanding the City's right to carry out work, maintenance and protection of the Work

remains Contractor's responsibility, as provided in the Contract.

ARTICLE 3 - CONTRACTOR

3.1 *RESPONSIBILITIES*

3.1.1 Contractor shall maintain office with agent in the greater City of Houston area during the Contractor's performance under the Contract. Contractor shall file its street address with City Engineer.

3.1.2 Contractor and Contractor's employees shall not give or lend money or anything of value to an officer or employee of the City. Should this Paragraph 3.1.2 be violated, City Engineer may terminate the Contract under Section 14.1.

3.2 *REVIEW OF CONTRACT AND FIELD CONDITIONS BY CONTRACTOR*

3.2.1 Contractor shall carefully study and compare documents contained in the Contract with each other and with information furnished by the City pursuant to Section 2.2 and shall immediately report, in writing, any errors, inconsistencies, or omissions to City Engineer. If work is affected, Contractor shall obtain a written interpretation or clarification from City Engineer before proceeding with the affected work. However, Contractor will not be liable to the City for failure to report an error, inconsistency, or omission in the Contract unless Contractor had actual knowledge or should have had knowledge of the error, inconsistency, or omission.

3.2.2 Contractor shall take field measurements and verify field conditions, and shall carefully compare the conditions and other information known to Contractor with the Contract, before commencing activities. Contractor shall immediately report, in writing, to City Engineer for interpretation or clarification of discrepancies, inconsistencies, or omissions discovered during this process.

3.2.3 Contractor shall make a reasonable attempt to understand the Contract before requesting interpretation from City Engineer.

3.3 *SUPERVISION AND CONSTRUCTION PROCEDURES*

3.3.1 Contractor shall supervise, direct, and inspect the Work competently and efficiently, devoting the attention and applying the skills and

expertise as necessary to perform the Work in accordance with the Contract. Contractor is solely responsible and has control over construction means, methods, techniques, sequences, and procedures of construction; for safety precautions and programs in connection with the Work; and for coordinating all work under the Contract.

3.3.2 Regardless of observations or inspections by the City or City's consultants, Contractor shall perform and complete the Work in accordance with the Contract and submittals approved pursuant to Section 3.18. The City is not liable or responsible to Contractor or Surety for work performed by Contractor that is not in accordance with the Contract regardless of whether discovered during construction or after acceptance of the Work.

3.4 *SUPERINTENDENT*

3.4.1 Contractor shall employ a competent Superintendent and necessary assistants who shall be present at the site during performance of the Work. Communications given to Superintendent are binding on the Contractor.

3.4.2 Contractor shall notify City Engineer in writing of its intent to replace the Superintendent. Contractor may not replace the Superintendent if City Engineer makes a reasonable objection in writing.

3.5 *LABOR*

3.5.1 Contractor shall provide competent, qualified personnel to survey and lay out the Work and perform construction as required by the Contract. The City may, by written notice, require Contractor to remove from the Work any employee of Contractor or Subcontractors to whom City Engineer makes reasonable objection.

3.5.2 Contractor shall comply with the applicable Business Enterprise Policy set out in this Agreement and in the Supplementary Conditions, as set out in Chapter 15, Article V of the City of Houston Code of Ordinances.

3.5.3 When Original Contract Price is greater than \$1,000,000, Contractor shall make Good Faith Efforts to award subcontracts or supply agreements in at least the percentages set out in the Supplementary Conditions for Business Enterprise Policy ("Stated MWBE goal"). If the Contractor is a certified MBE or WBE, Contractor may count toward goals the work that it commits to perform with its own work force, capped at 50% of the total advertised goal. Contractor acknowledges that it has reviewed the requirements for Good Faith

Efforts on file with the City's Office of Business Opportunity and shall comply with them.

3.5.3.1 Contractor shall require written subcontracts with Business Enterprises and shall submit all disputes with Business Enterprises to voluntary mediation. Business Enterprise subcontracts complying with City Code of Ordinances Chapter 15, Article II must contain the terms set out in Subparagraph 3.5.3.2. If Contractor is an individual person, as distinguished from a corporation, partnership, or other legal entity, and the amount of the subcontract is \$50,000 or less, the subcontract must also be signed by the attorneys of the respective parties.

3.5.3.2 Contractor shall ensure that subcontracts with Business Enterprise firms are clearly labeled **"THIS CONTRACT MAY BE SUBJECT TO MEDIATION ACCORDING TO THE TEXAS ALTERNATIVE DISPUTE RESOLUTION ACT"** and contain the following terms:

3.5.3.2.1 (Business Enterprise) shall permit representatives of the City of Houston, at all reasonable times, to perform (1) audits of the books and records of the Subcontractors and Suppliers, and (2) inspections of all places where work is to be undertaken in connection with this subcontract. (Business Enterprise) shall keep the books and records available for this purpose for at least four years after the end of its performance under this subcontract. Nothing in this provision shall affect the time for bringing a cause of action nor the applicable statute of limitations.

3.5.3.2.2 Within five business days of execution of this subcontract, Contractor and (Business Enterprise) shall designate in writing to the Director an agent for receiving any notice required or permitted to be given pursuant to Chapter 15 of the Houston City Code of Ordinances, along with the street and mailing address and phone number of the agent.

3.5.3.3 If the term of this Agreement exceeds one Contract Year and Contractor's MWBE participation level in a Contract Year is less than the Stated MWBE goal, then

within 30 calendar days of the end of each Contract Year, Contractor must provide a written detailed explanation to both the Director and OBO Director of the following: (1) the discrepancy between Contractor's MWBE participation level and the Stated MWBE goal, (2) the reason for the discrepancy, and (3) Contractor's good faith efforts (in accordance with the City's policy) towards achieving the Stated MWBE goal. As part of the good faith efforts assessment, the OBO Director may consider Contractor's failure to timely submit the notice or explanation required by this provision and the OBO Director may impose sanctions or other penalties on Contractor for said failures in accordance with Chapter 15 of the Code of Ordinances, OBO's policies and procedures, and the City's good faith efforts policy.

3.5.4 The requirements and terms of the City of Houston Pay or Play Program, as set out in Executive Order 1-7, as revised from time to time, are incorporated into the Contract for all purposes. Contractor has reviewed Executive Order 1-7 and shall comply with its terms and conditions. **IF CONTRACTOR DOES NOT PAY IN ACCORDANCE WITH THE PAY OR PLAY PROGRAM WITHIN 30 DAYS OF THE DATE CITY ENGINEER SENDS CONTRACTOR WRITTEN NOTIFICATION, CITY CONTROLLER MAY DEDUCT FUNDS UP TO THE AMOUNT OWED FROM ANY PAYMENTS OWED TO CONTRACTOR UNDER THIS CONTRACT, AND CONTRACTOR WAIVES ANY RECOURSE.**

3.6 *PREVAILING WAGE RATES*

3.6.1 Contractor shall comply with governing statutes providing for labor classification of wage scales for each craft or type of laborer, worker, or mechanic.

3.6.2 Prevailing wage rates applicable to the Work may be one or a combination of the following wage rates identified in Division 00:

- 3.6.2.1 Federal Wage Rate General Decisions
 - 3.6.2.1.1 Highway Rates
 - 3.6.2.1.2 Building Rates
 - 3.6.2.1.3 Heavy Construction Rates
 - 3.6.2.1.4 Residential Rates
- 3.6.2.2 City Prevailing Wage Rates
 - 3.6.2.2.1 Building Construction Rates

3.6.2.2 Engineering Construction Rates

3.6.2.2.3 Asbestos Worker Rates

3.6.3 Each week Contractor shall submit to the City's Mayor's Office of Business Opportunity certified copies of payrolls showing classifications and wages paid by Contractor, Subcontractors, and Suppliers for each employee under the Contract, for any day included in the Contract.

3.7 *LABOR CONDITIONS*

3.7.1 In the event of labor disputes affecting Contractor or Contractor's employees, Contractor shall utilize all possible means to resolve disputes in order that the Work not be delayed to any extent. These means will include seeking injunctive relief and filing unfair labor practice charges, and any other action available to Contractor.

3.7.2 When Contractor has knowledge that any actual or potential labor dispute is delaying or is threatening to delay timely performance of the Work, Contractor shall immediately notify City Engineer in writing. No Claims will be accepted by City Engineer for costs incurred as a result of jurisdictional or labor disputes.

3.8 *DRUG DETECTION AND DETERRENCE*

3.8.1 It is the policy of the City to achieve a drug-free work force and to provide a workplace that is free from the use of illegal drugs and alcohol. It is also the policy of the City that manufacture, distribution, dispensation, possession, sale, or use of illegal drugs or alcohol by contractors while on the City's premises is prohibited. By executing the Contract, Contractor represents and certifies that it meets and will comply with all requirements and procedures set forth in the Mayor's Policy on Drug Detection and Deterrence, City Council Motion No. 92-1971 ("Mayor's Policy") and the Mayor's Drug Detection and Deterrence Procedures for Contractors, Executive Order No. 1-31, (Revised) ("Executive Order"). Mayor's Policy is on file in the office of the City Secretary. Copies of Executive Order may be obtained at the location specified in the Advertisement for Bids.

3.8.1.1 The Executive Order applies to the City's contracts for labor or services except the following:
3.8.1.1.1 contracts authorized by Emergency Purchase Orders,

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- 3.8.1.1.2 contracts in which imposition of requirements of the Executive Order would exclude all potential bidders or proposers, or would eliminate meaningful competition for the Contract,
- 3.8.1.1.3 contracts with companies that have fewer than 15 employees during any 20-week period during a calendar year and no safety impact positions,
- 3.8.1.1.4 contracts with non-profit organizations providing services at no cost or reduced cost to the public, and
- 3.8.1.1.5 contracts with federal, state, or local governmental entities.
- 3.8.1.2 Prior to execution of the Contract, Contractor shall have filed with the City:
- 3.8.1.2.1 a Drug Policy Compliance Agreement form (Attachment "A" to the Executive Order), and
- 3.8.1.2.2 a copy of Contractor's drug free workplace policy, and
- 3.8.1.2.3 a written designation of all safety impact positions, if applicable, or a Contractor's Certification of a No Safety Impact Positions form (Attachment "C" to the Executive Order).
- 3.8.1.3 Every six months during performance of the Contract and upon completion of the Contract, Contractor shall file a Drug Policy Compliance Declaration form (Attachment "B" to the Executive Order). The Contractor shall submit the Drug Policy Compliance Declaration within 30 days of expiration of each six-month period of performance and within 30 days of completion of the Contract. The first six-month period shall begin on Date of Commencement of the Work.
- 3.8.1.4 Contractor shall have a continuing obligation to file updated designation of safety impact positions when additional safety impact positions are added to Contractor's employee workforce during performance of the Work.
- 3.8.1.5 Contractor shall require its Subcontractors and Suppliers to comply with the Mayor's Policy and Executive Order. Contractor is responsible for securing and maintaining required documents from Subcontractors and Suppliers for the City inspection throughout the term of the Contract.
- 3.8.1.6 Failure of Contractor to comply with requirements will be a material breach of the Contract entitling the City to terminate in accordance with Section 14.1.
- 3.9 *MATERIALS & EQUIPMENT*
- 3.9.1 Unless otherwise provided in the Contract, Contractor shall provide and assume full responsibility for Products, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, transportation, temporary facilities, supplies, and other facilities and incidentals necessary for Furnishing, performing, testing, starting-up, and completing the Work.
- 3.9.1.1 Contractor, Subcontractors, and Suppliers shall use Ultra Low Sulfur Diesel Fuel in all diesel operating vehicles and motorized equipment utilized in performing the Work. Ultra Low Sulfur Diesel Fuel is defined as diesel fuel having 15 ppm or the applicable standard set by state or federal law or rules and regulations of the Texas Commission on Environmental Quality, or the Environmental Protection Agency, whichever is less in sulfur content. Off-road Ultra Low Sulfur Diesel Fuel may be used in lieu of on-road Ultra Low Sulfur Diesel Fuel. Contractor shall provide, upon request by City Engineer, proof that Contractor, Subcontractors, and Suppliers are using Ultra Low Sulfur Diesel Fuel.
- 3.9.2 Contractor shall provide Products that are:
- 3.9.2.1 new, unless otherwise required or permitted by the Contract, and
- 3.9.2.2 of specified quality.
- If required by City Engineer, Contractor shall furnish satisfactory evidence, including reports of required tests, as to kind and quality of Products.
- 3.9.3 Contractor shall store Products in a safe, neat, compact, and protected manner. Contractor shall also store Products delivered during the work, along the right-of-way:
- 3.9.3.1 so as to cause the least inconvenience to property owners, tenants, and general public; and
- 3.9.3.2 so as not to block access to, or be closer than, three feet to any fire hydrant.
- Contractor shall protect trees, lawns, walks, drives, streets, and other improvements that are to remain, from damage. If private or public property is damaged by Contractor, Contractor shall, at its sole

expense, restore the damaged property to at least its original condition.

3.9.3.1 Contractor shall obtain City Engineer's approval for storage areas used for Products for which payment has been requested under Paragraph 9.6.1. Contractor shall provide the City access to the storage areas for inspection purposes. Products, once paid for by the City, become the property of the City and may not be removed from place of storage, without City Engineer's written permission except for a movement to the site. Contractor's Installation Floater, required under Section 11.2, shall cover all perils, including loss or damage to Products during storage, loading, unloading, and transit to the site.

3.10 *PRODUCT OPTIONS AND SUBSTITUTIONS*

3.10.1 For Products specified by reference standards or by description only, Contractor may provide any Product meeting those standards or description.

3.10.2 For Products specified by naming one or more manufacturers with provision for substitutions or equal, Contractor may submit a request for substitution for any manufacturer not named.

3.10.3 City Engineer will consider requests for substitutions only within the first 15 percent of Contract Time, or first 90 days after date of Notice to Proceed, whichever is less.

3.10.4 Contractor shall document each request for substitution with complete data substantiating compliance of proposed substitution with the Contract.

3.10.5 A request for substitution constitutes a representation that Contractor:

3.10.5.1 has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified Product;

3.10.5.2 shall provide the same warranty for the substitution as for the specified Product;

3.10.5.3 shall coordinate installation of the proposed substitution and make changes to other work which may be required for the Work to be completed,

with no additional cost or increase in time to the City;

3.10.5.4 confirms that cost data is complete and includes all related costs under the Contract;

3.10.5.5 waives Claim for additional costs or time extensions that may subsequently become apparent; and

3.10.5.6 shall provide review or redesign services by a design consultant with appropriate professional license and shall obtain re-approval and permits from authorities.

3.10.6 City Engineer will not consider and will not approve substitutions when:

3.10.6.1 they are indicated or implied on Shop Drawing or Product Data submittals without separate written request; or

3.10.6.2 acceptance will require revision to the Contract.

3.10.7 City Engineer may reject requests for substitution, and his decision will be final and binding on the Parties.

3.11 *CASH ALLOWANCES*

3.11.1 Contract Price includes Cash Allowances as identified in the Contract.

3.11.2 The City will pay the actual costs of Cash Allowance item exclusive of profit, overhead or administrative costs. If actual costs exceed the Cash Allowance, City Engineer must approve a Change Order for the additional costs.

3.12 *WARRANTY*

3.12.1 Contractor warrants to the City that Products furnished under the Contract are:

3.12.1.1 free of defects in title;

3.12.1.2 of good quality; and

3.12.1.3 new, unless otherwise required or permitted by the Contract.

If required by the City Engineer, Contractor shall furnish satisfactory evidence as to kind, quality and title of Products, and that Products conform to requirements of the Contract.

3.12.2 In the event of a defect in a Product, either during construction or warranty period, Contractor shall take appropriate action with manufacturer of Product to assure correction or replacement of defective Product with minimum delay.

3.12.3 Contractor warrants that the Work is free of defects not inherent in the quality required or permitted, and that the Work does conform with the requirements of the Contract. Contractor further warrants that the Work has been performed in a thorough and workmanlike manner.

3.12.4 Contractor warrants that the Work is free of concentrations on polychlorinated biphenyl (PCB) and other substances defined as hazardous by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) or any other applicable law or regulation.

3.12.5 Work not conforming to requirements of Section 3.12, including substitutions not properly approved and authorized, may be considered nonconforming work.

3.12.6 Contractor's warranty excludes remedy for damage or defect caused by:

3.12.6.1 improper or insufficient maintenance by the City;

3.12.6.2 normal wear and tear under normal usage; or

3.12.6.3 claim that hazardous material was incorporated into the Work, if that material was specified in the Contract.

3.12.7 Contractor warrants that title to all work covered by Contractor's request for payment passes to the City upon incorporation into the Work or upon Contractor's receipt of payment, whichever occurs first. The Contractor further warrants that the title is free of all liens, claims, security interests or other interests ("Encumbrances"). If not, upon written demand from City Engineer, Contractor shall immediately take legal action necessary to remove Encumbrances.

3.13 TAXES

3.13.1 Contractor shall pay all sales, consumer, use, and similar taxes, which are in effect or scheduled to go into effect on or before bids are received, related to work provided by Contractor.

3.13.2 Contractor shall obtain, and require Subcontractors and Suppliers to obtain, necessary permits from the state and local taxing authorities to perform contractual obligations under the Contract, including sales tax permits.

3.13.3 The City is exempt from the Federal Transportation and Excise Tax. Contractor shall comply with federal regulations governing the exemptions.

3.13.4 Products incorporated into the Work are exempt from state sales tax according to provisions of the TEX. TAX CODE ANN. CH. 151, Subsection H.

3.14 PERMITS, FEES, AND NOTICES

3.14.1 Unless otherwise provided in the Contract, Contractor shall secure and pay for all construction permits, licenses, and inspections:

3.14.1.1 necessary for proper execution and completion of the Work; and

3.14.1.2 legally required at time bids are received.

3.15 CONSTRUCTION SCHEDULES

3.15.1 On receipt of Notice to Proceed, Contractor shall promptly prepare and submit construction schedule for the Work for City Engineer's review. The schedule must reflect the minimum time required to complete the Work not to exceed Contract Time.

3.15.2 Contractor shall give 24-hour written notice to City Engineer before commencing work or resuming work where work has been stopped. Contractor shall also give the same notice to inspectors.

3.15.3 Contractor shall incorporate milestones specified in Summary of Work Specification into the construction schedule. Contractor's failure to meet a milestone, as determined by City Engineer, may be considered a material breach of the Contract.

3.15.4 Each month, Contractor shall submit to City Engineer a copy of an updated construction schedule indicating actual progress, incorporating applicable changes, and indicating courses of action required to assure completion of the Work within Contract Time.

3.15.5 Contractor shall keep a current schedule of submittals that coordinates with the construction schedule, and shall submit the initial schedule of submittals to City Engineer for approval.

3.16 DOCUMENTS AND SAMPLES AT THE SITE

3.16.1 Contractor shall maintain at the site, and make available to City Engineer, one record copy of Drawings, Specifications, and Modifications. Contractor shall maintain the documents in good order and marked currently to record changes and selections made during construction. In addition, Contractor shall maintain at the site, approved Shop Drawings, Product Data, Samples, and similar

submittals, which will be delivered to City Engineer prior to final inspection as required in Paragraph 9.11.4.

3.16.2 Contractor shall maintain all books, documents, papers, accounting records, and other relevant documentation pursuant to the Work and shall make the books, documents, papers, and accounting records available to representatives of the City for review and audits during the Contract term and for the greater of three years following Date of Substantial Completion or until all litigation or audits are fully resolved.

3.16.3 Contractor shall provide to City Attorney all documents and records that City Attorney deems necessary to assist in determining Contractor's compliance with the Contract, with the exception of those documents made confidential by federal or state law or regulation.

3.17 *MANUFACTURER'S SPECIFICATIONS*

3.17.1 Contractor shall handle, store, and Install Products and perform all work in the manner required by Product manufacturer. Should the Contract and manufacturer's instructions conflict, Contractor shall report conflict to City Engineer for resolution prior to proceeding with the affected work.

3.17.2 References in the Contract to the manufacturer's specifications, directions, or recommendations, mean manufacturer's current published documents in effect as of date of receipt of bids, or in the case of a Modification, as of date of Modification.

3.18 *SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES*

3.18.1 Shop Drawings, Product Data, and Samples are not part of the Contract. The purpose of Contractor submittals is to demonstrate, for those portions of the Work for which submittals are required, the way Contractor proposes to conform to information given and design concept expressed in the Contract.

3.18.2 Contractor shall submit to Project Manager for review the Shop Drawings, Product Data, and Samples, which are required by the Contract. Review by Project Manager is subject to limitations of Paragraph 4.1.4. Contractor shall transmit the submittals to the Project Manager with reasonable promptness and in a sequence, so as to cause no delay in the Work or in activities of the City or of separate contractors. Contractor shall transmit

submittals in time to allow a minimum of 30 days for Project Manager's review prior to date Contractor needs reviewed submittals returned. This time may be shortened for a particular job requirement if approved by Project Manager in advance of submittal.

3.18.3 Contractor shall certify that the content of submittals conforms to the Contract without exception by affixing Contractor's approval stamp and signature. By certifying and submitting Shop Drawings, Product Data, and Samples, Contractor represents, and Contractor's stamp of approval shall state, that Contractor has determined and verified materials, quantities, field measurements, and field construction criteria related to the submittal, and has checked and coordinated information contained within the submittals with requirements of the Contract.

3.18.4 Contractor may not perform any work requiring submittal and review of Shop Drawings, Product Data, or Samples until the submittal has been returned with appropriate review decision by the Project Manager. Contractor shall perform work in accordance with the review.

3.18.5 If Contractor performs any work requiring submittals prior to review and acceptance of the submittals by Project Manager, such work is at Contractor's risk and the City is not obligated to accept work if the submittals are later found to be unacceptable.

3.18.6 If, in the opinion of Project Manager, the submittals are incomplete, or demonstrate an inadequate understanding of the Work or lack of review by the Contractor, then submittals may be returned to the Contractor for correction and resubmittal.

3.18.7 Contractor shall direct specific attention in writing and on the resubmitted Shop Drawings, Product Data, or Samples to any additional proposed revisions, other than those revisions requested by Project Manager on previous submittals.

3.18.8 Contractor is not relieved of responsibility for deviations from requirements of the Contract by Project Manager's review of Shop Drawings, Product Data, or Samples unless Contractor has specifically informed Project Manager in writing of the deviation at the time of the submittal, and Project Manager has given written approval of the deviation.

3.18.9 When professional certification of performance criteria of Products is required by the Contract, the City may rely upon accuracy and completeness of the calculations and certifications.

3.18.10 For Product colors or textures to be selected by the City, Contractor shall submit all samples together to allow preparation of a complete selection schedule.

3.18.11 Contractor shall submit informational submittals, on which Project Manager is not expected to take responsive action, as required by the Contract.

3.18.12 Submittals made by Contractor which are not required by the Contract may be returned to Contractor without action.

3.19 *CULTURAL RESOURCES AND ENDANGERED SPECIES*

3.19.1 Contractor may not remove or disturb, or cause to be removed or disturbed, any historical, archaeological, architectural, or other cultural artifacts, relics, vestiges, remains, or objects of antiquity. If Contractor discovers one of these items, Contractor shall immediately notify City Engineer and further comply with the requirements of 13 Tex. Admin. Code Chs. 25 and 26 (2002), or successor regulation. Contractor shall protect site and cultural resources from further disturbance until professional examination can be made or until clearance to proceed is authorized in writing by City Engineer.

3.19.2 Should either threatened or endangered plant or animal species be encountered, Contractor shall cease work immediately in the area of encounter and notify City Engineer.

3.20 *CUTTING AND PATCHING*

3.20.1 Contractor is responsible for necessary cutting, fitting, and patching to accomplish the Work and shall suitably support, anchor, attach, match, and trim or seal materials to work of other contractors. Contractor shall coordinate the Work with work of other contractors to minimize conflicts, as provided in Article 6.

3.20.2 Contractor may not endanger work by cutting, digging, or other action, and may not cut or alter work of other contractors except by written consent of City Engineer and affected contractor.

3.21 *CLEANING*

3.21.1 Contractor shall perform daily cleanup of all dirt, debris, scrap materials and other disposable

items resulting from Contractor's operations, whether on-site or off-site. Unless otherwise authorized in writing by City Engineer, Contractor shall keep all streets, access streets, driveways, areas of public access, walkways, and other designated areas clean and open at all times.

3.21.2 Failure of Contractor to maintain a clean site, including access streets, is the basis for City Engineer to issue a Notice of Noncompliance. Should compliance not be attained within the time period in the Notice of Noncompliance, City Engineer may authorize necessary cleanup to be performed by others and the cost of the cleanup will be deducted from monies due Contractor.

Contractor shall legally dispose off-site, all waste materials and other excess materials resulting from Contractor's operations.

3.22 *SANITATION*

3.22.1 Contractor shall provide and maintain sanitary facilities at site for use of all construction forces under the Contract. Newly-constructed or existing sanitary facilities may not be used by Contractor.

3.23 *ACCESS TO WORK AND TO INFORMATION*

3.23.1 Contractor shall provide the City, Design Consultant, testing laboratories, and governmental agencies which have jurisdictional interests, access to the Work in preparation and in progress wherever located. Contractor shall provide proper and safe conditions for the access.

3.23.2 If required by City Engineer, Contractor shall furnish information concerning character of Products and progress and manner of the Work, including information necessary to determine cost of the Work, such as number of employees, pay of employees, and time employees worked on various classes of the Work.

3.24 *TRADE SECRETS*

3.24.1 Contractor will not make any claim of ownership of trade secrets as to products used in the Work, or preparation of any mixture for the Work. City Engineer will at all times have the right to demand and Contractor shall furnish information concerning materials or samples of ingredients of any materials used, or proposed to be used, in preparation of concrete placed or other work to be done. Mixtures, once agreed on, shall not be changed in any manner without knowledge and consent of City Engineer. The City will make its best

efforts to protect confidentiality of proprietary information.

3.25 *INDEMNIFICATION*

3.25.1 CONTRACTOR AGREES TO AND SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY, ITS AGENTS, EMPLOYEES, OFFICERS, AND LEGAL REPRESENTATIVES (COLLECTIVELY THE "CITY") HARMLESS FOR ALL CLAIMS, CAUSES OF ACTION, LIABILITIES, FINES, AND EXPENSES (INCLUDING, WITHOUT LIMITATION, ATTORNEYS' FEES, COURT COSTS, AND ALL OTHER DEFENSE COSTS AND INTEREST) FOR INJURY, DEATH, DAMAGE, OR LOSS TO PERSONS OR PROPERTY SUSTAINED IN CONNECTION WITH OR INCIDENTAL TO PERFORMANCE UNDER THE CONTRACT INCLUDING, WITHOUT LIMITATION, THOSE CAUSED BY:

3.25.1.1 CONTRACTOR'S AND/OR ITS AGENTS', EMPLOYEES', OFFICERS', DIRECTORS', CONTRACTORS', OR SUBCONTRACTORS' (COLLECTIVELY IN NUMBERED SUBPARAGRAPHS .1 through .3, "CONTRACTOR") ACTUAL OR ALLEGED NEGLIGENCE OR INTENTIONAL ACTS OR OMISSIONS;

3.25.1.2 THE CITY'S AND CONTRACTOR'S ACTUAL OR ALLEGED CONCURRENT NEGLIGENCE, WHETHER CONTRACTOR IS IMMUNE FROM LIABILITY OR NOT;

3.25.1.3 THE CITY'S AND CONTRACTOR'S ACTUAL OR ALLEGED STRICT PRODUCTS LIABILITY OR STRICT STATUTORY LIABILITY, WHETHER CONTRACTOR IS IMMUNE FROM LIABILITY OR NOT.

CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY HARMLESS DURING THE TERM OF THE CONTRACT AND FOR FOUR YEARS AFTER THE CONTRACT TERMINATES. CONTRACTOR SHALL NOT INDEMNIFY THE CITY FOR THE CITY'S SOLE NEGLIGENCE.

3.25.2 NOTWITHSTANDING ANYTHING TO THE CONTRARY, THE LIABILITY OF CONTRACTOR FOR THE CITY'S CONCURRENT NEGLIGENCE SHALL NOT EXCEED \$1,000,000.

3.26 *RELEASE AND INDEMNIFICATION – PATENT, COPYRIGHT, TRADEMARK, AND TRADE SECRET INFRINGEMENT*

3.26.1 UNLESS OTHERWISE SPECIFICALLY REQUIRED BY THE CONTRACT, CONTRACTOR AGREES TO AND SHALL RELEASE AND DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY, ITS AGENTS, EMPLOYEES, OFFICERS, AND LEGAL REPRESENTATIVES (COLLECTIVELY THE "CITY") FROM ALL CLAIMS OR CAUSES OF ACTION BROUGHT AGAINST THE CITY BY ANY PARTY, INCLUDING CONTRACTOR, ALLEGING THAT THE CITY'S USE OF ANY EQUIPMENT, SOFTWARE, PROCESS, OR DOCUMENTS CONTRACTOR FURNISHES DURING THE TERM OF THE CONTRACT INFRINGES ON A PATENT, COPYRIGHT, OR TRADEMARK, OR MISAPPROPRIATES A TRADE SECRET. CONTRACTOR SHALL PAY ALL COSTS (INCLUDING, WITHOUT LIMITATION, ATTORNEYS' FEES, COURT COSTS, AND ALL OTHER DEFENSE COSTS, AND INTEREST) AND DAMAGES AWARDED.

3.26.2 CONTRACTOR SHALL NOT SETTLE ANY CLAIM ON TERMS WHICH PREVENT THE CITY FROM USING THE EQUIPMENT, SOFTWARE, PROCESS, OR PRODUCT WITHOUT THE CITY ENGINEER'S PRIOR WRITTEN CONSENT.

3.26.3 UNLESS OTHERWISE SPECIFICALLY REQUIRED BY THE CONTRACT, WITHIN 60 DAYS AFTER BEING NOTIFIED OF THE CLAIM, CONTRACTOR SHALL, AT ITS OWN EXPENSE, EITHER:

3.26.3.1 OBTAIN FOR THE CITY THE RIGHT TO CONTINUE USING THE EQUIPMENT, SOFTWARE, PROCESS, OR PRODUCT, OR

3.26.3.2 IF BOTH PARTIES AGREE, REPLACE OR MODIFY THEM WITH COMPATIBLE AND FUNCTIONALLY EQUIVALENT PRODUCTS.

IF NONE OF THESE ALTERNATIVES IS REASONABLY AVAILABLE, THE CITY MAY RETURN THE EQUIPMENT, SOFTWARE, OR PRODUCT, OR DISCONTINUE THE PROCESS, AND CONTRACTOR SHALL REFUND THE PURCHASE PRICE.

3.27 *INDEMNIFICATION PROCEDURES*

3.27.1 *Notice of Indemnification Claims:* If the City or Contractor receives notice of any claim or circumstances which could give rise to an indemnified loss, the receiving party shall give written notice to the other Party within 10 days. The notice must include the following:

- 3.27.1.1 a description of the indemnification event in reasonable detail,
- 3.27.1.2 the basis on which indemnification may be due, and
- 3.27.1.3 the anticipated amount of the indemnified loss.

This notice does not estop or prevent the City from later asserting a different basis for indemnification or a different amount of indemnified loss than that indicated in the initial notice. If the City does not provide this notice within the 10-day period, it does not waive any right to indemnification except to the extent that Contractor is prejudiced, suffers loss, or incurs expense because of the delay.

3.27.2 *Defense of Indemnification Claims:*

3.27.2.1 *Assumption of Defense:*

Contractor may assume the defense of the claim at its own expense with counsel chosen by it that is reasonably satisfactory to the City. Contractor shall then control the defense and any negotiations to settle the claim. Within 10 days after receiving written notice of the indemnification request, Contractor must advise the City as to whether or not it will defend the claim. If Contractor does not assume the defense, the City shall assume and control the defense, and all defense expenses constitute an indemnified loss.

3.27.2.2 *Continued Participation:*

If Contractor elects to defend the claim, the City may retain separate counsel to participate in, but not control, the defense and to participate in, but not control, any settlement negotiations. Contractor may settle the claim without the consent or agreement of the City, unless it:

3.27.2.2.1 would result in injunctive relief or other equitable remedies or otherwise require the City to comply with restrictions or limitations that adversely affect the City;

3.27.2.2.2 would require the City to pay amounts that Contractor does not fund in full; or

3.27.2.2.3 would not result in the City's full and complete release from all liability to the plaintiffs or claimants who are parties to or otherwise bound by the settlement.

3.28 *CONTRACTOR DEBT*

IF CONTRACTOR, AT ANY TIME DURING THE TERM OF THIS AGREEMENT, INCURS A DEBT, AS THE WORD IS DEFINED IN SECTION 15-122

OF THE HOUSTON CITY CODE OF ORDINANCES, IT SHALL IMMEDIATELY NOTIFY CITY CONTROLLER IN WRITING. IF CITY CONTROLLER BECOMES AWARE THAT CONTRACTOR HAS INCURRED A DEBT, IT SHALL IMMEDIATELY NOTIFY CONTRACTOR IN WRITING. IF CONTRACTOR DOES NOT PAY THE DEBT WITHIN 30 DAYS OF EITHER SUCH NOTIFICATION, CITY CONTROLLER MAY DEDUCT FUNDS IN AN AMOUNT EQUAL TO THE DEBT FROM ANY PAYMENTS OWED TO CONTRACTOR UNDER THIS AGREEMENT, AND CONTRACTOR WAIVES ANY RECOURSE THEREFOR. CONTRACTOR SHALL FILE A NEW AFFIDAVIT OF OWNERSHIP, USING THE FORM DESIGNATED BY CITY, BETWEEN FEBRUARY 1 AND MARCH 1 OF EVERY YEAR DURING THE TERM OF THE CONTRACT.

3.29 *PRESERVATION OF CONTRACTING INFORMATION*

3.29.1 The requirements of Subchapter J, Chapter 552, Texas Government Code, may apply to this Agreement and the Contractor agrees that this Agreement can be terminated if the Contractor knowingly or intentionally fails to comply with a requirement of that subchapter. If the requirements of Subchapter J, Chapter 552, Texas Government Code, apply to this Agreement, then for the duration of this Agreement (including the initial term, any renewal terms, and any extensions), Contractor shall preserve all Contracting Information, as defined by Section 552.003 of the Texas Government Code, related to this Agreement as provided by the records retention requirements applicable to the City pursuant to federal or state law or regulation, city ordinance or city policy, which record retention requirements include but are not limited to those set forth in Chapters 201 and 205 of the Texas Local Government Code and Texas Administrative Code Title 13, Chapter 7. Within five business days after receiving a request from the Director, Contractor shall provide any Contracting Information related to this Agreement that is in the custody or possession of Contractor. Upon the expiration or termination of this Agreement, Contractor shall, at the Director's election, either (a) provide, at no cost to the City, all Contracting Information related to this Agreement that is in the custody or possession of Contractor, or (b) preserve the Contracting Information related to this Agreement as provided by the records retention requirements applicable to the City pursuant to federal or state law or regulation, city ordinance or city policy.

3.29.2 If Contractor fails to comply with any one or more of the requirements of this Section, ***PRESERVATION OF CONTRACTING***

INFORMATION, or Subchapter J, Chapter 552, Texas Government Code, then, in accordance with and pursuant to the processes and procedures set forth in Sections 552.373 and 552.374 of the Texas Government Code, the Director shall provide notice to the Contractor and may terminate this Agreement. To effect final termination, the Director must notify Contractor in writing with a copy of the notice to the CPO. After receiving the notice, Contractor shall, unless the notice directs otherwise, immediately discontinue all services under this Agreement, and promptly cancel all orders or subcontracts chargeable to this Agreement.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.1 CONTRACT ADMINISTRATION

4.1.1 City Engineer will provide administration of the Contract and City Engineer is authorized to issue Change Orders, Work Change Directives, and Minor Changes in the Work.

4.1.2 City Engineer may act through Project Manager, Design Consultant, or Inspector. When the term "City Engineer" is used in the Contract, action by City Engineer is required unless City Engineer delegates his authority in writing. The City Engineer may not delegate authority to render decisions under Section 4.4.

The City does not have control over or charge of, and is not responsible for, supervision, construction, and safety procedures enumerated in Section 3.3. The City does not have control over or charge of and is not responsible for acts or omissions of Contractor, Subcontractors, or Suppliers.

4.1.3 The City and Design Consultant may attend project meetings and visit the site to observe progress and quality of the Work. The City and Design Consultant are not required to make exhaustive or continuous on-site inspections to check quality or quantity of the Work.

4.1.4 Project Manager will review and approve or take other appropriate action on Contractor's submittals, but only for limited purpose of checking for conformance with information given and design concept expressed in the Contract.

4.1.5 Project Manager's review of the submittals is not conducted for purpose of determining accuracy and completeness of other details, such as dimensions and quantities, or for substantiating instructions for installation or

performance of Products, all of which remain the responsibility of Contractor.

4.1.6 Project Manager's review of submittals does not relieve Contractor of its obligations under Sections 3.3, 3.12, and 3.18. Review does not constitute approval of safety precautions or, unless otherwise specifically stated by Project Manager in writing, of construction means, methods, techniques, sequences, or procedures. Project Manager's review of a specific item does not indicate approval of an assembly of which the item is a component.

4.1.7 Based on field observations and evaluations, Project Manager will process Contractor's progress payments, certify amounts due Contractor, and issue Certificates for Payment in the amount certified.

4.1.8 Project Manager will receive and forward to City Engineer for his review and records, written warranties and related documents required by the Contract and assembled by Contractor.

4.1.9 Upon written request by Contractor or Project Manager, City Engineer will resolve matters of interpretation of or performance of the Contract, which are not Claims. City Engineer's decisions are final and binding on the Parties.

4.1.10 City Engineer may reject work which does not conform to the Contract.

4.1.11 When City Engineer considers it necessary to implement the intent of the Contract, City Engineer may require additional inspection or testing of work in accordance with Paragraphs 13.6.3 and 13.6.4, whether such work is fabricated, Installed, or completed.

4.2 COMMUNICATIONS IN ADMINISTRATION OF THE CONTRACT

4.2.1 Except as otherwise provided in the Contract or when authorized by City Engineer in writing, Contractor shall communicate with Project Manager. Contractor shall communicate with Design Consultant, Design Consultant's subconsultants, and separate contractors through Project Manager. The City will communicate with Subcontractors and Suppliers through Contractor.

4.3 CLAIMS AND DISPUTES

4.3.1 *Documentation by Project Manager:* Contractor shall submit Claims, including those alleging an error or omission by Project Manager or Design Consultant, to Project Manager for documentation and recommendation to City Engineer.

4.3.2 *Decision of City Engineer:* Upon submission of Claim by Project Manager or Contractor, City Engineer will resolve Claims in accordance with Section 4.4.

4.3.3 *Time Limits on Claims:* Claims by Contractor must be made within 90 days after occurrence of event giving rise to the Claim.

4.3.4 *Continuing the Contract Performance:* Pending final resolution of a Claim including referral to non-binding mediation, unless otherwise agreed in writing, Contractor shall proceed diligently with the performance of the Contract and the City will continue to make payments in accordance with the Contract.

4.3.4.1 Pending final resolution of a Claim including referral to non-binding mediation, Contractor is responsible for safety and protection of physical properties and conditions at site.

4.3.5 *Claims for Concealed or Unknown Conditions:* Concealed or unknown physical conditions include utility lines, other man-made structures, storage facilities, Pollutants and Pollutant Facilities, and the like, but do not include conditions arising from Contractor operations, or failure of Contractor to properly protect and safeguard subsurface facilities. Concealed conditions also include naturally-occurring soil conditions outside the range of soil conditions identified through geotechnical investigations, but do not include conditions arising from groundwater, rain, or flood.

4.3.5.1 If conditions are encountered at the site which are Underground Facilities or otherwise concealed or unknown conditions which differ materially from:

4.3.5.1.1 those indicated by the Contract; or

4.3.5.1.2 conditions which Contractor could have discovered through site inspection, geotechnical testing, or otherwise;

then Contractor will give written notice to City Engineer no later than five days after Contractor's first observation of the condition and before condition is disturbed. Contractor's failure to provide notice constitutes a waiver of a Claim.

4.3.5.2 City Engineer will promptly investigate concealed or unknown conditions. If City Engineer determines that conditions at the site are not materially different and that no change in Contract Price or Contract Time is justified, City Engineer will notify Contractor in writing, stating reasons. If City Engineer determines the conditions differ materially and cause increase or decrease in Contractor's cost or time required for performance of part of the Work, City Engineer will recommend an adjustment in Contract Price or Contract Time, or both, as provided in Article 7. Opposition by a Party to the City Engineer's determination must be made within 21 days after City Engineer has given notice of the decision. If the Parties cannot agree on adjustment to Contract Price or Contract Time, adjustment is subject to further proceedings pursuant to Section 4.4.

4.3.6 *Claims for Additional Cost:* If Contractor wishes to make a Claim for increase in Contract Price, Contractor shall give written notice before proceeding with work for which Contractor intends to submit a Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

4.3.6.1 Contractor may file a Claim in accordance with Section 4.4 if Contractor believes it has incurred additional costs, for the following reasons:

4.3.6.1.1 written interpretation of City Engineer;

4.3.6.1.2 order by City Engineer to stop the Work when Contractor is not at fault;

4.3.6.1.3 suspension of the Work by City Engineer;

4.3.6.1.4 termination of the Contract by City Engineer; or

4.3.6.1.5 The City's non-compliance with another provision of the Contract.

4.3.6.2 No increase in Contract Price is allowed for delays or hindrances to the Work, except for direct and unavoidable extra costs to Contractor caused by failure of the City to provide information and services, or to make land and materials available, when required of the City under the Contract. Any increase claimed is subject to the provisions of Section 4.4 and Article 7.

4.3.6.3 The City is not liable for Claims for delay when Date of Substantial Completion occurs prior to expiration of Contract Time.

4.3.7 *Claims for Additional Time:* If Contractor wishes to make a Claim for an increase in Contract Time, Contractor shall give written notice as provided in Section 8.2. In case of continuing delay, only one Claim is necessary.

4.4 ***RESOLUTION OF CLAIMS AND DISPUTES***

4.4.1 City Engineer will review Claims and take one or more of the following preliminary actions within 30 days of receipt of Claim:

- 4.4.1.1 submit a suggested time to meet and discuss the Claim with City Engineer;
- 4.4.1.2 reject Claim, in whole or in part, stating reasons for rejection;
- 4.4.1.3 recommend approval of the Claim by the other Party;
- 4.4.1.4 suggest a compromise; or
- 4.4.1.5 take other actions as City Engineer deems appropriate to resolve the Claim.

4.4.2 City Engineer may request additional supporting data from claimant. Party making Claim shall, within 10 days after receipt of City Engineer's request, submit additional supporting data requested by City Engineer.

4.4.3 At any time prior to rendering a written decision regarding a Claim, City Engineer may refer Claim to non-binding mediation. If Claim is resolved, City Engineer will prepare and obtain all appropriate documentation. If Claim is not resolved, City Engineer will take receipt of Claim and begin a new review under Section 4.4.

4.4.4 If Claim is not referred to or settled in non-binding mediation, City Engineer may conduct a hearing and will render a written decision, including findings of fact, within 75 days of receipt of Claim, or a time mutually agreed upon by the Parties in writing. City Engineer may notify Surety and request Surety's assistance in resolving Claim. City Engineer's decision is final and binding on the Parties.

4.5 ***CONDITION PRECEDENT TO SUIT; WAIVER OF ATTORNEY FEES AND INTEREST***

4.5.1 A final decision by the City Engineer is a condition precedent to file suit in any jurisdiction for a claim made in connection with this Contract.

4.5.2 Neither the City nor Contractor may recover attorney fees for any claim brought in connection with this Contract.

4.5.3 Neither the City nor the Contractor may recover interest for any damages claim brought in connection with this Contract except as allowed by TEXAS LOCAL GOVERNMENT CODE Chapter 2251.

4.6 ***INTERIM PAYMENT WAIVER & RELEASE***

4.6.1 In accordance with section 4.3, the Contractor shall use due diligence in the discovery and submission of any Claim against the City related to the Contractor's work.

4.6.2 The Contractor shall submit any Claim to the City not later than the 90th day after the occurrence of the event giving rise to the Claim.

4.6.3 Any failure to timely comply with the requirements of section 4.6.2 waives and releases any Claim when the Contractor submits an application for payment after the 90th day.

4.6.4 This waiver does not cover any retainage. In case of any conflict of law, this language shall be revised to the minimum extent necessary to avoid legal conflict. This waiver is made specifically for the benefit of the City.

ARTICLE 5 - SUBCONTRACTORS AND SUPPLIERS

5.1 ***AWARD OF SUBCONTRACTS OTHER CONTRACTS FOR PORTIONS OF THE WORK***

5.1.1 Contractor may not contract with a Subcontractor, Supplier, person, or entity that City Engineer has made a reasonable and timely objection to.

5.1.2 If City Engineer has a reasonable objection to person or entity proposed by Contractor, Contractor shall propose another with whom City Engineer has no reasonable objection.

5.1.3 Contractor shall execute contracts with approved Subcontractors, Suppliers, persons, or entities before the Subcontractors or Suppliers begin

work under the Contract. All such contracts must be executed and sent to the OBO Director and Contracting Department within 30 days after the date of the Notice to Proceed and must include provisions set forth in Articles 3 and 5 of this Document.

5.1.4 Contractor shall notify City Engineer in writing of any proposed change of Subcontractor, Supplier, person, or entity previously accepted by the City.

5.1.5 Contractor shall make timely payments to Subcontractors and Suppliers for performance of the Contract. Contractor shall protect, defend, and indemnify the City from any claim or liability arising out of Contractor's failure to make the payments. Disputes relating to payment of Business Enterprise Subcontractors or Suppliers will be submitted to arbitration in same manner as other disputes under Business Enterprise subcontracts. Failure of Contractor to comply with decisions of arbitrator may be determined by City Engineer a material breach leading to termination of the Contract.

5.2 **CONTRACTOR RESPONSIBILITY FOR SUBCONTRACTORS**

5.2.1 Contractor is responsible to the City, as may be required by laws and regulations, for all acts and omissions of Subcontractors, Suppliers, and other persons and organizations performing or furnishing any of the Work under direct or indirect contract with Contractor.

5.2.2 Contractor shall make available to each proposed Subcontractor, prior to execution of subcontract, copies of the Contract to which Subcontractor is bound by this Section 5.2. Contractor shall notify Subcontractor of any terms of proposed subcontract which may be at variance with the Contract.

5.2.3 The City's approval of Subcontractor or Suppliers does not relieve Contractor of its obligation to perform, or to have performed to the full satisfaction of the City, the Work required by the Contract.

5.2.4 Unless there is a contractual relationship between Contractor and a Subcontractor or Supplier to the contrary, Contractor shall withhold no more retainage from Subcontractors or Suppliers than City withholds from Contractor under this Agreement. However, once a Subcontractor or Supplier completes performance, Contractor shall release all retainage to that Subcontractor or Supplier regardless if City continues to retain under this Agreement.

5.2.5 Prior to a Subcontractor or Supplier commencing performance for Contractor, Contractor shall meet with that Subcontractor or Supplier to provide instructions on invoicing procedures, dispute resolution procedures, and statutory rights, such as claim filing procedures under the McGregor Act. Subcontractors and Suppliers must certify to the City Engineer that Contractor has fulfilled the requirements of this Section.

ARTICLE 6 - CONSTRUCTION BY THE CITY OR BY SEPARATE CONTRACTORS

6.1 **THE CITY'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS**

6.1.1 The City may perform on-site construction operations related to the Work and as part of the Project with the City's workforce or with separate contractors.

6.2 **COORDINATION**

6.2.1 The City will coordinate activities of the City's workforce and of each separate contractor with work of Contractor, and Contractor shall cooperate with the City and separate contractors.

6.2.1.1 Contractor shall participate with other separate contractors and the City in reviewing their construction schedules when directed to do so by the Project Manager. Contractor shall make revisions to construction schedule and Contract Price deemed necessary after joint review and mutual agreement. Construction schedules shall then constitute schedules to be used by Contractor, separate contractors, and the City, until subsequently revised.

6.2.2 Contractor shall afford to the City and to separate contractors reasonable opportunity for introduction and storage of their materials and equipment, and for performance of their activities.

6.2.3 If part of Contractor's work depends on proper execution of construction or operations by the City or a separate contractor, Contractor shall, prior to proceeding with that portion of the Work, inspect the other work and promptly report to City Engineer apparent discrepancies or defects in the other construction that would render it unsuitable for the proper execution of the Work. Failure of Contractor to report apparent discrepancies or defects in the other construction shall constitute acknowledgment

that the City's or separate contractor's completed or partially completed construction is fit and proper to receive Contractor's work, except as to discrepancies or defects not then reasonably discoverable.

6.3 *MUTUAL RESPONSIBILITY*

6.3.1 The responsible party bears the costs caused by delays, by improperly timed activities, or by nonconforming construction.

6.3.2 Contractor shall promptly remedy damage caused by Contractor to completed or partially completed construction or to property of the City or separate contractor.

6.3.3 Claims or disputes between Contractor and other City contractors, or subcontractors of other City contractors, working on the Project must be submitted to binding arbitration in accordance with Construction Industry Arbitration Rules of the American Arbitration Association upon demand by any party to the dispute or by the City.

6.4 *THE CITY'S RIGHT TO CLEAN UP*

6.4.1 If dispute arises among Contractor, separate contractors, and the City as to responsibility under their respective contracts for maintaining premises and surrounding area free from waste materials and rubbish as described in Section 3.21, the City may clean up and allocate cost among those responsible, as determined by City Engineer.

ARTICLE 7 - CHANGES IN THE WORK

7.1 *CHANGES*

7.1.1 Changes in scope of the Work, subject to limitations in Article 7 and elsewhere in the Contract, may be accomplished without invalidating the Contract, or without notifying Surety by:

- 7.1.1.1 Change Order;
- 7.1.1.2 Work Change Directive; or
- 7.1.1.3 Minor Change in the Work.

7.1.2 The following types of Change Orders require City Council approval:

- 7.1.2.1 a single Change Order that exceeds five percent of Original Contract Price,
- 7.1.2.2 a Change Order which, when added to previous Change Orders, exceeds five percent of Original Contract Price,

7.1.2.3 a Change Order, in which the total value of increases outside of the general scope of work approved by City Council, when added to increases outside the general scope of work approved by City Council in previous Change Orders, exceeds 40 percent of the Original Contract Price, even if the net increase to the Original Contract Price is five percent or less.

In this context, "increase" means an increase in quantity resulting from the addition of locations not within the scope of work approved by City Council, or the addition of types of goods or services not bid as unit price items.

Nothing in this Section is intended to permit an increase of the Contract Price in excess of the limit set out in TEX. LOC. GOV'T CODE ANN. §252.048 or its successor statute.

7.1.3 Contractor shall proceed promptly to execute changes in the Work provided in Modifications, unless otherwise stated in the Modification.

7.2 *WORK CHANGE DIRECTIVES*

7.2.1 A Work Change Directive cannot change Contract Price or Contract Time, but is evidence that the Parties agree that a change, ordered by directive, will be incorporated in a subsequently issued Change Order as to its effect, if any, on Contract Price or Contract Time.

7.2.2 Failure by Contractor to commence work identified in a Work Change Directive within the time specified by City Engineer, or to complete the work in a reasonable period of time, may be determined by City Engineer to be a material breach of Contract.

7.2.3 A Work Change Directive is used in the absence of total agreement of the terms of a Change Order. Interim payments are made in accordance with Paragraph 9.6.1.

7.2.4 If Contractor signs a Work Change Directive, then Contractor agrees to its terms including adjustment in Contract Price and Contract Time or method for determining them. Agreement by the Parties to adjustments in Contract Price and Contract Time are immediately recorded as a Change Order.

7.2.5 City Engineer, by Work Change Directive, may direct Contractor to take measures as necessary to expedite construction to achieve Date of Substantial Completion on or before expiration of

Contract Time. When the Work is expedited solely for convenience of the City and not due to Contractor's failure to prosecute timely completion of the Work, then Contractor is entitled to an adjustment in Contract Price equal to actual costs determined in accordance with Article 7.

7.3 ADJUSTMENTS IN CONTRACT PRICE

7.3.1 Adjustments in Contract Price are accomplished by Change Order and are based on one of the following methods:

- 7.3.1.1 mutual acceptance of fixed price, properly itemized and supported by sufficient data to permit evaluation;
- 7.3.1.2 unit prices stated in the Contract or subsequently agreed upon;
- 7.3.1.3 cost to be determined in a manner agreed upon by the Parties and mutually acceptable fixed or percentage fee; or
- 7.3.1.4 as provided in Paragraph 7.3.2.

7.3.2 If Contractor does not agree with a change in Contract Price or Contract Time or the method for adjusting them specified in the Work Change Directive within 21 days from date of the Work Change Directive's issuance, method and adjustment are determined by City Engineer. If Project Manager or Contractor disagree with City Engineer's determination they then may file a Claim in accordance with Section 4.4.

7.3.2.1 If City Engineer determines a method and adjustment in Contract Price under Paragraph 7.3.2, Contractor shall provide, in a form as City Engineer may prescribe, appropriate supporting data for items submitted under Paragraph 7.3.2. Failure to submit the data within 21 days of request for the data by City Engineer shall

7.3.2.2 Unless otherwise provided in the Contract, costs for the purposes of this Paragraph 7.3.2 are limited to the following:

- 7.3.2.2.1 costs of labor, including labor burden as stated below for social security, unemployment insurance, customary and usual fringe benefits required by agreement or custom, and Workers' Compensation insurance;
- 7.3.2.2.1.1 the maximum labor burden applied to costs of labor for changes in the Work is 55 percent;
- 7.3.2.2.2 costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- 7.3.2.2.3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from Contractor or others, with prior approval of City Engineer;
- 7.3.2.2.4 costs of premiums for Bonds and insurance and permit fees related to the change in the Work;
- 7.3.2.2.5 additional costs of direct supervision of work and field office personnel directly attributable to the change; and
- 7.3.2.2.6 allowances for overhead and profit as stated below.

7.3.2.2.6.1 the maximum allowances for overhead and profit on increases due to Change Orders:

7.3.2.2.6.2 for changes in the Work performed by Contractor and Subcontractors, allowance for overhead and profit are applied to an amount equal to cost of all additions less cost of all deletions to the Work. Allowance for overhead to Contractor and first tier Subcontractors on changes performed by Subcontractors are applied to an amount equal to the sum of all increases to the Work by applicable Subcontractors.

	<u>Overhead</u>	<u>Profit</u>
to Contractor for change in the Work performed by Subcontractors:	10 percent	0 percent
to first tier Subcontractors for change in the Work performed by its Subcontractors:	10 percent	0 percent
to Contractor and Subcontractor for change in the Work performed by their respective firms:	10 percent	5 percent

constitute waiver of a Claim.

7.3.3 If the City deletes or makes a change, which results in a net decrease in Contract Price, the City is entitled to a credit calculated in accordance with Paragraphs 7.3.1 and 7.3.2 and Subparagraphs 7.3.2.1, and 7.3.2.2.1 through 7.3.2.2.5. When both additions and credits covering related work or substitutions are involved in a change, allowance for overhead and profit is figured on the basis of a net increase, if any, with respect to that change in accordance with Subparagraph 7.3.2.2.6.

7.3.4 When Contractor agrees with the determination made by City Engineer concerning adjustments in Contract Price and Contract Time, or the Parties otherwise reach agreement upon the adjustments, the agreement will be immediately recorded by Change Order.

7.4 *MINOR CHANGES IN THE WORK*

7.4.1 A Minor Change in Work is binding on the Parties. Contractor shall acknowledge, in a written form acceptable to City Engineer, that there is no change in Contract Time or Contract Price and shall carry out the written orders promptly.

ARTICLE 8 - TIME

8.1 *PROGRESS AND COMPLETION*

8.1.1 Time is of the essence in the Contract. By executing the Contract, Contractor agrees that Contract Time is a reasonable period for performing the Work.

8.1.2 *Computation of Time:* In computing any period of time prescribed or allowed by the General Conditions, the day of the act, event, or default after which designated period of time begins to run is not to be included. Last day of the period so computed is to be included, unless it is a Sunday or Legal Holiday, in which event the period runs until end of next day which is not a Sunday or Legal Holiday. Sundays and Legal Holidays are considered to be days and are to be included in all other time computations relative to Contract Time.

8.1.3 Contractor may not commence the Work prior to the effective date of insurance and Bonds required by Article 11.

8.1.4 Contractor shall proceed expeditiously and without interruption, with adequate forces, and shall achieve Date of Substantial Completion within Contract Time.

8.1.5 Should progress of the Work fall behind construction schedule, except for reasons stated in Paragraph 8.2.1, Contractor shall promptly submit at the request of Project Manager, updated construction schedule to City Engineer for approval. Contractor's failure to submit updated schedule may, at City Engineer's discretion, constitute a material breach of the Contract. Contractor shall take action necessary to restore progress by working the hours, including night shifts and lawful overtime operations as necessary, to achieve Date of Substantial Completion within Contract Time.

8.1.6 Except in connection with safety or protection of persons or the Work or property at the site or adjacent to the site, and except as otherwise indicated in the Contract, all the Work at the site will be performed Monday through Saturday between the hours of 7:00 a.m. and 7:00 p.m. Contractor may not perform work between 7:00 p.m. and 7:00 a.m., on a Sunday, or on a Legal Holiday, without giving City Engineer 24-hour prior written notice and receiving written consent of City Engineer.

8.2 *DELAYS AND EXTENSIONS OF TIME*

8.2.1 Contractor may request extension of Contract Time for a delay in performance of work that arises from causes beyond control and without fault or negligence of Contractor. Examples of these causes are:

- 8.2.1.1 acts of God or of the public enemy;
- 8.2.1.2 acts of government in its sovereign capacity;
- 8.2.1.3 fires;
- 8.2.1.4 floods;
- 8.2.1.5 epidemics;
- 8.2.1.6 quarantine restrictions;
- 8.2.1.7 strikes;
- 8.2.1.8 freight embargoes;
- 8.2.1.9 unusually severe weather; and
- 8.2.1.10 discovery of Pollutants or Pollutant Facilities at the site.

8.2.2 For any reason other than those listed in Section 4.3.6.2, if the Contractor's work is delayed in any manner or respect, the Contractor shall have no claim for damages and shall have no right of additional compensation from the City by reason of any delay or increased expense to the Contractor's work, except for an extension of time as provided in this provision.

8.2.3 Contractor may request an extension of Contract Time for delay only if:

8.2.3.1 delay is caused by failure of Subcontractor or Supplier to perform or make progress; and

8.2.3.2 cause of failure is beyond control of both Contractor and Subcontractor or Supplier.

8.2.4 Claims relating to Contract Time must be made in accordance with Paragraph 4.3.7.

8.2.5 Claims for extending or shortening Contract Time are based on written notice promptly delivered by the Party making Claim to other Party. Claim must accurately describe occurrence generating Claim, and a statement of probable effect on progress of the Work.

8.2.6 Claims for extension of Contract Time are considered only when a Claim is filed within the time limits stated in Paragraph 4.3.3.

8.2.6.1 Notwithstanding paragraph 4.3.3, an extension of time for delays under this paragraph may be granted only upon written application by the Contractor within 48 hours from the claimed delay.

8.2.7 Written notice of Claim must be accompanied by claimant's written statement that adjustment claimed is entire adjustment to which claimant is entitled as a result of the occurrence of the event. When the Parties cannot agree, Claims for adjustment in Contract Time are determined by City Engineer in accordance with Section 4.4.

8.2.8 Adjustments to Contract Time are accomplished by Change Order.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 *UNIT PRICE WORK*

9.1.1 Where the Contract provides that all or part of the Work is based on Unit Prices, the Original Contract Price includes, for all Unit Price work, an amount equal to the sum of Unit Prices times Unit Price Quantities for each separately identified item of Unit Price work.

9.1.2 Each Unit Price includes an amount to cover Contractor's overhead and profit for each separately identified item.

9.1.3 The Contractor may not make a Claim against the City for excess or deficiency in Unit Price Quantities provided in the Contract, except as provided in Subparagraph 9.1.4. Payment at the prices stated in the Contract is in full for the completed work. Contractor is not entitled to additional payment for materials, supplies, labor,

tools, machinery and all other expenditures incidental to satisfactory completion of the Work.

9.1.4 City Engineer may increase or decrease quantities of the Work within limitations stated in Paragraph 7.1.2. Contractor is entitled to payment for actual quantities of items provided at Unit Prices set forth in the Contract.

9.1.5 Where the final quantity of work performed by Contractor on Major Unit Price Work item differs by more than 25 percent from quantity of the item stated in the Contract, a Party may request an adjustment in Unit Price, for the portion that differs by more than 25 percent, by a Change Order under Section 7.3.

9.2 *ESTIMATES FOR PAYMENT, UNIT PRICE WORK*

9.2.1 Following the day of each month indicated in the Contract, Project Manager will prepare a Certificate for Payment for the preceding monthly period based on estimated units of work completed. Prior to preparing Certificate of Payment, Contractor shall have submitted to City Engineer, on a form approved by the Director of the Office of Business Opportunity, evidence satisfactory to the City Engineer of payments made to Subcontractors and Suppliers for the month preceding the month for which the Certificate for Payment is prepared, including evidence of electronic submission of certified payrolls.

9.2.2 Before final completion, City Engineer will review and confirm with Contractor the actual final installed Unit Price quantities. City Engineer's determination of actual final installed Unit Price quantities will be included in the final Certificate for Payment and any previous underpayments and overpayments will be reconciled with the actual final Unit Price quantities. Contractor shall file written notice of intent to appeal, if any, City Engineer's determination within 10 days of receipt of final Certificate for Payment. Upon expiration of the 10-day period, City Engineer's decision is final and binding on the Parties. If Contractor submits notice within the 10-day period, Contractor shall submit a Claim in accordance with Section 4.4.

9.3 *STIPULATED PRICE WORK*

9.3.1 For work contracted on a Stipulated Price basis, 10 days before submittal of first Application for Payment, Contractor shall submit to City Engineer a Schedule of Values allocated to various portions of the Work, prepared in the form and supported by the data as City Engineer may require to substantiate its accuracy. This schedule,

as approved by City Engineer, is used as a basis for approval of Contractor's Applications for Payment.

9.4 *APPLICATIONS FOR PAYMENT, STIPULATED PRICE WORK*

9.4.1 For work contracted on a Stipulated Price basis, Contractor shall submit Applications for Payment to City Engineer each month on a form acceptable to City Engineer in accordance with Schedule of Values. Application must indicate percentages of completion of each portion of the Work listed in Schedule of Values as of the end of the period covered by the Application for Payment.

9.4.2 Applications for Payment must be supported by substantiating data as City Engineer may require and must reflect retainages as provided below. Evidence satisfactory to the City Engineer of payments made to Subcontractors and Suppliers for the month preceding the month for which the Application for Payment is submitted must accompany each Application for Payment on a form approved by the Director of the Office of Business Opportunity. Evidence of electronic submission of certified payrolls must be included. Application must be sworn and notarized.

9.5 *CERTIFICATES FOR PAYMENT*

9.5.1 City Engineer will, within 10 days after the date specified in the Contract for Unit Price work, or upon receipt of Contractor's Application for Payment for Stipulated Price work, issue a Certificate for Payment for work based on amount which City Engineer determines is properly due, with copy to Contractor.

9.5.2 Unless otherwise provided in the Contract, payment for completed work and for properly stored Products is conditioned upon compliance with procedures satisfactory to City Engineer to protect the City's interests. Procedures will include applicable insurance, storage, and transportation to site for materials and equipment stored off-site. Contractor is responsible for maintaining materials and equipment until Date of Substantial Completion.

9.5.3 Contractor shall document its use of Ultra Low Sulfur Diesel Fuel by providing invoices and receipts evidencing Contractor's use.

9.6 *COMPUTATIONS OF CERTIFICATES FOR PAYMENT*

9.6.1 Subject to the provisions of the Contract, the amount of each Certificate for Payment is calculated as follows:

9.6.1.1 that portion of Contract Price allocated to completed work as determined by:

9.6.1.1.1 multiplying the percentage of completion of each portion of the Work listed in the Schedule of Values by the value of that portion of the Work, or

9.6.1.1.2 multiplying Unit Price quantities Installed times the Unit Prices listed in the Contract;

9.6.1.2 plus progress payments for completed work that has been properly authorized by Modifications;

9.6.1.3 less retainage of five percent;

9.6.1.4 plus actual costs, properly substantiated by certified copies of invoices and freight bills, of non-perishable materials and equipment delivered and properly stored, if approved in advance by Project Manager, less 15 percent;

9.6.1.5 less any previous payments by the City.

9.7 *DECISIONS TO WITHHOLD CERTIFICATION*

9.7.1 City Engineer may decline to certify payment and may withhold payment in whole or in part to the extent reasonably necessary to protect the City if, in City Engineer's opinion, there is reason to believe that:

9.7.1.1 nonconforming work has not been remedied;

9.7.1.2 the Work cannot be completed for unpaid balance of Contract Price;

9.7.1.3 there is damage to the City or another contractor;

9.7.1.4 the Work will not be completed within Contract Time and that unpaid balance will not be adequate to cover actual and liquidated damages;

9.7.1.5 probable evidence that third party claims will be filed in court, in arbitration, or otherwise;

9.7.1.6 Contractor has failed to make payments to Subcontractors or Suppliers for labor, material, or equipment; or

9.7.1.7 Contractor has persistently failed to carry out work in accordance with the Contract.

9.7.1.8 Contractor has not paid Subcontractors or Suppliers because of a payment dispute; or

9.7.1.9 Contractor has failed to provide satisfactory evidence described in Paragraphs 9.2.1, 9.4.2, and 9.8.2.

9.7.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

9.7.3 City Engineer may decline to certify payment and may withhold request for payment in whole or in part upon failure of Contractor to submit initial construction schedule or monthly schedule updates, as required in Paragraphs 3.15.1 and 3.15.3.

9.8 **PROGRESS PAYMENTS**

9.8.1 The City will make payment, in an amount certified by City Engineer, within 20 days after City Engineer has issued a Certificate for Payment.

9.8.2 The City has no obligation to pay or to facilitate the payment to a Subcontractor or Supplier, except as may otherwise be required by law. Contractor shall comply with the prompt payment requirements of Chapter 2251 of the Government Code. State law requires payment of Subcontractors and Suppliers by Contractor within 7 calendar days of Contractor's receipt of payment from the City, unless there is a payment dispute between Contractor and a Subcontractor or Supplier evidenced on a form approved by the Director of Mayor's Office of Business Opportunity and submitted to the City Engineer each month with Application for Payment or Estimate for Payment. **CONTRACTOR SHALL DEFEND AND INDEMNIFY THE CITY FROM ANY CLAIMS OR LIABILITY ARISING OUT OF CONTRACTOR'S FAILURE TO MAKE THESE PAYMENTS.**

9.8.2.1 The City may, upon request and at the discretion of City Engineer, furnish to Subcontractor information regarding percentages of completion or the amounts applied for by Contractor, and action taken thereon by the City because of work done by the Subcontractor.

9.8.2.2 Contractor shall prepare and submit to City Engineer a Certification of Payment to Subcontractors and Suppliers form to be attached to each monthly Estimate for Payment or Application for Payment.

9.8.3 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Work by the City, does not constitute acceptance of work which is not in accordance with the Contract.

9.9 **DATE OF SUBSTANTIAL COMPLETION**

9.9.1 When Contractor considers the Work, or a portion thereof designated by City Engineer, to be substantially complete, Contractor shall prepare and submit to Project Manager a comprehensive punch list of items to be completed or corrected. Failure to include an item on the punch list does not alter the responsibility of Contractor to comply with the Contract.

9.9.1.1 By submitting the punch list to Project Manager, Contractor represents that work on the punch list will be completed within the time provided for in Subparagraph 9.9.4.3.

9.9.2 Upon receipt of Contractor's punch list, Project Manager will inspect the Work, or designated portion thereof, to verify that the punch list contains all items needing completion or correction. If Project Manager's inspection discloses items not on Contractor's punch list, the items must be added to the punch list of items to be completed or corrected. If Project Manager's inspection reveals that Contractor is not yet substantially complete, Contractor shall complete or correct the deficiencies and request another inspection by Project Manager. The City may recover the costs of re-inspection from Contractor.

9.9.3 Prior to City Engineer's issuing a Certificate of Substantial Completion, Contractor shall also provide:

9.9.3.1 Certificate of Occupancy for new construction, or Certificate of Compliance for remodeled work, as applicable, and

9.9.3.2 compliance with Texas Accessibility Standards through state inspection of the Work, if required. If Contractor calls for inspection in a timely manner and the inspection is delayed through no fault of Contractor, and City Engineer so confirms, City Engineer may, upon request by Contractor, add the inspection to the punch list in Paragraph 9.9.2 and issue a Certificate of Substantial Completion.

9.9.4 When the Work, or designated portion thereof, is determined by City Engineer to be sufficiently complete in accordance with the Contract so the City can occupy or utilize the Work, or designated portion thereof, for the purpose for which it is intended, City Engineer will prepare a Certificate of Substantial Completion that incorporates the punch list in Paragraph 9.9.2 and establishes:

9.9.4.1 Date of Substantial Completion;

9.9.4.2 responsibilities of the Parties for security, maintenance, heating, ventilating and air conditioning, utilities, damage to the Work, and insurance; and

9.9.4.3 fixed time within which Contractor shall complete all items on punch list of items to be corrected accompanying the certificate.

9.9.5 Warranties required by the Contract shall commence on the Date of Substantial Completion unless otherwise provided by City Engineer in Certificate of Substantial Completion. Warranties may not commence on items not substantially completed.

9.9.6 After Date of Substantial Completion and upon application by Contractor and approval by City Engineer, the City may make payment, reflecting adjustment in retainage, if any, as follows:

9.9.6.1 with the consent of Surety, the City may increase payment to Contractor to 96 percent of Contract Price, less value of items to be completed and accrued liquidated damages.

9.9.7 Contractor shall complete or correct the items in Paragraph 9.9.2 within the time period set out in the Certificate of Substantial Completion. If Contractor fails to do so, the City may issue a Notice of Noncompliance and proceed according to Section 2.5.

9.10 *PARTIAL OCCUPANCY OR USE*

9.10.1 The City may occupy or use any completed or partially completed portion of the Work at any stage, provided the occupancy or use is consented to by Contractor and Contractor's insurer and authorized by public authorities having jurisdiction over the Work. Consent of Contractor to partial occupancy or use may not be unreasonably withheld.

9.10.2 Immediately prior to the partial occupancy or use, Project Manager and Contractor shall jointly inspect the area to be occupied or portion of the Work to be used to determine and record condition of the Work.

9.10.3 Partial occupancy or use of a portion of the Work does not constitute acceptance of work not in compliance with requirements of the Contract.

9.11 *FINAL COMPLETION AND FINAL PAYMENT*

9.11.1 Contractor shall review the Contract and inspect the Work prior to Contractor notification to City Engineer that the Work is complete and ready for final inspection. Contractor shall submit affidavit that the Work has been inspected and that the Work is complete in accordance with requirements of the Contract.

9.11.2 Project Manager will make final inspection within 15 days after receipt of Contractor's written notice that the Work is ready for final inspection and acceptance. If Project Manager finds the Work has been completed in accordance with the Contract, Contractor shall submit items set out in Paragraph 9.11.4 and, for stipulated price contracts, a final Application for Payment. City Engineer will, within 10 days, issue Certificate of Final Completion stating that to the best of City Engineer's knowledge, information, and belief, the Work has been completed in accordance with the Contract, and will recommend acceptance of the Work by City Council.

9.11.3 Should work be found not in compliance with requirements of the Contract, City Engineer will notify Contractor in writing of items of noncompliance. Upon inspection and acceptance of the corrections by Project Manager, compliance with all procedures of Paragraph 9.11.2, and Contractor's submission of the items set out in Paragraph 9.11.4, the City Engineer will issue Certificate of Final Completion to Contractor as provided in Paragraph 9.11.2.

9.11.4 Contractor shall submit the following items to City Engineer before City Engineer will issue a Certificate of Final Completion:

9.11.4.1 affidavit that payrolls, invoices for materials and equipment, and other indebtedness of Contractor connected with the Work, less amounts withheld by the City, have been paid or otherwise satisfied. If required by City Engineer, Contractor shall submit further proof including waiver or release of lien or claims from laborers or Suppliers of Products;

9.11.4.2 certificate evidencing that insurance required by the Contract to remain in force after final payment is currently in effect, will not be canceled or materially changed until at least 30 days written notice has been given to the City;

9.11.4.3 written statement that Contractor knows of no substantial reason that insurance will not be renewable to cover correction and warranty period required by the Contract;

9.11.4.4 consent of Surety to final payment; and

9.11.4.5 copies of record documents, maintenance manuals, tests, inspections, and approvals.

Upon City Engineer's issuance of a Certificate of Final Completion, Contractor may request increase in payment to 99 percent of Contract Price, less accrued liquidated damages.

9.11.5 If Contractor fails to submit required items in Paragraph 9.11.4 within 10 days of Project Manager's inspection of the Work under Paragraph 9.11.2 or Paragraph 9.11.3, City Engineer may, but is not obligated to:

9.11.5.1 deduct liquidated damages accrued from monies held;

9.11.5.2 proceed to City Council for acceptance of the Work, minus some or all of the items Contractor fails to submit under Paragraph 9.11.4; and,

9.11.5.3 upon acceptance by City Council of the portion of the Work completed, make final payment as set out in Paragraph 9.11.8.

9.11.6 If final completion is materially delayed through no fault of Contractor, or by issuance of Change Orders affecting date of final completion, and City Engineer so confirms, the City may, upon application by Contractor and certification by City Engineer, and without terminating the Contract, make payment of balance due for that portion of the Work fully completed and accepted.

9.11.7 If remaining balance due for work not corrected is less than retainage stipulated in the Contract, Contractor shall submit to City Engineer written consent of Surety to payment of balance due for that portion of the Work fully completed and accepted, prior to certification of the payment. The payment is made under terms governing final payment, except that it does not constitute waiver of Claims.

9.11.8 The City will make final payment to Contractor within 30 days after acceptance of the Work by City Council, subject to limitations, if any, as stated in the Contract.

9.11.9 Acceptance of final payment by Contractor shall constitute a waiver of all Claims, whether known or unknown, by Contractor, except those previously made in writing and identified by Contractor as unsettled at the time of final payment.

9.12 *LIQUIDATED DAMAGES*

9.12.1 Contractor, Surety, and the City agree that failure to complete the Work within Contract Time will cause damages to the City and that actual damages from harm are difficult to estimate accurately. Therefore, Contractor, Surety, and the City agree that Contractor and Surety are liable for and shall pay to the City the amount stipulated in Supplementary Conditions as liquidated damages, and that the amount of damages fixed therein is a reasonable forecast of just compensation for harm to the City resulting from Contractor's failure to complete the Work within Contract Time. The amount stipulated will be paid for each day of delay beyond Contract Time until Date of Substantial Completion.

9.12.2 Contractor shall pay the City an amount equal to \$1,200.00 per diesel operating vehicle or piece of motorized equipment per incident of high sulfur diesel fuel usage.

ARTICLE 10 - SAFETY PRECAUTIONS

10.1 *SAFETY PROGRAMS*

10.1.1 Contractor is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with performance of the Contract. Contractor shall submit a safety program to City Engineer prior to mobilizing for the Work, and is solely responsible for safety, efficiency, and adequacy of ways, means, and methods, and for damage which might result from failure or improper construction, maintenance, or operation performed by Contractor.

10.2 *POLLUTANTS AND POLLUTANT FACILITIES*

10.2.1 If Contractor encounters material on-site which it reasonably believes to be a Pollutant or facilities which it reasonably believes to be a Pollutant Facility, Contractor shall immediately stop work in affected area and immediately notify City Engineer, confirming the notice thereafter in writing.

10.2.2 If City Engineer determines that the material is a Pollutant or facility is a Pollutant Facility, work in affected area may not be resumed except by Modification, and only if the work would not violate applicable laws or regulations.

10.2.3 If City Engineer determines that the material is not a Pollutant or a facility is not a Pollutant Facility, work in affected area will be resumed upon issuance of a Modification.

10.2.4 Contractor is not required to perform, unless authorized by Change Order, work relating to Pollutants or Pollutant Facilities except for that work relating to Pollutants or Pollutant Facilities specified in the Contract.

10.3 *SAFETY OF THE ENVIRONMENT, PERSONS, AND PROPERTY*

10.3.1 Contractor shall take reasonable precautions for safety and shall provide reasonable protection to prevent damage, injury, or loss from all causes, to:

10.3.1.1 employees performing work on-site, and other persons who may be affected thereby;

10.3.1.2 work, including Products to be incorporated into the Work, whether in proper storage, under control of Contractor or Subcontractor; and

10.3.1.3 other property at or adjacent to the site, such as trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal or replacement in course of construction.

10.3.2 Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons, property, or environment.

10.3.2.1 Contractor shall comply with requirements of Underground Facility Damage Prevention and Safety Act TEX. UTIL. CODE ANN. Ch. 251 (Vernon Supp. 2002).

10.3.2.2 Contractor shall comply with all safety rules and regulations of the Federal Occupational Health and Safety Act of 1970 and subsequent amendments (OSHA).

10.3.3 Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection of persons and property, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

10.3.4 Contractor shall designate responsible member of Contractor's organization at site whose duty is prevention of accidents. This person will be Contractor's Superintendent unless otherwise designated by Contractor in writing to City Engineer.

10.3.5 Contractor shall prevent windblown dust and may not burn or bury trash debris or waste products on-site. Contractor shall prevent environmental pollution, including but not limited to particulates, gases and noise, as a result of the Work.

10.3.6 When use or storage of hazardous materials or equipment, or unusual methods are necessary for execution of the Work, Contractor shall exercise utmost care and carry on the activities under supervision of properly qualified personnel.

10.3.7 Contractor shall promptly remedy damage and loss to property referred to in Subparagraphs 10.3.1.2 and 10.3.1.3, caused in whole or in part by Contractor, or Subcontractors, which is not covered by insurance required by the Contract. Contractor is not required to remedy damage or loss attributable to the City, Design Consultant, or other contractors.

10.4 *EMERGENCIES*

10.4.1 In emergencies affecting safety of persons or property, Contractor shall act at Contractor's discretion to prevent imminent damage, injury, or loss. Additional compensation or extension of time claimed by Contractor because of emergencies are determined as provided in Article 7.

ARTICLE 11 - INSURANCE AND BONDS

11.1 *GENERAL INSURANCE REQUIREMENTS*

11.1.1 With no intent to limit Contractor's liability under indemnification provisions set forth in Paragraphs 3.25 and 3.26, Contractor shall provide and maintain in full force and effect during term of the Contract and all extensions and amendments thereto, at least the following insurance and available limits of liability.

11.1.2 If any of the following insurance is written as "claims made" coverage and the City is required to be carried as additional insured, then Contractor's insurance shall include a two-year extended discovery period after last date that Contractor provides any work under the Contract.

11.1.3 Aggregate amounts of coverage, for purposes of the Contract, are agreed to be amounts

of coverage available during fixed 12-month policy period.

11.2 ***INSURANCE TO BE PROVIDED BY CONTRACTOR***

11.2.1 ***Risks and Limits of Liability:*** Contractor shall maintain the insurance coverages in the listed amounts, as set out in Table 1.

11.2.2 If Limit of Liability for Excess Coverage is \$2,000,000 or more, Limit of Liability for Employer's Liability may be reduced to \$500,000.

11.2.3 ***Insurance Coverage:*** At all times during the term of this Contract and any extensions or renewals, Contractor shall provide and maintain insurance coverage that meets the Contract requirements. Prior to beginning performance under the Contract, at any time upon the Director's request, or each time coverage is renewed or updated, Contractor shall furnish to the Director current certificates of insurance, endorsements, all policies, or other policy documents evidencing adequate coverage, as necessary. Contractor shall be responsible for and pay (a) all premiums and (b) any claims or losses to the extent of any deductible amounts. Contractor waives any claim it may have for premiums or deductibles against the City, its officers, agents, or employees. Contractor shall also require all subcontractors or consultants whose subcontracts exceed \$100,000 to provide proof of insurance coverage meeting all requirements stated above except amount. The amount must be commensurate with the amount of the subcontract, but no less than \$500,000 per claim.

11.2.4 ***Form of insurance:*** The form of the insurance shall be approved by the Director and the City Attorney; such approval (or lack thereof) shall never (a) excuse non-compliance with the terms of this Section, or (b) waive or estop the City from asserting its rights to terminate this Contract. The policy issuer shall (1) have a Certificate of Authority to transact insurance business in Texas, or (2) be an eligible non-admitted insurer in the State of Texas and have a Best's rating of at least B+, and a Best's Financial Size Category of Class VI or better, according to the most current Best's Key Rating Guide. Each insurer is subject to approval by City Engineer in City Engineer's sole discretion as to conformance with these requirements.

11.2.5 ***Required Coverage:*** The City shall be an Additional Insured under this Contract, and all policies except Professional Liability and Worker's Compensation must name the City as an Additional Insured. Contractor waives any claim or right of

subrogation to recover against the City, its officers, agents, or employees, and each of Contractor's insurance policies except professional liability must contain coverage waiving such claim. Each policy, except Workers' Compensation and Professional Liability, must also contain an endorsement that the policy is primary to any other insurance available to the Additional Insured with respect to claims arising under this Contract. If professional liability coverage is written on a "claims made" basis, Contractor shall also provide proof of renewal each year for two years after substantial completion of the Project, or in the alternative: evidence of extended reporting period coverage for a period of two years after substantial completion, or a project liability policy for the Project covered by this Contract with a duration of two years after substantial completion.

11.2.6 ***Deductibles:*** Contractor assumes and bears any claims or losses to extent of deductible amounts and waives any claim it may ever have for same against the City, its officers, agents, or employees.

11.2.7 ***Notice: CONTRACTOR SHALL GIVE 30 DAYS' ADVANCE WRITTEN NOTICE TO THE DIRECTOR IF ANY OF ITS INSURANCE POLICIES ARE CANCELED OR NON-RENEWED.*** Within the 30-day period, Contractor shall provide other suitable policies in order to maintain the required coverage. If Contractor does not comply with this requirement, the Director, at his or her sole discretion, may immediately suspend Contractor from any further performance under this Agreement and begin procedures to terminate for default.

11.2.8 ***Subrogation:*** Contractor waives any claim or right of subrogation to recover against the City, its officers, agents, or employees. Each policy, except professional liability, must contain an endorsement waiving such claim.

11.2.9 ***Endorsement of Primary Insurance:*** Each policy, except Workers' Compensation policies, must contain an endorsement that the policy is primary insurance to any other insurance available to additional insured with respect to claims arising hereunder.

11.2.10 ***Liability for Premium:*** Contractor is solely responsible for payment of all insurance premium requirements hereunder and the City is not obligated to pay any premiums.

11.2.11 ***Additional Requirements for Workers' Compensation Insurance Coverage:*** Contractor shall, in addition to meeting the obligations set forth in Table 1, maintain throughout the term of the Contract Workers' Compensation coverage as

required by statute, and Contractor shall specifically comply with requirements set forth in Paragraph 11.2.10. The definitions set out below shall apply only for purposes of this Paragraph 11.2.10.

11.2.12 Definitions:

11.2.12.1 *Certificate of Coverage*: A copy of certificate of insurance, or coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory Workers' Compensation insurance coverage for Contractor's, Subcontractor's, or Supplier's employees providing services for the duration of the Contract.

11.2.12.2 *Duration of the Work*: Includes the time from Date of Commencement of the Work until Contractor's work under the Contract has been completed and accepted by City Council.

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

11.2.13 Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of coverage agreements, which meets the statutory requirements of TEX. LAB. CODE ANN., Section 401.011(44) for employees of Contractor providing services on the Work, for duration of the Work.

11.2.14 Contractor shall provide a Certificate of Coverage to the City prior to being awarded the Contract.

11.2.15 If coverage period shown on Contractor's original Certificate of Coverage ends during duration of the Work, Contractor shall file new

Certificate of Coverage with the City showing that coverage has been extended.

11.2.16 Contractor shall obtain from each person providing services on the Work, and provide to City Engineer:

11.2.16.1 Certificate of Coverage, prior to that person beginning work on the Work, so the City will have on file Certificates of Coverage showing coverage for all persons providing services on the Work; and

11.2.16.2 no later than seven days after receipt by Contractor, new Certificate of Coverage showing extension of coverage, if coverage period shown on current Certificate of Coverage ends during the duration of the Work.

11.2.17 Contractor shall retain all required Certificates of Coverage for the duration of the Work and for one year thereafter.

11.2.18 Contractor shall notify City Engineer in writing by certified mail or personal delivery, within 10 days after Contractor knew or should have known, of any change that materially affects provision of coverage of any person providing services on the Work.

11.2.19 Contractor shall post on-site a notice, in text, form and manner prescribed by Texas Workers' Compensation Commission, informing all persons providing services on the Work that they are required to be covered, and stating how person may verify coverage and report lack of coverage.

11.2.20 Contractor shall contractually require each person with whom it contracts to provide services on the Work to:

11.2.20.1 provide coverage, based on proper reporting of classification codes, payroll amounts and filing of any coverage agreements, which meets statutory requirements of TEX. LAB. CODE ANN., Section 401.011(44) for all its employees providing services on the Work, for the duration of the Work;

11.2.20.2 provide to Contractor, prior to that person's beginning work on the Work, a Certificate of Coverage showing that coverage is being provided for all employees of the person providing services on the Work, for the duration of the Work;

11.2.20.3 provide Contractor, prior to the end of the coverage period, a new Certificate of Coverage showing extension of coverage,

- if the coverage period shown on the current Certificate of Coverage ends during the duration of the Work;
- 11.2.20.4 obtain from each other person with whom it contracts, and provide to Contractor: (1) Certificate of Coverage, prior to other person's beginning work on the Work; and (2) new Certificate of Coverage showing extension of coverage, prior to end of coverage period, if coverage period shown on the current Certificate of Coverage ends during duration of the Work.
- 11.2.20.5 retain all required Certificates of Coverage on file for the duration of the Work and for one year thereafter;
- 11.2.20.6 notify City Engineer in writing by certified mail or personal delivery within 10 days after person knew, or should have known, of change that materially affects provision of coverage of any person providing services on the Work; and
- 11.2.20.7 contractually require each person with whom it contracts to perform as required by Paragraphs 11.2.10.1 through 11.2.10.7, with Certificates of Coverage to be provided to person for whom they are providing services.
- 11.2.21 By signing the Contract or providing or causing to be provided a Certificate of Coverage, Contractor is representing to the City that all employees of Contractor who will provide services on the Work will be covered by Workers'

Compensation coverage for the duration of the Work, that coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with appropriate insurance carrier. Contractor is not allowed to self-insure Workers' Compensation. Contractor may be subject to administrative penalties, criminal penalties, civil penalties, or other civil actions for providing false or misleading information.

11.2.22 Contractor's failure to comply with Paragraph 11.2.10 is a breach of the Contract by Contractor, which entitles the City to declare the Contract void if Contractor does not remedy breach within 10 days after receipt of notice of breach from City Engineer.

11.2.23 *Subcontractor Insurance Requirements:* Contractor shall require Subcontractors and Suppliers to obtain Commercial General Liability, Workers' Compensation, Employer's Liability and Automobile Liability coverage that meets all the requirements of Paragraph 11.2. The amount must be commensurate with the amount of the subcontract, but not less than \$500,000 per occurrence. Contractor shall require all Subcontractors with whom it contracts directly, whose subcontracts exceed \$100,000, to provide proof of Commercial General Liability and Automobile Liability insurance coverage meeting the above requirements. Contractor shall comply with all requirements set out under Paragraph 11.2.10 as to Workers' Compensation Insurance for all Subcontractors and Suppliers.

TABLE 1
REQUIRED COVERAGE

Coverage	Limit of Liability
1. Workers' Compensation	<ul style="list-style-type: none"> Texas Statutory Limits for Workers' Compensation
2. Employer's Liability	<ul style="list-style-type: none"> Bodily Injury by Accident \$1,000,000 (each accident) Bodily Injury by Disease \$1,000,000 (policy limit) Bodily Injury by Disease \$1,000,000 (each employee)
3. Commercial General Liability: Including Broad Form Property Damage, Contractual Liability, Explosion, Underground and Collapse, Bodily Injury, Personal Injury, Products, and Completed Operations (for a period of one year following completion of the Work).	<ul style="list-style-type: none"> \$1,000,000 Limit (each occurrence), subject to general aggregate Limit of \$2,000,000 Products and Completed Operations \$2,000,000 aggregate Limit
4. Owner's and Contractor's Protective Liability	<ul style="list-style-type: none"> \$1,000,000 each Occurrence/ aggregate

5. Installation Floater (Unless alternative coverage approved by City Attorney)	<ul style="list-style-type: none"> Value of stored material or equipment, listed on Certificates of Payments, but not yet incorporated into the Work
6. Automobile Liability Insurance: (For automobiles furnished by Contractor in course of his performance under the Contract, including Owned, Non-owned, and Hired Auto coverage)	<ul style="list-style-type: none"> \$1,000,000 combined single limit each occurrence for (1) Any Auto or (2) All Owned, Hired, and Non-Owned Autos
7. Excess Coverage	<ul style="list-style-type: none"> \$1,000,000 each occurrence/ aggregate in excess of limits specified for Commercial General Liability, and Automobile Liability
Aggregate Limits are per 12-month policy period unless otherwise indicated.	

11.3 PROOF OF INSURANCE

11.3.1 Prior to commencing services and at time during the term of the Contract, Contractor shall furnish City Engineer with Certificates of Insurance, along with Affidavit from Contractor confirming that Certificate accurately reflects insurance coverage that is available during term of the Contract. If requested in writing by City Engineer, Contractor shall furnish City Engineer with certified copies of Contractor's actual insurance policies. Failure of Contractor to provide certified copies, as requested, may be deemed, at City Engineer's or City Attorney's discretion, a material breach of the Contract.

11.3.2 Notwithstanding the proof of insurance requirements, Contractor shall continuously maintain in effect required insurance coverage set forth in Paragraph 11.2. Failure of Contractor to comply with this requirement does constitute a material breach by Contractor allowing the City, at its option, to immediately suspend or terminate work, or exercise any other remedy allowed under the Contract. Contractor agrees that the City has not waived or is not estopped to assert a material breach of the Contract because of any acts or omissions by the City regarding its review or non-review of insurance documents provided by Contractor, its agents, employees, or assigns.

11.3.3 Contractor shall provide updated certificates of insurance to the Director upon request. The Contractor shall be responsible for delivering a current certificate of insurance in the proper form to the Director as long as Contractor is required to furnish insurance coverage under Paragraph 11.2.

11.3.4 Every certificate of insurance Contractor delivers in connection with this Contract shall
 11.3.4.1 be less than 12 months old;

11.3.4.2 include all pertinent identification information for the Insurer, including the company name and address, policy number, NAIC number or AMB number, and authorized signature;

11.3.4.3 include in the Certificate Holder Box the Project name and reference numbers, contractor's email address, and indicates the name and address of the Project Manager;

11.3.4.4 include the Contractor's email address in the Certificate Holder Box;

11.3.4.5 include the Project reference numbers on the City address so the Project reference number is visible in the envelope window; and

11.3.4.6 be appropriately marked to accurately identify all coverages and limits of the policy, effective and expiration dates, and waivers of subrogation in favor of the City for Commercial General Liability, Automobile Liability, and Worker's Compensation/Employers' Liability.

11.4 PERFORMANCE AND PAYMENT BONDS

11.4.1 For Contracts over the value of \$25,000, Contractor shall provide Bonds on the City's standard forms covering faithful performance of the Contract and payment of obligations arising thereunder as required in the Contract pursuant to Chapter 2253 of the Government Code. The Bonds must be for 100 percent of Original Contract Price and in accordance with conditions stated on standard City Performance and Payment Bond and Statutory Payment Bond forms. Bonds may be obtained from Contractor's usual source and cost for the Bonds are included in Contract Price.

11.5 *MAINTENANCE BONDS*

11.5.1 *One-year Maintenance Bond:* Contractor shall provide Bond on standard City One-year Maintenance Bond form, providing for Contractor's correction, replacement, or restoration of any portion of the Work which is found to be not in compliance with requirements of the Contract during one-year correction period required in Paragraph 12.2. The Maintenance Bond must be for 100 percent of the Original Contract Price.

11.6 *SURETY*

11.6.1 A Bond that is given or tendered to the City pursuant to the Contract must be executed by a surety company that is authorized and admitted to write surety Bonds in the State of Texas.

11.6.2 If a Bond is given or tendered to the City pursuant to the Contract in an amount greater than 10 percent of Surety's capital and surplus, Surety shall provide certification that Surety has reinsured that portion of the risk that exceeds 10 percent of Surety's capital and surplus. The reinsurance must be with one or more reinsurers who are duly authorized, accredited, or trusted to do business in the State of Texas. The amount reinsured by reinsurer may not exceed 10 percent of reinsurer's capital and surplus. The amount of allowed capital and surplus must be based on information received from State Board of Insurance.

11.6.3 If the amount of a Bond is greater than \$100,000, Surety shall:

11.6.3.1 also hold certificate of authority from the United States Secretary of Treasury to qualify as surety on obligations permitted or required under federal law; or,

11.6.3.2 Surety may obtain reinsurance for any liability in excess of \$100,000 from reinsurer that is authorized and admitted as a reinsurer in the State of Texas and is the holder of a certificate of authority from the United States Secretary of the Treasury to qualify as surety or reinsurer on obligations permitted or required under federal law.

11.6.4 Determination of whether Surety on the Bond or the reinsurer holds a certificate of authority from the United States Secretary of the Treasury is based on information published in Federal Register covering the date on which Bond was executed.

11.6.5 Each Bond given or tendered to the City pursuant to the Contract must be on City forms with no changes made by Contractor or Surety, and must

be dated, executed, and accompanied by power of attorney stating that the attorney in fact executing such the bond has requisite authority to execute such Bond. The Bonds must be dated and must be no more than 30 days old.

11.6.6 Surety shall designate in its Bond, power of attorney, or written notice to the City, an agent resident in Harris County to whom any requisite notices may be delivered and on whom service of process may be had in matters arising out of the suretyship.

11.6.7 Contractor shall furnish information to a payment bond beneficiary as required by TEX. GOV'T CODE ANN. CH. 2253.

11.7 *DELIVERY OF BONDS*

11.7.1 Contractor shall deliver required Bonds to the City within time limits stated in Notice of Intent to Award and prior to Date of Commencement of the Work.

ARTICLE 12 - UNCOVERING AND CORRECTION OF THE WORK

12.1 *UNCOVERING OF THE WORK*

12.1.1 If a portion of the Work has been covered which City Engineer has not specifically requested to observe prior to its being covered, City Engineer may request to see such work and it must be uncovered by Contractor. If such work is in accordance with the Contract, the costs of uncovering and covering such work are charged to the City by Change Order. If such work is not in accordance with the Contract, Contractor shall pay for uncovering and shall correct the nonconforming Work promptly after receipt of Notice of Noncompliance to do so.

12.2 *CORRECTION OF THE WORK*

12.2.1 Contractor shall promptly correct or remove work rejected by City Engineer or work failing to conform to requirements of the Contract, whether observed before or after Date of Substantial Completion and whether fabricated, Installed, or completed.

12.2.2 Contractor bears costs of correcting the rejected or nonconforming work including additional testing and inspections, and compensation for Design Consultant's services and expenses made necessary thereby.

12.2.3 If within one year after Date of Substantial Completion, or after date for commencement of warranties established under Paragraph 9.9.5 or by other applicable special warranty required by the Contract, whichever is later in time, any of the Work is found not to be in accordance with the requirements of the Contract, Contractor shall correct such work promptly after receipt of Notice of Noncompliance to do so.

12.2.4 One-year correction period for portions of the Work completed after Date of Substantial Completion will begin on the date of acceptance of that portion of the Work. This obligation under this Paragraph survives acceptance of the Work under the Contract and termination of the Contract.

12.2.5 The one-year correction period does not establish a duration for the Contractor's general warranty under Paragraph 3.12. The City retains the right to recover damages from the Contractor as long as may be permitted by the applicable statute of limitations.

12.2.6 If Contractor does not proceed with correction of the nonconforming work within time fixed by Notice of Noncompliance, the City may correct nonconforming work or remove nonconforming work and store salvageable Products at Contractor's expense. Contractor shall pay the costs of correction of nonconforming work and removal and storage of salvageable Products to the City. If Contractor does not pay costs of the correction or removal and storage within 10 days after written notice, the City may sell the Products at auction or at private sale. The City will account for proceeds thereof after deducting costs and damages that would have been borne by Contractor, including compensation for services of Design Consultant and necessary expenses. If the proceeds of sale do not cover costs which Contractor should have borne, Contractor shall pay the value of the deficiency to the City.

12.2.7 Contractor bears cost of correcting work originally installed by Contractor, the City, or by separate contractors and damaged by Contractor's correction or removal of Contractor's work.

12.3 **ACCEPTANCE OF NONCONFORMING WORK**

12.3.1 If City Engineer prefers to accept work which is not in accordance with requirements of the Contract, City Engineer may do so only by issuance of Change Order, instead of requiring its removal and correction. City Engineer will determine

Contract Price reduction. The reduction will become effective even if final payment has been made.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1 **GOVERNING LAW AND VENUE**

13.1.1 This Contract shall be construed and interpreted in accordance with the applicable laws of the State of Texas and City of Houston. Venue for any disputes relating in any way to this Contract shall lie exclusively in Harris County, Texas.

13.2 **SUCCESSORS**

13.2.1 The Contract binds and benefits the Parties and their legal successors and permitted assigns; however, this Paragraph 13.2.1 does not alter the restrictions on assignment and disposal of assets set out in Paragraph 13.3.1. The Contract does not create any personal liability on the part of any officer or agent of the City.

13.3 **BUSINESS STRUCTURE AND ASSIGNMENTS**

13.3.1 Contractor may not assign the Contract at law or otherwise, or dispose of all or substantially all of its assets without City Engineer's prior written consent. Nothing in this Section, however, prevents the assignment of accounts receivable or the creation of a security interest as described in §9.406 of the Texas Business & Commerce Code. In the case of such an assignment, Contractor shall immediately furnish the City with proof of the assignment and the name, telephone number, and address of the assignee and a clear identification of the fees to be paid to the assignee.

13.3.2 Any series, as defined by the TEX. BUS. ORG. CODE ANN., affiliate, subsidiary, or successor to which Contractor assigns or transfers assets shall join in privity and be jointly and severally liable under this Contract.

13.4 **WRITTEN NOTICE**

13.4.1 All notices required or permitted by the Contract must be in writing and must be effected by hand delivery; registered or certified mail, return receipt requested; or facsimile with confirmation copy mailed to receiving Party. Notice is sufficient if made or addressed with proper postage to the address stated in the Agreement for each Party ("Notice Address") or faxed to the facsimile number stated in the Agreement for each Party. The notice is deemed delivered on the earlier of:

- 13.4.1.1 the date the Notice is actually received;
- 13.4.1.2 the third day following deposit in a United States Postal Service post office or receptacle; or
- 13.4.1.3 the date the facsimile is sent unless the facsimile is sent after 5:00 p.m. local time of the recipient and then it is deemed received on the following day.

Any Party may change its Notice Address or facsimile number at any time by giving written notice of the change to the other Party in the manner provided for in this Paragraph at least 15 days prior to the date the change is affected.

13.5 *RIGHTS AND REMEDIES*

13.5.1 Duties and obligations imposed by the Contract and rights and remedies available thereunder are in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

13.5.2 No act or failure to act by the City or Contractor is a waiver of rights or duties afforded them under the Contract, nor is the act or failure to act constitute approval of or acquiescence in a breach of the Contract. No waiver, approval or acquiescence is binding unless in writing and, in the case of the City, signed by City Engineer.

13.6 *TESTS AND INSPECTIONS*

13.6.1 Contractor shall give City Engineer, Construction Manager, and Design Consultant timely notice of the time and place where tests and inspections are to be made. Contractor shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

13.6.2 The City will employ and pay for services of an independent testing laboratory to perform inspections or acceptance tests required by the Contract except:

- 13.6.2.1 inspections or tests covered by Paragraph 13.6.3;
- 13.6.2.2 those otherwise specifically provided in the Contract; or
- 13.6.2.3 costs incurred in connection with tests or inspections conducted pursuant to Paragraph 12.2.2.

13.6.3 Contractor is responsible for and shall pay all costs in connection with inspection or testing required in connection with City Engineer's acceptance of a Product to be incorporated into the Work, or of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation into the Work.

13.6.4 Neither observations by the City, Construction Manager, or Design Consultant, nor inspections, tests, or approvals by others, relieves Contractor from Contractor's obligations to perform the Work in accordance with the Contract.

13.7 *INTEREST*

13.7.1 No interest will accrue on late payments by the City except as provided under Chapter 2251 of the Government Code.

13.8 *PARTIES IN INTEREST*

13.8.1 The Contract does not bestow any rights upon any third party, but binds and benefits the Parties only.

13.9 *ENTIRE CONTRACT*

13.9.1 The Contract merges the prior negotiations and understandings of the Parties and embodies the entire agreement of the Parties. No other agreements, assurances, conditions, covenants, express or implied, or other terms of any kind, exist between the Parties regarding the Contract.

13.10 *WRITTEN AMENDMENT*

13.10.1 Changes to the Contract that cannot be effected by Modifications, must be made by written amendment, which will not be effective until approved by City Council.

13.11 *COMPLIANCE WITH LAWS*

13.11.1 Contractor shall comply with the Americans with Disabilities Act of 1990 as amended (ADA) and Texas Architectural Barriers Act and all regulations relating to either statute.

13.11.2 Contractor shall comply with all applicable federal, state, and city laws, rules and regulations.

13.12 *SEVERABILITY*

13.12.1 If any part of the Contract is for any reason found to be unenforceable, all other parts remain enforceable to the extent permitted by law.

13.13 *COMPLIANCE WITH CERTAIN STATE LAW REQUIREMENTS*

13.13.1 *Anti-Boycott of Israel.* Contractor certifies that Contractor is not currently engaged

in, and agrees for the duration of this Agreement not to engage in, the boycott of Israel as defined by Section 808.001 of the Texas Government Code.

13.13.2 *Anti-Boycott of Energy Companies.* Contractor certifies that Contractor is not currently engaged in, and agrees for the duration of this Agreement not to engage in, the boycott of energy companies as defined by Section 809.001 of the Texas Government Code.

13.13.3 *Anti-Boycott of Firearm Entities or Firearm Trade Associations.* Contractor certifies that Contractor does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, or will not discriminate against a firearm entity or firearm trade association for the duration of this Agreement, as defined by Section 2274.001 of the Texas Government Code.

13.13.4 *Certification of No Business with Foreign Terrorist Organizations.* For purposes of Section 2252.152 of the Code, Contractor certifies that, at the time of this Agreement neither Contractor nor any wholly owned subsidiary, majority-owned subsidiary, parent company or affiliate of Contractor, is a company listed by the Texas Comptroller of Public Accounts under Sections 2252.153 or 2270.0201 of the Code as a company known to have contracts with or provide supplies or to a foreign terrorist organization.

13.14 **ZERO TOLERANCE POLICY FOR HUMAN TRAFFICKING & RELATED ACTIVITIES**

13.14.1 The requirements and terms of the City of Houston's Zero Tolerance Policy for Human Trafficking and Related Activities, as set forth in Executive Order 1-56, as revised from time to time, are incorporated into this Agreement for all purposes. Contractor has reviewed Executive Order 1-56, as revised, and shall comply with its terms and conditions as they are set out at the time of this Agreement's effective date. Contractor shall notify the City's Chief Procurement Officer, City Attorney, and the Director of any information regarding possible violation by the Contractor or its subcontractors providing services or goods under this Agreement.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 **TERMINATION BY THE CITY FOR CAUSE**

14.1.1 Each of the following acts or omissions of Contractor or occurrences shall constitute an "Event of Default" under the Contract:

14.1.1.1 Contractor refuses or fails to supply enough properly skilled workers or proper Products;

14.1.1.2 Contractor disregards laws, ordinances, rules, regulations, or orders of a public authority having jurisdiction;

14.1.1.3 Contractor is guilty of material breach of any duty or obligation of Contractor under the Contract, including, but not limited to, failure to submit certified payrolls electronically;

14.1.1.4 Contractor has had any other contract with the City terminated for cause at any time subsequent to the effective date of the Contract as set out in the Agreement; or

14.1.1.5 Contractor fails to utilize Ultra Low Sulfur Diesel Fuel, as required in Paragraph 3.9.1.1.

14.1.2 If an Event of Default occurs, City Engineer may, at his option and without prejudice to any other rights or remedies which the City may have, deliver a written notice to Contractor and Surety describing the Event of Default and giving the Contractor 10 days to cure the Event of Default. If after the cure period, Contractor has failed or refused to cure the Event of Default, then City Engineer may deliver a second written notice to Contractor giving notice of the termination of the Contract or of the termination of Contractor's performance under the Contract ("Notice of Termination"). If City Engineer issues a Notice of Termination, then City Engineer may, subject to any prior rights of Surety and any other rights of the City under the Contract or at law:

14.1.2.1 request that Surety complete the Work; or

14.1.2.2 take possession of the site and all materials, equipment, tools, and construction equipment and machinery on the site owned by Contractor; and

14.1.2.3 finish the Work by whatever reasonable method City Engineer may deem expedient.

14.1.3 After Contractor's receipt of a Notice of Termination, and except as otherwise directed in writing by City Engineer, Contractor shall:

14.1.3.1 stop the Work on the date and to the extent specified in the Notice of Termination;

- 14.1.3.2 place no further orders or subcontracts for Products or services;
- 14.1.3.3 terminate all orders and subcontracts to the extent that they relate to performance of work terminated;
- 14.1.3.4 assign to the City, in the manner, at the times, and to the extent directed by City Engineer, all rights, title, and interest of Contractor, under the terminated supply orders and subcontracts. The City may settle or pay claims arising out of termination of the orders and subcontracts;
- 14.1.3.5 settle all outstanding liabilities and all claims arising out of the termination of supply orders and subcontracts with approval of City Engineer;
- 14.1.3.6 take action as may be necessary, or as City Engineer may direct, for protection and preservation of property related to the Work that is in possession of Contractor, and in which the City has or may acquire an interest; and
- 14.1.3.7 secure the Work in a safe state before leaving the site, providing any necessary safety measures, shoring, or other devices.

14.1.4 If the City terminates the Contract or terminates Contractor's performance under the Contract for any one or more of the reasons stated in Paragraph 14.1.1, Contractor may not receive any further payment until the Work is complete, subject to Paragraph 14.1.5.

14.1.5 If the unpaid balance of Contract Price exceeds the costs of finishing the Work, including liquidated damages and other amounts due under the Contract, the balance will be paid to Contractor. If the costs of finishing the Work exceed the unpaid balance, Contractor shall, within 10 days of receipt of written notice setting out the amount of the excess costs, pay the difference to the City. The amount to be paid to Contractor or the City will be certified by City Engineer in writing, and this obligation for payment shall survive termination of the Contract or termination of Contractor's performance under the Contract. Termination of the Contractor for cause shall not relieve the Surety from its obligation to complete the project.

14.2 TERMINATION BY THE CITY FOR CONVENIENCE

14.2.1 City Engineer may, without cause and without prejudice to other rights or remedies of the City, give Contractor and Surety a Notice of Termination with a seven days written notice.

14.2.2 After receipt of the Notice of Termination, and except as otherwise approved by City Engineer, Contractor shall conform to requirements of Paragraph 14.1.3.

14.2.3 After receipt of the Notice of Termination, Contractor shall submit and substantiate to the City its termination Claim, in forms required by City Engineer. The Claim will be submitted and substantiated to the City promptly, but no later than six months from the effective date of termination, unless one or more extensions are granted by City Engineer in writing. If Contractor fails to submit its termination Claim within the time allowed, in accordance with Paragraph 14.2.4, City Engineer will determine, on the basis of available information, the amount, if any, due to Contractor because of termination, and City Engineer's determination is final and binding on the Parties. The City will then pay to Contractor the amount so determined.

14.2.4 City Engineer will determine, on the basis of information available to City Engineer, the amount due, if any, to Contractor for the termination as follows:

14.2.4.1 Contract Price for all work performed in accordance with the Contract up to the date of termination determined in the manner prescribed for monthly payments in Article 9, except no retainage is withheld by the City either for payment determined by percentage of completion or for materials and equipment delivered to the site, in storage or in transit.

14.2.4.2 Reasonable termination expenses, including costs for settling and paying Subcontractor and Supplier claims arising out of termination of the Work, reasonable cost of preservation and protection of the City's property after termination, if required, and the cost of Claim preparation. Termination expenses do not include field or central office overhead, salaries of employees of Contractor, or litigation costs, including attorneys' fees.

No amount is allowed for anticipated profit or central office overhead on uncompleted work, or any cost or lost profit for other business of Contractor alleged to be damaged by the termination.

14.2.5 Contractor shall promptly remove from the site any construction equipment, tools, and temporary facilities, except the temporary facilities which City Engineer may wish to purchase and retain.

14.2.6 Contractor shall cooperate with City Engineer during the transition period.

14.2.7 The City will take possession of the Work and materials delivered to the site, in storage, or in transit, as of date or dates specified in the Notice of Termination, and is responsible for maintenance, utilities, security, and insurance, as stated in Notice of Termination.

14.3 *SUSPENSION BY THE CITY FOR CONVENIENCE*

14.3.1 City Engineer may, without cause, after giving Contractor and Surety 24-hour prior written notice, order Contractor to suspend, delay, or interrupt the Work in whole or in part for a period of time as City Engineer may determine.

14.3.2 An adjustment will be made in Contract Time equivalent to the time of suspension.

14.3.3 Adjustment will be made to Contract Price for increases in the cost of performance of the Work, including profit on increased cost of performance caused by suspension, delay, or interruption of the Work in accordance with Paragraph 7.3. No adjustment will be made to the extent that:

14.3.3.1 performance was, or would have been, suspended, delayed, or interrupted by another cause for which Contractor is responsible; or

14.3.3.2 adjustment is made or denied under another provision of the Contract.

14.4 *TERMINATION BY CONTRACTOR*

14.4.1 Contractor may terminate the Contract if the Work is stopped for a period of 30 days through no act or fault of Contractor, directly related to one of these events:

14.4.1.1 issuance of an order of a court or other public authority having jurisdiction;

14.4.1.2 act of government, such as a declaration of national emergency which makes material unavailable; or

14.4.1.3 if repeated suspensions, delays, or interruptions by the City as described in Paragraph 14.3 constitute, in the aggregate, more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less;

No termination will be effective for the above reasons if Contractor delivers written notice to City

Engineer describing the reason for termination, giving the proposed termination date, and granting the City a reasonable opportunity to respond and cure any City default before termination is effective.

14.4.2 If the Contract is terminated pursuant to this Paragraph 14.4, Contractor shall comply with the requirements of Paragraphs 14.2.2 through 14.2.7.

[END OF DOCUMENT]

Document 00800

SUPPLEMENTARY CONDITIONS

Project Manager: Jeffrey Tennison

Project No.: PN 941

The following Paragraphs amend and supplement the March 7,2022 edition of the General Conditions. Unaltered portions of General Conditions remain in effect.

ARTICLE 1 - GENERAL PROVISIONS:

1.1 *DEFINITIONS: Insert the following Paragraphs 1.1.9.1, 1.1.23, and 1.1.25, and reorder the remaining definitions accordingly. Please insert the amended definition of "Specifications".*

1.1.23 *Good Faith Efforts:* Steps taken to achieve an MBE, WBE, SBE, or PDBE goal or other requirements which, by their scope, intensity, and usefulness, demonstrate the bidder's responsiveness to fulfill the business opportunity objective, as well as the Contractor's responsibility to put forth measures to meet or exceed the MBE, WBE, SBE, or PDBE goal (Contract Goal). These steps apply from before a contract's award, through its duration, and after its conclusion, in the event the Contractor has been unsuccessful in meeting the Contract Goal. These efforts are required whether a Goal Oriented Contract or a Regulated Contract, as defined in the Office of Business Opportunity's Policy & Procedures Manual, available at <http://www.houstontx.gov/obo>.

1.1.25 *Incidental Work:* Work described as incidental shall be work defined in Document 01110 - Summary of Work, that do not have a direct pay item listed in the Document 00410B - Bid Form Part B, or less than 1% of the Contract Price and not capable of being measured. If Work is identified as Incidental Work and also covered by Bid Form Part B quantities, then the unit price item quantities in the Bid Form Part B shall govern.

1.1.45 *Specifications:* Divisions 01 through 33 of the documents that are incorporated into the Agreement, consisting of written General Requirements and requirements for Products, standards, and workmanship for the Work, and performance of related services. All specifications are amended to include, under the Measurement and Payment Section, the following sentence: "Work described as Incidental Work shall not be paid as a separate unit price item."

ARTICLE 3 - THE CONTRACTOR

3.5 *LABOR: Insert the following Paragraphs, 3.5.3.1.1, 3.5.3.1.2, and 3.5.3.1.3.*

Information Booths Hobby

Project No PN941

SUPPLEMENTARY CONDITIONS

3.5.3.1.1 If the Original Contract Price is greater than One Million Dollars, Contractor shall make Good Faith Efforts to comply with the City ordinances regarding Minority Business Enterprises (MBE), Women Business Enterprises (WBE), Persons with Disabilities Business Enterprises (PDBE) and Small Business Enterprise (SBE) participation goals which are as follows:

3.5.3.1.1.1 the MBE goal is 0 percent,

3.5.3.1.1.2 the WBE goal is 0 percent, and

3.5.3.1.1.3 the PDBE goal is 0 percent.

3.5.3.1.1.4 The bidder may substitute SBE participation of no more than four percent of the MBE goal, the WBE goal, or portions of the MBE Goal and WBE Goal.

3.5.3.1.1.5 The bidder may not use Native-American-owned firms that are certified as MBEs to meet MBE contract goals. Native-Americans firms can only be used as SBEs in fulfillment of the above stated goals.

3.5.3.1.1.6 The bidder may not use MWSBE Suppliers to account for more than 50% of the MWSBE participation plan.

3.5.3.1.2 The MBE, WBE, PDBE, and SBE goals are specific to this Agreement. The Contractor shall make reasonable efforts to achieve these goals.

3.5.3.1.3 Failure by Contractor to comply with the goals for MBE, WBE, SBE, or PDBE is a material breach of the Agreement, which may result in termination of the Agreement, or such other remedy permitted as the City deems appropriate.

ARTICLE 8 - TIME

8.1 *PROGRESS AND COMPLETION: Add the following Paragraph 8.1.6.1.*

8.1.6.1 Contractor shall credit the City by Change Order for inspection services for overtime work or work performed on Sundays or Legal Holidays. The amount Contractor credits the City will be actual costs per inspector for inspection services.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 *UNIT PRICE WORK: Delete Section 9.1 in its entirety and insert the following Section 9.1.*

Using table below as a guideline, insert amount of calculated daily cost to City, to be used for liquidated damages, in Paragraph 9.12.1.1. Include calculations in Project files. Department will consider guidelines based on the Project and its Scope.

<u>Est. Amount of Construction Cost</u>	<u>Liquidated Damages per Day</u>
<i>Project less than \$2.5 M</i>	\$800
<i>Project \$2.5 M to \$7.5 M</i>	\$1200
<i>Non-facility Projects Greater than \$7.5 M</i>	\$1500
<i>Facility Projects greater than \$7.5 M</i>	\$2000

9.12 **LIQUIDATED DAMAGES:** *Insert the following Paragraph 9.12.1.1.*

9.12.1.1 The amount of liquidated damages payable by Contractor or Surety for each and every day of delay beyond Contract Time, are \$800 per day.

ARTICLE 11 - INSURANCE AND BONDS

**TABLE 1
REQUIRED COVERAGES**

(Coverage)	(Limit of Liability)
.1 Workers' Compensation	Statutory Limits for Workers' Compensation
.2 Employer's Liability	Bodily Injury by Accident \$1,000,000 (each accident) Bodily Injury by Disease \$1,000,000 (policy limit) Bodily Injury by Disease \$1,000,000 (each employee)
.3 Commercial General Liability: Including Contractor's Protective, Broad Form Property Damage, Contractual Liability, Explosion, Underground and Collapse, Bodily Injury, Personal Injury, Products, and Completed Operations (for a period of one year following completion of the Work)	Combined single limit of \$1,000,000 (each occurrence), subject to general aggregate of \$2,000,000; Products and Completed Operations \$1,000,000 aggregate.
.4 Owner's and Contractor's Protective Liability	\$1,000,000 combined single limit each Occurrence/aggregate
.5 Installation Floater (Unless alternative coverage by City Attorney)	Value of stored equipment or material, listed on Certificates of Payments, but not yet incorporated into the Work
.6 Automobile Liability Insurance: (For automobiles furnished by Contractor in course of his performance under the Contract, including Owned, Non-owned, and Hired Auto coverage)	\$1,000,000 combined single limit each occurrence for (1) Any Auto or (2) All Owned, Hired, and Non-Owned Autos. *increase to \$10,000,000 for runway, taxiway, ramp, apron or in vicinity of aircraft construction projects.
.7 Excess Coverage (This coverage is not required if 8(c) below is required)	\$1,000,000 each occurrence/combined aggregate in excess of limits specified for Employer's Liability, Commercial General Liability, and Automobile Liability
.8 Optional Coverages	(Required when checked)

<p>___ (a) Contractor's Pollution Liability including pollution coverage for Contractual Liability, Clean-up costs, Abatement, Transport and Non-owned disposal sites. Including Bodily Injury Liability, Property Damage Liability and environmental damage arising from pollution conditions caused in performance of operations. Include Asbestos and Lead if part of operations.</p> <p>(MCS-90 endorsement: To Auto Policy and removal of Pollution Exclusion)</p>	<p>\$1,000,000 each occurrence</p> <p>\$1,000,000 CSL</p>
<p>___ (b) Property & Casualty Coverage: "All Causes of Loss" Builders Risk Form for directing physical change to building or plant construction on Work site and/or all land improvements including all work. [Including but not limited to earthquake, flood, boiler and machinery--including testing, damage to existing or adjoining property, time element coverage, collapse, soft costs (management, architecture, financial costs, pre-opening costs, etc.), transit coverage, off-site storage].</p>	<p>100% Contract price, including all change orders</p>
<p>___ (c) Increased Excess Coverage</p>	<p>\$ _____ each occurrence aggregate in excess of limits specified for Employer's Liability, Commercial General Liability, and Automotive Liability</p>
<p>*Defense costs are excluded from face amount of policy. Aggregate Limits are per 12-month policy period unless otherwise indicated.</p> <p>*Use Builder's Risk insurance for projects that include lift stations, plant or facility work. Include Building Wage rates in the project manual</p> <p>*Flood Hazard Insurance: Contractor shall apply for flood insurance on all insurable structures built under the Contract. A copy of the completed application must be provided to City Engineer before commencing construction of the Work. Contractor shall obtain flood hazard insurance as soon as possible and submit a copy of the policy to City Engineer. Use Flood Hazard Insurance only for projects that include structures. Do not include Flood Insurance for line projects, projects outside of the 100-year floodplain, or projects with structures less than \$10,000 in value.</p>	

Use Paragraph 11.2.1.2 if any of the following additional insurance is required by the nature of the contract. DO NOT require any additional insurance that is unnecessary; notify the Legal Department when requiring any additional insurance. When inserting additional insurance requirements into Table 2, number them consecutively, starting with .1 as follows:

Example:

Table 2

- .1 Property and Casualty Coverage*
- .2 Contractor's Pollution Liability Coverage*

.3 Etc.

11.2 *INSURANCE TO BE PROVIDED BY CONTRACTOR: Insert the following Paragraph 11.2.1.2., and Table 2, "Additional Required Coverage".*

11.2.1.2 Contractor shall purchase for the duration of the Contract the insurance set out in Table 2 in addition to the minimum insurance coverage set out in section 11.2.1.

TABLE 2
ADDITIONAL REQUIRED COVERAGE
DEFENSE COSTS EXCLUDED FROM FACE AMOUNT OF POLICY.

(Coverage)	(Limit of Liability)
Property and Casualty Coverage: "All Causes of Loss" Builder's Risk Form for directing physical change to building or plant construction on the Work site and/or all land improvements including all work. (Including but not limited to earthquake, flood, boiler, and machinery including testing, damage to existing or adjoining property, time element coverage, collapse, soft costs (management, architecture, financial costs, pre-opening costs, etc.), transit coverage, off-site storage).	100% of Contract Price, including change orders

ARTICLE 13 – MISCELLANEOUS PROVISIONS

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

END OF DOCUMENT

Document 00805

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS
(City of Houston Information Requirements
for the Successful Bidder on All Construction Contracts)

**DOCUMENTS THAT MUST BE SIGNED AND RETURNED TO THE CITY OF
HOUSTON PRIOR TO FINAL EXECUTION OF CONTRACT**

- Certification by Bidder Regarding Equal Employment Opportunity EEO-3
- Total Work Force Composition of the Company..... EEO-6
*or in lieu thereof, a copy of the latest Equal Employment Opportunity
Commission's EEO-1 form (This information is required only if the Contractor
has a work force of 50 or more people and the Contract is \$50,000 or more.)*
- Company's Equal Employment Opportunity Compliance Program EEO-7

INFORMATION THAT MUST BE SUPPLIED DURING THE COURSE OF THE WORK

- Certification By Proposed Subcontractor Regarding
Equal Employment Opportunity EEO-26
- Subcontractor's Equal Employment Opportunity
Compliance Program EEO-29
- Certification by Proposed Material Suppliers, Lessors, and Professional
Service Providers Regarding Equal Employment Opportunity EEO-30

PLEASE COMPLETE PAGES EEO-3 THROUGH EEO-7 AND MAIL TO:

**Houston Airport System
Office of Business Opportunity
Contract Compliance Section
18600 Lee Road, Suite 131
Humble, Texas 77338**

The remainder of the reports can be mailed at the appropriate time.

EQUAL EMPLOYMENT OPPORTUNITY PROGRAM REQUIREMENTS

The following are Equal Employment Opportunity requirements to be met and documents to be submitted to:

Houston Airport System
Office of Business Opportunity
Contract Compliance Section
18600 Lee Road, Suite 131
Humble, Texas 77338

Under the conditions and terms of all City construction contract, the prime contractor is responsible for all Equal Employment Opportunity compliance, including subcontractor compliance.

EQUAL EMPLOYMENT OPPORTUNITY FORMS (EEO Forms)

These forms are submitted by the prime contractors at the beginning of the Project and as requested:

- EEO Forms 3, 6, and 7 by prime contractors.

These forms are submitted by all subcontractors before they begin work on the project.

- EEO Forms 26 - 29 by subcontractors.

This form is submitted by all suppliers, lessors, or professional services providers before they begin work on the project:

- EEO Form 30

POSTING

The following poster should be clearly displayed on each job site, or in case of annual service agreements, in the Contractor's office:

Equal Employment Opportunity is the Law Poster

JOB SITE VISITS

Site visits will be made by a Contract Compliance Officer who will make their presence known to the Project Manager, Supervisor, or Foreman, and will conduct interviews with employees on site.

PAYMENT AND EVALUATION

Upon completion of the Project, as part of the contract-awarding department's total clearance process, the Office of Business Opportunity's Contract Compliance Section must certify to the department that all EEO compliance requirements have been met.

Project No. PN 941

**CERTIFICATION BY BIDDER REGARDING
EQUAL EMPLOYMENT OPPORTUNITY**

GENERAL

In accordance with Executive Order 11246 (30 F.R. 12319-25), the implementing rules and regulations thereof, and orders of the Secretary of Labor, a certification regarding Equal Opportunity is required of bidders or prospective contractors and their proposed subcontractors prior to the award of contracts or subcontracts.

CERTIFICATION OF BIDDER

Bidder's Name: _____

Address: _____

Telephone Number: _____ Fax : _____

Name of the company's EEO Officer: _____

E-mail Address: _____

Web Page/URL Address: _____

IRS Employer Identification Number: _____

Work to be performed: _____

Project No: _____

1. Participation in a previous contract or subcontract.
 - a. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. YES NO
 - b. Compliance reports were required to be filed in connection with such contract or subcontract. YES NO
 - c. Bidder has filed all compliance reports required by Executive Orders 10925, 11114, 11246, or by regulations of the Equal Employment Opportunity Commission issued pursuant to Title VII of the Civil Rights Act of 1964. YES NO
 - d. If answer of Item c. is "No", please explain in detail on reverse side of this certification.

Project No. PN 941

- 2. Dollar amount of bid:\$ _____
- 3. Anticipated performance period in days: _____
- 4. Expected total number of employees to perform the proposed construction: _____
- 5. Nonsegregated facilities.

a. Notice to prospective federally-assisted construction contractors

- (1) A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted to the recipient prior to the award of a federally-assisted construction contract exceeding \$50,000 which is not exempt from the provisions of the Equal Opportunity Clause.
- (2) Contractors receiving federally-assisted construction contract awards exceeding \$50,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide the forwarding of the following notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$50,000 and are not exempt from the provisions of the Equal Opportunity Clause.

The federally-assisted construction Contractor certifies that he/she does not maintain or provide any segregated facilities at any of his/her establishments, and does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. The federally-assisted construction Contractor certifies further that he/she will not maintain or provide segregated facilities at any of his/her establishments, and will not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. The federally-assisted construction Contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this Contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin because of habit, local custom, or otherwise. The federally-assisted construction Contractor agrees that (except where he/she has obtained identical certifications from proposed Subcontractors for specific time periods) he/she will obtain identical certifications in duplicate from proposed Subcontractors prior to the award of subcontracts exceeding \$50,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that he/she will retain the duplicate of such certifications in his/her files. The Subcontractor will include the original in his/her bid package.

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6. Race or ethnic group designation of bidder. Enter race or ethnic group in appropriate box:

White Black Hispanic

Pacific Islander, Asian American Indian, Aleut.

7. Gender of Owner Male Female

REMARKS: _____

Certification - The information above is true and complete to the best of my knowledge and belief.

Company Officer (Please Type)

Signature

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Project No. PN 941

**EQUAL EMPLOYMENT OPPORTUNITY COMPLIANCE PROGRAM
FOR**

Name of Company

The Company's Office of Business Opportunity Program shall consist of documented good faith efforts to comply with the goals, timetables, and objectives set forth in the following Affirmative Action steps:

- A. City of Houston's Specific Equal Employment Opportunity Policy and Clause as contained in City Council Ordinance No. 78-1538, passed August 9, 1978.
- B. Notice of Requirement for Office of Business Opportunity to ensure Equal Employment Opportunity (Executive Order 11246).
- C. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246).

Project: _____

Company Officer (Please Type)

Signature

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

**SPECIAL PROVISIONS
SPECIFIC EQUAL EMPLOYMENT OPPORTUNITY POLICY**

1. GENERAL

- a. Equal employment opportunity requirements not to discriminate and to take affirmative action to assure equal employment opportunity are required by Executive Order 11246, as amended. The requirements set forth in these Special Provisions shall constitute the specific affirmative action requirements for Project activities under this Contract and shall supplement the notice of requirement for affirmative action to ensure equal employment opportunity and standard federal equal employment opportunity construction contract specifications.
- b. The Contractor shall work with the City and the Federal Government in carrying out equal employment opportunity obligations and in their review of his/her activities under the Contract.
- c. The prime Contractor and all Subcontractors holding subcontracts of \$50,000 or more shall comply with the following minimum specific requirement activities of equal employment opportunity. The Contractor shall include these requirements in every subcontract of \$50,000 or more with such modification of language as is necessary to make them binding on the Subcontractor.

2. EQUAL EMPLOYMENT OPPORTUNITY POLICY

The Contractor shall accept as his/her operating policy the following statement which is designed to further the provision of equal employment opportunity to all persons without regard to their race, age, color, religion, sex, or national origin, and to promote the full realization of equal employment opportunity through a positive continuing program:

It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, color, sex, or national origin. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

3. EQUAL EMPLOYMENT OPPORTUNITY OFFICER

The Contractor shall designate and make known to the City contracting officers an equal employment opportunity officer (hereinafter referred to as the EEO Officer) who must be capable of effectively administering and promoting an active Contractor program of equal employment opportunity and who must be assigned adequate authority and responsibilities to do so.

4. DISSEMINATION OF POLICY

- a. All members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement the Contractor's equal employment opportunity policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. To ensure that the above agreement will be met, the following actions shall be taken as a minimum:
 - (1) Periodic meetings of supervisory and personnel office employees shall be conducted before the start of work and then not less often than once every six months, at which time the Contractor's equal employment opportunity policy and its implementation will be reviewed and explained. The meetings shall be conducted by the EEO Officer or other knowledgeable company official.
 - (2) All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, or other knowledgeable company official, covering all major aspects of the Contractor's equal employment opportunity obligations, within 30 days following their reporting for duty with the Contractor.
 - (3) The EEO Officer or appropriate company official shall instruct all employees engaged in the direct recruitment of employees for the Project relative to the methods followed by the Contractor in locating and hiring minorities and females.

- b. In order to make the Contractor's equal employment opportunity policy known to all employees, prospective employees, and potential sources of employees, i.e., schools, employment agencies, labor unions (where appropriate), college placement officers, etc., the Contractor shall take the following actions:
 - (1) Notices and posters setting forth the Contractor's equal employment opportunity policy shall be placed in areas readily accessible to employees, applicants for employment, and potential employees.
 - (2) The Contractor's equal employment opportunity policy and the procedures to implement such policy shall be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

5. RECRUITMENT

- a. When advertising for employees, the Contractor shall include in all advertisements for employees the notation "An Equal Opportunity Employer". All such advertisements will be published in newspapers, or

other publications, having a large circulation among minority groups in the area from which the Project work force would normally be derived.

- b. The Contractor shall, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee-referral sources likely to yield qualified minority-group applicants, including, but not limited to, State employment agencies, schools, colleges, minority-group organizations, and female recruitment agencies. To meet this requirement, the Contractor shall, through his/her EEO Officer, identify sources of potential minority and female employees, and establish with such identified sources procedures whereby such group applicants may be referred to the Contractor for employment consideration.

In the event the Contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he/she is expected to observe the provisions of that agreement to the extent that the system permits the Contractor's compliance with equal employment opportunity Contract provisions. (The U. S. Department of Labor has held that where implementation of such agreements has the effect of discriminating against minorities or women, or obligates the Contractor to do the same, such implementation violates Executive Order 11246 as amended).

- c. The Contractor shall encourage his/her present employees to refer female or minority-group applicants for employment by posting appropriate notices or bulletins in areas accessible to all such employees. In addition, information and procedures with regard to referring such applicants will be discussed with employees.

6. PERSONNEL ACTIONS

- a. Wage, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff and termination, shall be taken without regard to race, color, religion, sex, national origin, or age. The following procedures shall be followed:

- (1) The Contractor shall conduct periodic inspections of Project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of Project-site personnel.
- (2) The Contractor shall periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
- (3) The Contractor shall periodically review selected personnel actions in depth to determine whether there is evidence of discrimination.

Where evidence is found, the Contractor shall promptly take corrective action. If the review indicates that the discrimination may

extend beyond the actions reviewed, such corrective action shall include all affected persons.

- (4) The Contractor shall promptly investigate all complaints of alleged discrimination made in connection with his/her obligations under this Contract, shall attempt to resolve such complaints, and shall take appropriate corrective action. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the Contractor shall inform every complainant of all avenues of appeal.

7. TRAINING AND PROMOTION

- a. The Contractor shall assist in locating, qualifying, and increasing the skills of minority-group and women employees and applicants for employment.
- b. Consistent with the Contractor's work force requirements and as permissible under Federal and State regulations, the Contractor shall make full use of training programs, i.e., apprenticeship and on-the-job training programs, for the geographical area of Contract performance.
- c. The Contractor shall advise employees and applicants for employment of available training programs and entrance requirements for each.
- d. The Contractor shall periodically review the training and promotion potential of minority-group and women employees and shall encourage eligible employees to apply for such training and promotion.

8. UNIONS

If the Contractor relies in whole or in part upon unions as a source of employees, he/she shall use his/her best efforts to obtain the cooperation of such unions to increase minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the Contractor, either directly or through a contractor's association acting as his/her agent, will include the procedures set forth below:

- a. The Contractor shall use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority-group members and women for membership in the unions and increasing the skills of minority-group employees and women so that they may qualify for higher-paying employment.
- b. The Contractor shall use best efforts to incorporate an equal employment opportunity clause into all union agreements to the end that such unions will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, or age.

- c. The Contractor is to obtain information as to the referral practices and policies of the labor union, except that to the extent such information is within the exclusive possession of the labor union, and such labor union refuses to furnish such information to the Contractor, the Contractor shall so certify to the City and shall set forth what efforts have been made to obtain such information.
- d. In the event the union is unable to provide the Contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the Contractor shall, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, age, sex, or national origin, making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The U. S. Department of Labor has held that it shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the Contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such Contractor shall immediately notify the City.

9. SUBCONTRACTING

- a. The Contractor shall use his/her best efforts to solicit bids from and to utilize minority-group and female subcontractors or subcontractors with meaningful minority-group and/or female representation among their employees.
- b. The Contractor shall use his/her best efforts to assure Subcontractors' compliance with their equal employment opportunity obligations.

10. RECORDS AND REPORTS

- a. The Contractor shall keep such records as are necessary to determine compliance with the Contractor's equal employment opportunity obligations. The records kept by the Contractor will be designed to indicate:
 - (1) The number of minority and non-minority group members and women employed in each work classification on the Project.
 - (2) The progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and women (applicable only to contractors who rely in whole or in part on unions as a source of their work force).
 - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees.

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- (4) The progress and efforts being made in securing the services of female and minority subcontractors.

- b. All records, including payrolls, must be retained for a period of three years following completion of the Contract work and shall be available at reasonable times and places for inspection by authorized representatives of the City and/or the appropriate federal agency.

CITY OF HOUSTON, TEXAS

EQUAL EMPLOYMENT OPPORTUNITY CLAUSE

Pursuant to City Council Ordinance No. 78-1538, passed August 9, 1978, all contracts entered into by the City of Houston involving the expenditure of \$50,000 or more, shall incorporate the following Equal Employment Opportunity Clause:

1. The Contractor, Subcontractor, vendor, Supplier, or lessee shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, or age. The Contractor, Subcontractor, vendor, Supplier, or lessee shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, sex, national origin, or age. Such action will include, but not be limited to, the following: employment; upgrading; demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor, Subcontractor, vendor, Supplier, or lessee agrees to post in conspicuous places available to employees, and applicants for employment, notices to be provided by the City setting forth the provisions of this Equal Employment Opportunity Clause.
2. The Contractor, Subcontractor, vendor, Supplier, or lessee states that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, national origin, or age.
3. The Contractor, Subcontractor, vendor, Supplier, or lessee shall send to each labor union or representatives of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer advising the said labor union or workers' representative of the Contractor's and Subcontractor's commitments under Section 202 of Executive Order No. 11246, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Contractor, Subcontractor, vendor, Supplier, or lessee will comply with all provisions of Executive Order No. 11246 and the rules, regulations, and relevant orders of the Secretary of Labor or other Federal Agency responsible for enforcement of the equal opportunity and affirmative action provisions applicable, and shall likewise furnish all information and reports required by the Mayor and/or Contractor Compliance Officers for purposes of investigation to ascertain and effect compliance with this program.
5. The Contractor, Subcontractor, vendor, Supplier, or lessee shall furnish all information and reports required by Executive Order No. 11246, and by

the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and shall permit access to all books, records, and accounts by the appropriate City and Federal officials for purposes of investigation to ascertain compliance with such rules, regulations, and orders. Compliance reports filed at such times as directed shall contain information as to the employment practice policies, program, and work force statistics of the Contractor, Subcontractor, vendor, Supplier, or lessee.

6. In the event of a Contractor's, Subcontractor's, vendor's, Supplier's, or lessee's non-compliance with the non-discrimination clause of this Contract or with any of such rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part, and the Contractor, Subcontractor, vendor, Supplier, or lessee may be declared ineligible for further City contracts in accordance with procedures provided in Executive Order No. 11246, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as may otherwise be provided by law.
7. The Contractor shall include the provisions of paragraphs 1 through 8 of this Equal Employment Opportunity Clause in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965 so that such provisions will be binding upon each Subcontractor or vendor. The Contractor shall take such action with respect to any subcontractor or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in, or is threatened with litigation with a Subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.
8. The Contractor shall file and shall cause each of his Subcontractors, if any, to file compliance reports with the City in the form and to the extent as may be prescribed by the Office of Business Opportunity. Compliance reports filed at such times as directed shall contain information as to the practices, policies, programs, employment policies, and employment statistics of the Contractor and each Subcontractor.

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(EXECUTIVE ORDER 11246)**

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for Minority Participation for Each Trade	Goals for Female Participation for Each Trade
	(Refer to Document 00800)	(Refer to Document 00800)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally-assisted) performed in the covered area.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the Contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the Contract, the Executive Order, and regulations in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$50,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the Subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.
4. As used in this Notice, and in the Contract resulting from this solicitation, the "covered area" is The Houston, Texas Standard Metropolitan Statistical Area.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY
CONSTRUCTION CONTRACT SPECIFICATIONS
(EXECUTIVE ORDER 11246)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this Contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941.
 - d. "Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$50,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be

able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this Contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities or women, shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U. S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which Contractor's employees are assigned to work. The Contractor, where possible, shall assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment

sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

- c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the Contractor's EEO policy: by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions, including specific review of these items with on-site supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students, and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare, through appropriate training, etc., for such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist

in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under-utilized).
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in Paragraph 7 of these Specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.B.
14. The Contractor shall designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to

submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone number, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily-understandable and retrievable form; however to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

DESCRIPTION OF JOB CATEGORIES

Officials, Managers, and Administrators

Occupations requiring administrative personnel who set board policies, exercise overall responsibility for the execution of these policies, or provide specialized consultation on a regional, district, area basis, or direct individual departments or special phases of a firm's operations.

Includes: Officials, executives, middle management, plant managers, department managers, superintendents, salaried foremen who are members of management, purchasing agents, buyers, bureau chiefs, directors, deputy directors, wardens, examiners, sheriffs, police and fire chiefs, and kindred workers.

Professionals

Occupations which require specialized and theoretical knowledge which is usually acquired through college or experience of such kind and amount as to provide a comparable background.

Includes: Accountants, auditors, airplane pilots and navigators, architects, artists, chemists, designers, dieticians, editors, engineers, lawyers, librarians, mathematicians, natural scientists, registered professional nurses, personnel and labor relations workers, physical scientists, teachers, social workers, doctors, psychologists, economists, systems analysts, employment and vocational rehabilitation counselors, instructors, police and fire captains and lieutenants, and kindred workers.

Paraprofessionals

Occupations in which workers perform some of the duties of a professional or technician in a supportive role, which usually requires less formal training and/or experience normally required for professional or technical status. Such positions may fall within an identified pattern of a "New Careers" concept.

Includes: Library assistants, medical aides, child support workers, police auxiliary, welfare service aides, recreation assistants, homemakers aides, home health aides, and kindred workers.

Technicians

Occupations requiring a combination of basic scientific knowledge and manual skill which can be obtained through about two (2) years of post high school education, such as is offered in many technical institutes and junior colleges, or through equivalent on-the-job training.

Includes: Computer programmers and operators, draftsmen, engineering aides,

junior engineers, mathematical aides, licensed practical or vocational nurses, photographers, radio operators, scientific assistants, surveyors, technical illustrators, technicians (medical, dental, electronics, physical sciences), police and fire sergeants, and kindred workers.

Protective Service Workers

Occupations in which workers are entrusted with public safety, security, and protection from destructive forces.

Includes: Police patrol officers, fire fighters, guards, deputy sheriffs, bailiffs, correctional officers, detectives, marshals, harbor patrol officers, and kindred workers.

Sales Workers

Occupations engaging wholly or primarily in direct selling.

Includes: Advertising agents and salespersons, insurance agents and brokers, real estate agents and brokers, stock and bond salespersons, demonstrators, salespersons and sales clerks, grocery clerks, cashiers, and kindred workers.

Office and Clerical

Occupations in which workers are responsible for internal and external communications, recording and retrieval of data and/or information and other paper work required in an office predominantly non-manual, though some manual work not directly involved with altering or transporting the products is included.

Includes: Bookkeepers, cashiers, collectors (bills and accounts), messengers and office helpers, office machine operators, shipping and receiving clerks, stenographers, typists and secretaries, telegraph and telephone operators, court transcribers, hearing reporters, statistical clerks, dispatchers, license distributors, payroll clerks, and kindred workers.

Skilled Craft Workers

Occupations in which workers perform jobs which require special manual skill through on-the-job training and experience, or through apprenticeship or other formal training programs. These workers exercise considerable independent judgment and usually receive an extensive period of training.

Includes: The building trades, hourly paid foremen and leadmen who are not members of management, mechanics and repairmen, skilled machining occupations, compositors and typesetters, electricians, engravers, job setters (metal), motion picture projectionists, pattern and model makers, stationary engineers, tailors, heavy equipment operators, carpenters, and kindred workers.

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Operatives (semi-skilled)

Workers who operate machine or processing equipment or perform other factory-type duties of intermediate skill level which can be mastered in a few weeks and require only limited training.

Includes: Apprentices (auto mechanics), plumbers, bricklayers, carpenters, electricians, mechanics, building trades, metal workers, machinists, printing trades, operatives, attendants (auto service and parking), blasters, chauffeurs, deliverymen, dressmakers and seamstresses (except factory), dryers, furnacemen, heaters (metal), laundry and dry cleaning operatives, milliners, miners, motormen, oilers, greasers, etc. (except auto), painters (except construction and maintenance), photographic process workers, stationary firemen, truck and tractor drivers, weavers (textile), welders and flame cutters, and kindred workers.

Laborers (unskilled)

Workers in manual occupations which generally require no special training. These workers perform elementary duties that may be learned in a few days and require the application of little or no independent judgment.

Includes: Garage workers, car washers and greasers, gardeners (except farm) and groundskeepers, longshoremen and stevedores, lumbermen, craftsmen, and wood choppers, laborers performing lifting, digging, mixing, loading, and pulling operations, and kindred workers.

Service/Maintenance Workers

Occupations in which workers perform duties which result in or contribute to the comfort, convenience, hygiene, or safety for the general public, or which contribute to the upkeep and care of buildings, facilities or grounds, or public property. Workers in this group may operate machinery.

Includes: Chauffeurs, laundry and dry cleaning operatives, truck drivers, trash collectors, custodial personnel, gardeners and groundskeepers, construction laborers, attendants (hospital and other institutions), professional and personal service, counter and fountain workers, elevator operators, firemen and fire protection, guards, watchmen and doorkeepers, stewards, porters, waiters, and kindred workers.

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3. Anticipated performance period in days: _____
4. Expected total number of employees to perform the proposed subcontract: _____
5. Nonsegregated facilities.
 - a. Notice to prospective federally-assisted construction contractors
 - (1) A Certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted to the Contractor prior to the award of a subcontract exceeding \$50,000 which is not exempt from the provisions of the Equal Opportunity Clause.
 - (2) Contractors receiving subcontract awards exceeding \$50,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$50,000 and are not exempt from the provisions of the Equal Opportunity clause.

b. Certification of non-segregated facilities

The federally-assisted construction contractor certified that he/she does not maintain or provide any segregated facilities at any of his/her establishments, and does not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. The federally-assisted construction Contractor certifies further that he/she will not maintain or provide any segregated facilities at any of his/her establishments, and will not permit employees to perform their services at any location, under his/her control, where segregated facilities are maintained. The federally-assisted construction Contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this Contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants, and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin because of habit, local custom, or otherwise. The federally-assisted construction Contractor agrees that (except where he/she has obtained identical certifications from proposed Subcontractors for specific time periods) he/she will obtain identical certifications in duplicate from proposed Subcontractors prior to the award of subcontracts exceeding \$50,000 which are not exempt from the provisions of the Equal Opportunity Clause, and that he/she will retain the duplicate of such certifications in his/her files. The Contractor will include the original in his/her Bid Package.

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6. Race or ethnic group designation of bidder. Enter race or ethnic group in appropriate box:

- White Black Hispanic
 Pacific Islander, Asian American Indian, Aleut.

7. Gender

- Male Female

REMARKS:

Certification - The information above is true and complete to the best of my knowledge and belief.

Company Officer (Please Type)

Signature

Date

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

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**CITY OF HOUSTON
Company Wide EEO Report**

OBO-01-13-001
Office of Business Opportunity
04/13

1. Check One ___ Prime ___ Subcontractor		2. Name and Address		3. FEID No.	
4. County				5. TX CSJ DOT Project No. (if Applicable)	
6. Contractor's Beginning Work Date on Project		7. City Of Houston Contract No.		8. This Report is based on Pay Period ending MM/DD/YYYY	

9. TEXAS CONSTRUCTION EMPLOYMENT

JOB CATEGORIES	TABLE A																		TABLE B	
	TOTAL EMPLOYEES		TOTAL MINORITIES		WHITE (Not of Hispanic Origin)		BLACK (Not of Hispanic Origin)		HISPANIC		AMERICAN INDIAN or ALASKAN NATIVE		ASIAN		NATIVE HAWAIIAN OR OTHER PACIF ISL		TWO OR MORE RACES		On-The-Job Trainees (OJT)	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
OFFICIALS (MANAGERS)	0	0	0	0																
SUPERVISORS	0	0	0	0																
FOREMEN/WOMEN	0	0	0	0																
ADMIN SUPPORT	0	0	0	0																
EQUIPMENT OPERATORS	0	0	0	0																
MECHANICS	0	0	0	0																
TRUCK DRIVERS	0	0	0	0																
IRONWORKERS	0	0	0	0																
CARPENTERS	0	0	0	0																
CEMENT MASONS	0	0	0	0																
ELECTRICIANS	0	0	0	0																
PIPEFITTERS, PLUMBERS	0	0	0	0																
PAINTERS	0	0	0	0																
LABORERS, SEMI-SKILLED	0	0	0	0																
LABORERS, UNSKILLED	0	0	0	0																
TOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE C																		OJT TOTALS	
On-The-Job Trainee																		M	F
																		0	0

10. IF ANY EMPLOYEES REPORTED IN 'TABLE A' ARE APPRENTICES, NAME OF THE PROGRAM, JOB CATEGORY, COUNT, RACE & SEX.

11. SUMMARIZE ALL HIRES FOR THE ENTIRE ACTIVE MONTH BY JOB CATEGORY, RACE, SEX (USE ADDITIONAL SHEET IF NEEDED).

	PRINTED NAME-FIRST/LAST	EMAIL ADDRESS	PHONE	SIGNATURE	DATE
12. PREPARER					
13. REVIEWER					

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CERTIFICATION BY PROPOSED MATERIAL SUPPLIERS,
LESSORS, AND PROFESSIONAL SERVICE PROVIDERS
REGARDING EQUAL EMPLOYMENT OPPORTUNITY

Company Name: _____ \$ _____
(Supplier, Lessor, Professional Service Provider) (Amount of Contract)

Company Address: _____

Company Telephone Number: _____ Fax: _____

E-mail Address: _____

Web Page/URL Address: _____

Company Tax Identification Number: _____

Project Name & No.: _____

Materials/Services Provided: _____

In accordance with Chapter 15 of the City of Houston's Code of Ordinances, Supplier/Lessor/Professional Service Provider represents to be an equal opportunity employer and agrees to abide by the terms of the Ordinance. This certification is required of all Suppliers/Lessors/Professional Service Providers providing goods or service to this project with agreements \$50,000 or more.

- Yes No Supplier agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, or age.
- Yes No Supplier agrees that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, national origin, or age.
- Yes No Supplier will comply with all provisions of **Executive Order No. 11246** and rules, regulations and applicable orders of the Department of Labor or other Federal Agency responsible for enforcement of applicable equal opportunity and affirmative action provisions and will likewise furnish all information and reports required by the Mayor or Contract Compliance Officers for the purpose of investigation to ascertain and effect compliance with the City of Houston's Office of Business of Opportunity.
- Yes No The Supplier shall file and cause their sub-tier contractors to file compliance reports with the City in the form and to the extent as may be prescribed by the Mayor or Contract Compliance Officers. Compliance reports filed at such times as directed shall contain information including, but not limited to, the practices, policies, programs, and employment policies.

I hereby certify that the above information is true and correct.

COMPANY OFFICER (Signature)

DATE

NAME AND TITLE (Print or type)

END OF DOCUMENT

Document 00821

WAGE SCALE AND PAYROLL REQUIREMENTS FOR BUILDING CONSTRUCTION

Wage Scale Requirements

- 1.1 Contractor and its Subcontractors must pay the general prevailing wage rates for building construction for each craft or type of worker or mechanic employed in the execution of any building construction or repair under the Contract in accordance with Chapter 2258 of the Texas Government Code and City of Houston, Texas Ordinance Nos. 85-2070, 2000-1114, 2001-152, 2006-91 and 2006-168, and 2009- 247 all as amended from time to time. City Council has determined the prevailing wage rate in the locality in which the work is being performed, which is set forth in Exhibit "A".
- 1.2 This prevailing wage rate does not prohibit the payment of more than the rates stated.
- 1.3 In bidding, Contractor warrants and represents that it has carefully examined the classifications for each craft or type of worker needed to execute the Contract and determined that such classifications in Exhibit "A" include all necessary categories to perform the work under the Contract.
- 1.4 The wage scale for building construction is to be applied to work on a building including an area within 5 feet of the exterior wall.
- 1.5 If Contractor believes that an additional classification for a craft or type of worker is necessary to perform work under the Contract, it must submit with its bid a request to the Contract Compliance Division of the Office of Business Opportunity ("OBO") to use an additional labor classification not listed in Exhibit "A" and specify the proposed new classification. OBO shall determine whether a proposed classification is already covered in Exhibit "A", and, if it is, specify which classification is appropriate. OBO's decision is conclusive. If OBO decides that a new classification is necessary, it will determine the appropriate prevailing wage rate for any resurveyed, amended, new, or additional craft or type of worker not covered by Exhibit "A". Such determination must be decided in accordance with procedures established by OBO, and in compliance with Chapter 2258 of the Texas Government Code and City of Houston, Texas Ordinance Nos. 85-2070, 2000-1114, 2001-152, 2006-91, 2006-168, and 2009-247 subject to City Council approval.
- 1.6 Contractor must not use any labor classification not covered by Exhibit "A" until such classification is established and approved for use by OBO.
- 1.7 A Contractor or Subcontractor who violates Chapter 2258 of the Texas Government Code must pay to the City, \$60 per each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates set forth in Exhibit "A".
- 1.8 The City may withhold money required to be withheld under Chapter 2258 of the Texas Government Code from the final payment to Contractor or earlier payments if City Council makes a determination that there is good cause to believe that Contractor has not complied with these provisions and Chapter 2258 of the Government Code, in which case the City may

withhold the money at any time subsequent to the finding by City Council.

1.9 Contractor and Subcontractors must keep records specifying:

- (1) the name and classification of each worker employed under the Contract; and
- (2) the actual per diem wages paid to each worker, and the applicable hourly rate.

The records must be open at all reasonable hours for inspection by the officers and agents of the City.

1.10 The hourly cost of salary for non-exempt workers for labor in excess of 40 hours per worker per week, shall be calculated at 1.5 times the worker's base pay, plus 1.0 times fringe benefits, for the applicable craft and level.

Certified Payroll Requirements

- 2.1 Employees are paid weekly, and payrolls are submitted weekly using the City of Houston's electronic payroll submission module, unless the prime Contractor has been instructed to do otherwise by the Office of Business Opportunity. When no work is done after a Contractor has started work, the Contractor is required to submit a weekly compliance statement indicating no work was performed. The payrolls must reflect the exact work and classification of the workers, the exact amount that they were paid. Workers must be paid the contracted amount (prevailing wage rates). The Contractor will be penalized \$60.00 a day for each employee who is underpaid per Texas Government Code §2258-023 for all contracts.
- 2.2 Payrolls must be submitted electronically & indicate whether the worker worked inside or outside the building area when both wage rates are applicable to the project.
- 2.3 Payrolls must be submitted each week until all work by the contractor is complete and the electronic payroll submission is marked as final in the system.
- 2.4 Payrolls must cover a seven-day period from the start of the work week and must be consecutive seven-day periods until all work is complete.
- 2.5 Payrolls must have employees' names, addresses, last four digits of the social security numbers, and job classifications. The job classifications must be the same as the classifications on the prevailing wage rate schedule.
- 2.6 A payroll deduction authorization form must be submitted for each employee for any deductions other than Federal and FICA taxes and court ordered child support.
- 2.7 Employees must be paid overtime (time and a half) for all hours worked over 40 hours a week on both federally and City-funded contracts.
- 2.8 The Contractor has the responsibility to comply with all Internal Revenue Service rules and regulations. Contractors who submit certified payrolls with **Owner Operators (truckers)** must submit a signed tax liability statement from each Owner Operator acknowledging their responsibility for Federal Income Tax and FICA reporting obligations.
- 2.9 If the Contractor wants to use the apprentice wage rates for an employee, the apprenticeship

certificates must be submitted to the Office of Business Opportunity in advance of the employee working on the project and appearing on the payroll. Contractor must comply with posted number of journeymen to apprentices as listed on the wage rate.

- 2.10 A poster of the Prevailing Wage Rate Schedule should be clearly displayed on each job site from the time the project starts until the work is completed, or in case of annual service agreements, in the Contractor's office.
- 2.11 The Contractor shall submit the "Certificate from Contractor Appointing Officer or Employee to Supervise Payment of Employees" (Exhibit "B") to the Monitoring Authority listed in Document 00495 prior to final execution of the contract.
- 2.12 During the course of the work, Subcontractors shall submit the "Certificate from Subcontractor Appointing Officer or Employee to Supervise Payment of Employees" (Exhibit "C") to the Monitoring Authority listed in Document 00495.
- 2.13 Upon completion of the Project, as part of the contract-awarding department's total clearance process, the Office of Business Opportunity's Contract Compliance Section must review whether the Wage Rate and Payroll Requirements were met and report the results to the department.

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EXHIBIT "A"

**CITY OF HOUSTON, TEXAS
LABOR CLASSIFICATIONS AND PREVAILING WAGE RATES FOR BUILDING CONSTRUCTION
2022**

Worker Classification	Ratio	Base Rate	Fringe Benefit	Wage Total
Acoustical Ceiling Mechanic		\$17.27	\$3.98	\$21.25
Asbestos Abatement Worker (ceilings, walls, floors only)	Ratio 1/3	\$14.00	\$0.00	\$14.00
Asbestos Worker/ Heat & Frost Insulator (Duct, Pipe and Mechanical System Insulation) *	Ratio 1/1 – Apprentice	\$24.28	\$14.16	\$38.44
Boilermaker *	Ratio 5/1 – Apprentice	\$29.47	\$24.10	\$50.35
Bricklayer *	Ratio 1/3 – Mason Tender Brick	\$18.87	\$0.00	\$18.87
Carpenter (excludes acoustical ceiling installation, drywall hanging, form work and metal stud installation work) *	Ratio 2/1 – Apprentice	\$23.05	\$8.78	\$31.83
Caulker		\$15.36	\$0.00	\$15.36
Cement Mason/Concrete Finisher *	Ratio 1/3 – Mason Tender Concrete	\$13.93	\$0.00	\$13.93
Drywall Finisher/Taper *	Ratio 1/3 – Apprentice	\$16.27	\$3.66	\$19.93
Drywall Hanger and Metal Stud Installer *	Ratio 1/3 – Apprentice	\$17.44	\$3.93	\$21.37
Electrician (Excludes Low Voltage Wiring and Installation of Alarms)	Ratio 3/2 – Apprentice	\$32.55	\$10.35	\$42.90
Electrician (Alarm Installation Only) *	Ratio 1/1 – Apprentice	\$17.97	\$3.37	\$21.34
Electrician (Low Voltage Wiring Only) *		\$18.00	\$1.68	\$19.68
Elevator Mechanic *, +, **	Ratio 1/1 – Apprentice	\$45.48	\$36.365	\$81.845
Floor Layer: Carpet		\$20.00	\$0.00	\$20.00
Form worker *		\$12.77	\$0.00	\$12.77
Glazier *	Ratio 1/3 – Apprentice	\$23.27	\$7.12	\$30.39
Insulator – Batt *		\$14.87	\$0.73	\$15.60
Ironworker, Ornamental		\$25.14	\$7.43	\$32.57
Ironworker, Reinforcing *	Ratio 1/3 – Apprentice	\$12.14	\$0.00	\$12.14
Ironworker, Structural *	Ratio 1/3 – Apprentice	\$25.26	\$7.13	\$32.39
Laborer, Common or General		\$11.76	\$0.00	\$11.76
Laborer, Landscape and Irrigation		\$9.52	\$0.00	\$9.52
Laborer, Mason Tender - Brick		\$13.47	\$0.00	\$13.47
Laborer, Mason Tender - Cement /Concrete		\$10.48	\$0.00	\$10.48
Laborer, Pipelayer		\$12.94	\$0.00	\$12.94
Laborer, Roof Tearoff		\$11.28	\$0.00	\$11.28
Lather *	Ratio 1/3	\$19.73	\$0.00	\$19.73
Operator, Backhoe / excavator / trackhoe		\$13.94	\$0.00	\$13.94
Operator, Bobcat / skid steer / skid loader		\$13.93	\$0.00	\$13.93
Operator, Bulldozer		\$22.75	\$0.00	\$22.75
Operator, Drill		\$16.22	\$0.34	\$16.56
Operator, Forklift		\$16.00	\$0.00	\$16.00
Operator, Grader/blade		\$13.37	\$0.00	\$13.37
Operator, Loader		\$13.55	\$0.94	\$14.49
Operator, Mechanic		\$17.52	\$3.33	\$20.85

Information Booths Hobby
Project No. PN 941

**WAGE SCALE
FOR BUILDING CONSTRUCTION**

Operator, Paver (asphalt, aggregate, and concrete)		\$16.03	\$0.00	\$16.03
Operator, Roller		\$16.00	\$0.00	\$16.00
Painter * (brush, roller, and spray) excludes drywall finishing/taping	Ratio 1/3 – Apprentice	\$17.24	\$4.41	\$21.65
Pipe Fitter (including HVAC Pipe installation) *	Ratio 1/1 – Apprentice	\$35.68	\$12.46	\$48.14
Plasterer	Ratio 1/3 – Plasterer Tenders	\$26.04	\$9.02	\$35.06
Plumber *	Ratio 3/2 – Apprentice	\$36.15	\$11.88	\$48.03
Power Equipment Operator, Crane		\$34.85	\$9.85	\$44.70
Roofer *	Ratio 1/3 – Apprentice	\$15.40	\$0.00	\$15.40
Sheet Metal Worker (excludes HVAC Unit Installation) *	Ratio 2/1 – Apprentice	\$29.70	\$13.85	\$43.55
Sheet Metal Worker (HVAC Duct Installation only) *	Ratio 2/1 – Apprentice	\$29.70	\$13.85	\$43.55
Sheet Metal Worker (HVAC Unit Installation only) *	Ratio 2/1 – Apprentice	\$20.05	\$2.24	\$22.29
Sprinkler Fitter (Fire sprinklers) *	Ratio 1/1 – Apprentice	\$31.68	\$22.50	\$54.18
Tile Finisher *	Ratio 1/3 – Apprentice	\$12.00	\$0.00	\$12.00
Tile Setter *	Ratio 1/3 – Apprentice	\$16.17	\$0.00	\$16.17
Truck Driver, 1/Single Axle Truck		\$14.18	\$0.00	\$14.18
Truck Driver, Dump Truck		\$12.39	\$1.18	\$13.57
Truck Driver, Flatbed Truck		\$19.65	\$8.57	\$28.22
Truck Driver, Semi-Trailer Truck		\$12.50	\$0.00	\$12.50
Truck Driver, Water Truck		\$12.00	\$4.11	\$16.11
Waterproofers		\$14.39	\$0.00	\$14.39
Welders - Receive rate prescribed for craft performing operation in which welding is incidental.				
* Apprentices must be part of an approved Department of Labor apprenticeship program.				
* -- 6% under 5 years based on regular hourly rate for all hours worked. 8% over 5 years based on regular hourly rate for all hours worked.				
** -- Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Friday after Thanksgiving Day; Christmas Day; and Veterans Day.				

Building Construction Prevailing Wages Classification Definitions

Asbestos Worker/Insulator * - Ratio 1 Journeyman /1 Apprentice (1 Journeyman / 1 Apprentice)
(Including application of all insulating materials, protective coverings, coatings and finishing to all type of mechanical systems). Applies insulating material to exposed surfaces of structures, such as air ducts, hot and cold pipes, storage tanks, and cold storage rooms: Reads blueprints and selects required insulation material (in sheet, tubular, or roll form), such as fiberglass, foam rubber, styrofoam, cork, or urethane, based on material's heat retaining or excluding characteristics. Brushes adhesives on or attaches metal adhesive-backed pins to flat surfaces as necessary to facilitate application of insulation material. Measures and cuts insulation material to specified size and shape for covering flat or round surfaces, using tape measure, knife, or scissors. Fits, wraps, or attaches required insulation material around or to structure, following blueprint specifications. Covers or seals insulation with preformed plastic covers, canvas strips, sealant, or tape to secure insulation to structure, according to type of insulation used and structure covered, using staple gun, trowel, paintbrush, or caulking gun.

Asbestos Abatement Worker * (Ceilings, Floors, & Walls only)
Removes asbestos from ceilings, walls, beams, boilers, and other structures, following hazardous waste handling guidelines: Assembles scaffolding and seals off work area, using plastic sheeting and duct tape. Positions mobile decontamination unit or portable showers at entrance of work area. Builds connecting walkway between mobile unit or portable showers and work area, using hand tools, lumber, nails, plastic sheeting, and duct tape. Positions portable air evacuation and filtration system inside work area. Sprays chemical solution over asbestos covered surfaces, using tank with attached hose and nozzle, to soften asbestos. Cuts and scrapes asbestos from surfaces, using knife and scraper. Shovels asbestos into plastic disposal bags and seals bags, using duct tape. Cleans work area of loose asbestos, using vacuum, broom, and dustpan. Places asbestos in disposal bags and seals bags, using duct tape. Dismantles scaffolding and temporary walkway, using hand tools, and places plastic sheeting and disposal bags into transport bags. Seals bags, using duct tape, and loads bags into truck.

Boilermaker * - Ratio 5 Journeymen /1 Apprentice
Assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks, and vats in field, following blueprints and using hand tools and portable power tools and equipment: Locates and marks reference points for columns or plates on foundation, using master straightedge, squares, transit, and measuring tape, and applying knowledge of geometry. Attaches rigging or signals crane operator to lift parts to specified position. Aligns structures or plate sections to assemble boiler frame, tanks, or vats, using plumb bobs, levels, wedges, dogs, or turnbuckles. Hammers, flame cuts, files, or grinds irregular edges of sections or structural parts to facilitate fitting edges together. Bolts or arc-welds structures and sections together. Positions drums and headers into supports and bolts or welds supports to frame. Aligns water tubes and connects and expands ends to drums and headers, using tube expander. Bells, beads with power hammer, or welds tube ends to ensure leak proof joints. Bolts or welds casing sections, uptakes, stacks, baffles, and such fabricated parts as chutes, air heaters, fan stands, feeding tube, catwalks, ladders, coal hoppers, and safety hatch to frame, using wrench. Installs manholes, hand holes, valves, gauges, and feed water connection in drums to complete assembly of water tube boilers. Assists in testing assembled vessels by pumping water or gas under specified pressure into vessel and observing instruments for evidence of leakage. Repairs boilers or tanks in field by unbolting or flame cutting defective sections or tubes, straightening plates, using torch or jacks, installing new tubes, fitting and welding new sections and replacing worn lugs on bolts. May rivet and caulk sections of vessels, using pneumatic riveting and caulking hammers.

Bricklayer * (See Mason Tender) - Ratio 1 Journeyman /3 Mason Tender Brick

Lays building materials, such as brick, structural tile, and concrete cinder, glass, gypsum, and terra cotta block (except stone) to construct or repair walls, partitions, arches, sewers, and other structures: Measures distance from reference points and marks guidelines on working surface to lay out work. Spreads soft bed (layer) of mortar that serves as base and binder for block, using trowel. Applies mortar to end of block and positions block in mortar bed. Taps block with trowel to level, align, and embed in mortar, allowing specified thickness of joint. Removes excess mortar from face of block, using trowel. Finishes mortar between brick with pointing tool or trowel. Breaks bricks to fit spaces too small for whole brick, using edge of trowel or brick hammer. Determines vertical and horizontal alignment of courses, using plumb bob, gauge line (tightly stretched cord), and level. Fastens brick or terra cotta veneer to face of structures, with tie wires embedded in mortar between bricks, or in anchor holes in veneer brick. May weld metal parts to steel structural members. May apply plaster to walls and ceiling, using trowel, to complete repair work.

Carpenter * (Including Acoustical Ceiling Work) - Ratio 2 Journeymen /1 Apprentice

Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's hand tools and power tools, and conforming to local building codes: Studies blueprints, sketches, or building plans for information pertaining to type of material required, such as lumber or fiberboard, and dimensions of structure or fixture to be fabricated. Selects specified type of lumber or other materials. Prepares layout, using rule, framing square, and calipers. Marks cutting and assembly lines on materials, using pencil, chalk, and marking gauge. Shapes materials to prescribed measurements, using saws, chisels, and planes. Assembles cut and shaped materials and fastens them together with nails, dowel pins, or glue. Verifies trueness of structure with plumb bob and carpenter's level. Erects framework for structures and lays subflooring. Builds stairs and lays out and installs partitions and cabinetwork. Covers sub floor with building paper to keep out moisture and lays hardwood, parquet, and wood-strip-block floors by nailing floors to sub floor or cementing them to mastic or asphalt base. Applies shock-absorbing, sound-deadening, and decorative paneling to ceilings and walls. Fits and installs prefabricated window frames, doors, doorframes, weather stripping, interior and exterior trim, and finish hardware, such as locks, letter drops, and kick plates. Constructs forms and chutes for pouring concrete. Erects scaffolding and ladders for assembling structures above ground level. May weld metal parts to steel structural members.

Cement Mason/Concrete Finisher *(Mason Tender Cement/Concrete) - Ratio 1 Journeyman /3
Mason Tender Cement

Finisher; concrete floater Smooths and finishes surfaces of poured concrete floors, walls, sidewalks, or curbs to specified textures, using hand tools or power tools, including floats, trowels, and screeds: Signals concrete deliverer to position truck to facilitate pouring concrete. Moves discharge chute of truck to direct concrete into forms. Spreads concrete into inaccessible sections of forms, using rake or shovel. Levels concrete to specified depth and workable consistency, using hand held screed and floats to bring water to surface and produce soft topping. Smooths, and shapes surfaces of freshly poured concrete, using straightedge and float or power screed. Finishes concrete surfaces, using power trowel, or wets and rubs concrete with abrasive stone to impart finish. Removes rough or defective spots from concrete surfaces, using power grinder or chisel and hammer, and patches holes with fresh concrete or epoxy compound. Molds expansion joints and edges, using edging tools, jointers, and straightedge. May sprinkle colored stone chips, powdered steel, or coloring powder on concrete to produce prescribed finish. May produce rough concrete surface, using broom. May mix cement, using hoe or concrete-mixing machine. May direct sub grade work, mixing of concrete, and setting of forms.

Drywall Finisher/Taper

Wallboard and plasterboard; sheetrock taper; taper and bedder; taper and floater. Seals joints

between plasterboard or other wallboards to prepare wall surface for painting or papering; Mixes sealing compound by hand or with portable electric mixer, and spreads compound over joints between boards, using trowel, broad knife, or spatula. Presses paper tape over joint to embed tape into compound and seal joint, or tapes joint, using mechanical applicator that spreads compound and embeds tape in one operation. Spreads and smooths cementing material over tape, using trowel or floating machine to blend joint with wall surface. Sands rough spots after cement has dried. Fills cracks and holes in walls and ceiling with sealing compound. Installs metal molding at corners in lieu of sealant and tape. Usually works as member of crew. May apply texturing compound and primer to walls and ceiling preparatory to final finishing, using brushes, roller, or spray gun. May countersink nails or screws below surface of wall prior to applying sealing compound, using hammer or screwdriver.

Drywall Hanger

Dry-wall installer; gypsum dry-wall systems installer. Plans gypsum drywall installations, erects metal framing and furring channels for fastening drywall, and installs drywall to cover walls, ceilings, soffits, shafts, and movable partitions in residential, commercial, and industrial buildings: Reads blueprints and other specifications to determine method of installation, work procedures, and material, tool, and work aid requirements. Lays out reference lines and points for use in computing location and position of metal framing and furring channels and marks position for erecting metalwork, using chalk line. Measures, marks, and cuts metal runners, studs, and furring channels to specified size, using tape measure, straightedge and hand and portable power cutting tools. Secures metal framing to walls and furring channels to ceilings, using hand and portable power tools.

Measures and marks cutting lines on drywall, using square, tape measure, and marking devices. Scribes cutting lines on drywall, using straightedge and utility knife and breaks board along cut lines. Fits and fastens board into specified position on wall, using screws, hand tools, portable power tools, or adhesive. Cuts openings into board for electrical outlets, vents, or fixtures, using keyhole saw or other cutting tools. Measures, cuts, assembles, and installs metal framing and decorative trim for windows, doorways, and vents. Fits, aligns, and hangs doors and installs hardware, such as locks and kick plates (Includes Installing Metal Studs).

Electrician * Ratio 3 Journeymen /2 Apprentice

Plans layout, installs, and repairs wiring, electrical fixtures, apparatus, and control equipment: Plans new or modified installations to minimize waste of materials, provide access for future maintenance, and avoid unsightly, hazardous, and unreliable wiring, consistent with specifications and local electrical codes. Prepares sketches showing location of wiring and equipment, or follows diagrams or blueprints, ensuring that concealed wiring is installed before completion of future walls, ceilings, and flooring. Measures, cuts, bends, threads, assembles, and installs electrical conduit, using tools, such as hacksaw, pipe threader, and conduit bender. Pulls wiring through conduit. Splices wires by stripping insulation from terminal leads, using knife or pliers, twisting or soldering wires together, and applying tape or terminal caps. Connects wiring to lighting fixtures and power equipment, using hand tools. Installs control and distribution apparatus, such as switches, relays, and circuit-breaker panels, fastening in place with screws or bolts, using hand tools and power tools. Connects power cables to equipment, such as electric range or motor, and installs grounding leads. Tests continuity of circuit to ensure electrical compatibility and safety of components, using testing instruments, such as ohmmeter, battery and buzzer, and oscilloscope. Observes functioning of installed equipment or system to detect hazards and need for adjustments, relocation, or replacement (Including Pulling Wire and Low Voltage Wiring and Installation of Fire Alarms, Security Systems, Telephones, and Computers).

Elevator Mechanic * - Ratio 1 Journeyman /1 Apprentice

FOOTNOTES: a. - Employer contributes 8% of basic hourly rate for over 5 years' service and 6% of

basic hourly rate for 6 months to 5 years' service as Vacation Pay Credit. Paid Holidays: New Year's Day; Memorial Day; Independence Day Labor Day; Thanksgiving Day; Friday after Thanksgiving Day; Christmas Day.

Erector; elevator installer; elevator mechanic. Assembles and installs electric and hydraulic freight and passenger elevators, escalators, and dumbwaiters, determining layout and electrical connections from blueprints: Studies blueprints and lays out location of framework, counterbalance rails, motor pump, cylinder, and plunger foundations. Drills holes in concrete or structural steel members with portable electric drill. Secures anchor bolts or welds brackets to support rails and framework, and verifies alignment with plumb bob and level. Cuts prefabricated sections of framework, rails, and other elevator components to specified dimensions, using acetylene torch, power saw, and disk grinder. Installs cables, counterweights, pumps, motor foundations, escalator drives, guide rails, elevator cars, and control panels, using hand tools. Connects electrical wiring to control panels and electric motors. Installs safety and control devices. Positions electric motor and equipment on top of elevator shaft, using hoists and cable slings.

Formbuilder/Formsetter

Constructs built-in-place or prefabricated wooden forms, according to specifications, for molding concrete structures: Studies blueprints and diagrams to determine type and dimension of forms to be constructed. Saws lumber to blueprint dimensions, using handsaw or power saw, and nails lumber together to make form panels. Erects built-in-place forms or assembles and installs prefabricated forms on construction site according to blueprint specifications, using hand tools, plumb rule, and level. Inserts spreaders and tie rods between opposite faces of form to maintain specified dimensions. Anchors and braces forms to fixed objects, using nails, bolts, anchor rods, steel cables, planks, and timbers.

Glazier

Installs glass in windows, skylights, store fronts, and display cases, or on surfaces, such as building fronts, interior walls, ceilings, and tabletops: Marks outline or pattern on glass, and cuts glass, using glasscutter. Breaks off excess glass by hand or with notched tool. Fastens glass panes into wood sash with glazier's points, and spreads and smoothes putty around edge of panes with knife to seal joints. Installs mirrors or structural glass on building fronts, walls, ceilings, or tables, using mastic, screws, or decorative molding. Bolts metal hinges, handles, locks, and other hardware to prefabricated glass doors. Sets glass doors into frame and fits hinges. May install metal window and doorframes into which glass panels are to be fitted. May press plastic adhesive film to glass or spray glass with tinting solution to prevent light glare. May install stained glass windows.

Insulator (Batt and Foam)

Applies batt and form insulation to walls, ceilings and other surfaces according to manufacturers specifications and blue print instructions. May use sealants such as cement plaster or asphalt compound to seal insulation; may spread concrete over floor slabs to form wearing floor: brushes adhesives, cuts insulating materials to specified shape to cover surfaces; uses tape or other sealants to adhere insulation to surfaces. May use staple gun, towel, paintbrushes and caulking guns.

Ironworker (Reinforcing)

Positions and secures steel bars in concrete forms to reinforce concrete; places rods in forms, spacing and fastening together with wire and pliers. Cuts bars using hacksaw, bar cutters or acetylene torch. Bends steel rods with hand tools or rod bending machine; reinforces concrete with wire mesh; welds reinforcing bars together.

Ironworker (Structural)

Erector; ironworker; steel erector; structural-iron erector; structural-iron worker; structural steel erector. Performs any combination of following duties to raise, place, and unite girders, columns, and other structural-steel members to form completed structures or structure frameworks, working as member of crew: Sets up hoisting equipment for raising and placing structural-steel members. Fastens steel members to cable of hoist, using chain, cable, or rope. Signals worker operating hoisting equipment to lift and place steel member. Guides member, using tab line (rope) or rides on member to guide it into position. Pulls, pushes, or pries steel members into approximate position while member is supported by hoisting device. Forces members into final position, using turnbuckles, crowbars, jacks, and hand tools. Aligns rivet holes in member with corresponding holes in previously placed member by driving drift pins or handle of wrench through holes. Verifies vertical and horizontal alignment of members, using plumb bob and level.

Lather

Fastens wooden, metal, or rockboard lath to walls, ceilings, and partitions of buildings to provide supporting base for plaster, fireproofing, or acoustical material, using hand tools and portable power tools: Erects horizontal metal framework to which laths are fastened, using nails, bolts, and studgun. Drills holes in floor and ceiling, using portable electric tool, and drives ends of wooden or metal studs into holes to provide anchor for furring or rockboard lath. Wires horizontal strips to furring to stiffen framework. Cuts lath to fit openings and projections, using hand tools or portable power tools. Wires, nails, clips, or staples lath to framework, ceiling joists, and flat concrete surfaces. Bends metal lath to fit corners, or attaches preformed corner reinforcements. Wires plasterer's channels to overhead structural framework to provide support for plaster or acoustical ceiling tile.

Painter (Brush, Roller, and Spray)

Applies coats of paint, varnish, stain, enamel, or lacquer to decorate and protect interior or exterior surfaces, trimmings, and fixtures of buildings and other structures: Reads work order or receives instructions from supervisor or homeowner regarding painting. Smooths surfaces, using sandpaper, brushes, or steel wool, and removes old paint from surfaces, using paint remover, scraper, wire brush, or blowtorch to prepare surfaces for painting. Fills nail holes, cracks, and joints with caulk, putty, plaster, or other filler, using caulking gun and putty knife. Selects premixed paints, or mixes required portions of pigment, oil, and thinning and drying substances to prepare paint that matches specified colors. Removes fixtures, such as pictures and electric switchcovers, from walls prior to painting, using screwdriver. Spreads dropcloths over floors and room furnishings, and covers surfaces, such as baseboards, doorframes, and windows with masking tape and paper to protect surfaces during painting. Paints surfaces, using brushes, spray gun, or paint rollers. Simulates wood grain, marble, brick, or tile effects. Applies paint with cloth, brush, sponge, or fingers to create special effects. Erects scaffolding or sets up ladders to perform tasks above ground level.

Pipe fitter * (HVAC Pipe Only) - Ratio 1Journeyman /1 Apprentice (See Schedule included)

Lays out, assembles, installs, and maintains pipe systems, pipe supports, and related hydraulic and pneumatic equipment for steam, hot water, heating, cooling, lubricating, sprinkling, and industrial production and processing systems, applying knowledge of system operation, and following blueprints: Selects type and size of pipe, and related materials and equipment, such as supports, hangers, and hydraulic cylinders, according to specifications. Inspects work site to determine presence of obstructions and to ascertain that holes cut for pipe will not cause structural weakness. Plans installation or repair to avoid obstructions and to avoid interfering with activities of other workers. Cuts pipe, using saws, pipe cutter, hammer and chisel, cutting torch, and pipe cutting machine. Threads pipe, using pipe threading machine. Bends pipe, using pipe bending tools and pipe bending machine. Assembles and installs variety of metal and nonmetal pipes, tubes, and fittings, including iron, steel, copper, and plastic. Connects pipes, using threaded, caulked, soldered, brazed, fused, or cemented joints, and hand tools. Secures pipes to structure with brackets, clamps,

and hangers, using hand tools and power tools. Installs and maintains hydraulic and pneumatic components of machines and equipment, such as pumps and cylinders, using hand tools. Installs and maintains refrigeration and air-conditioning systems, including compressors, pumps, meters, pneumatic and hydraulic controls, and piping, using hand tools and power tools, and following specifications and blueprints. Increases pressure in pipe system and observes connected pressure gauge to test system for leaks.

Pipe Fitter * (Excluding HVAC Pipe)

Lays out, assembles, installs, and maintains pipe systems, pipe supports, and related hydraulic and pneumatic equipment for steam, hot water, heating, cooling, lubricating, sprinkling, and industrial production and processing systems, applying knowledge of system operation, and following blueprints: Selects type and size of pipe, and related materials and equipment, such as supports, hangers, and hydraulic cylinders, according to specifications. Inspects work site to determine presence of obstructions and to ascertain that holes cut for pipe will not cause structural weakness. Plans installation or repair to avoid obstructions and to avoid interfering with activities of other workers. Cuts pipe, using saws, pipe cutter, hammer and chisel, cutting torch, and pipe cutting machine. Threads pipe, using pipe-threading machine. Bends pipe, using pipe bending tools and pipe bending machine. Assembles and installs variety of metal and nonmetal pipes, tubes, and fittings, including iron, steel, copper, and plastic. Connects pipes, using threaded, caulked, soldered, brazed, fused, or cemented joints, and hand tools. Secures pipes to structure with brackets, clamps, and hangers, using hand tools and power tools. Installs and maintains hydraulic and pneumatic components of machines and equipment, such as pumps and cylinders, using hand tools. Installs and maintains refrigeration and air-conditioning systems, including compressors, pumps, meters, pneumatic and hydraulic controls, and piping, using hand tools and power tools, and following specifications and blueprints. Increases pressure in pipe system and observes connected pressure gauge to test system for leaks. May weld pipe supports to structural steel members. May observe production machines in assigned area of manufacturing facility to detect machinery malfunctions. May operate machinery to verify repair. May modify programs of automated machinery, such as robots and conveyors, to change motion and speed of machine, using teach pendant, control panel, or keyboard and display screen of robot controller and programmable controller. May be designated Steam Fitter (construction) when installing piping systems that must withstand high pressure

Plasterer * See Plaster Tender - Ratio 1 Journeyman /3 Plaster Tenders

Applies coats of plaster to interior walls, ceilings, and partitions of buildings, to produce finished surface, according to blueprints, architect's drawings, or oral instructions, using hand tools and portable power tools: Directs workers to mix plaster to desired consistency and to erect scaffolds. Spreads plaster over lath or masonry base, using trowel, and smoothes plaster with darby and float to attain uniform thickness. Applies scratch, brown, or finish coats of plaster to wood, metal, or board lath successively. Roughens undercoat with scratcher (wire or metal scraper) to provide bond for succeeding coats of plaster.

Plumber * (Excluding HVAC Pipe) - Ratio 3 Journeymen /2 Apprentice

Assembles, installs, and repairs pipes, fittings, and fixtures of heating, water, and drainage systems, according to specifications and plumbing codes: Studies building plans and working drawings to determine work aids required and sequence of installations. Inspects structure to ascertain obstructions to be avoided to prevent weakening of structure resulting from installation of pipe. Locates and marks position of pipe and pipe connections and passage holes for pipes in walls and floors, using ruler, spirit level, and plumb bob. Cuts openings in walls and floors to accommodate pipe and pipe fittings, using hand tools and power tools. Cuts and threads pipe, using pipe cutters, cutting torch, and pipe-threading machine. Bends pipe to required angle by use of pipe-bending machine or by placing pipe over block and bending it by hand. Assembles and installs valves, pipe

fittings, and pipes composed of metals, such as iron, steel, brass, and lead, and nonmetals, such as glass, vitrified clay, and plastic, using hand tools and power tools. Joins pipes by use of screws, bolts, fittings, solder, plastic solvent, and caulks joints. Fills pipe system with water or air and reads pressure gauges to determine whether system is leaking. Installs and repairs plumbing fixtures, such as sinks, commodes, bathtubs, water heaters, hot water tanks, garbage disposal units, dishwashers, and water softeners. Repairs and maintains plumbing by replacing washers in leaky faucets, mending burst pipes, and opening clogged drains.

Roofer

Covers roofs with roofing materials other than sheet metal, such as composition shingles or sheets, wood shingles, or asphalt and gravel, to waterproof roofs: Cuts roofing paper to size, using knife, and nails or staples it to roof in overlapping strips to form base for roofing materials. Installs gutters and downs spouts. Aligns roofing material with edge of roof, and overlaps successive layers, gauging distance of overlap with chalk line, gauge on shingling hatchet, or by lines on shingles. Fastens composition shingles or sheets to roof with asphalt, cement, or nails. Punches holes in slate, tile, terra cotta, or wooden shingles, using punch and hammer. Cuts strips of flashing and fits them into angles formed by walls, vents, and intersecting roof surfaces. When applying asphalt or tar and gravel to roof, mops or pours hot asphalt or tar onto roof base. Applies alternate layers of hot asphalt or tar and roofing paper until roof covering is as specified. Applies gravel or pebbles over top layer, using rake or stiff bristled broom.

Sheet metal worker * Ratio 2 Journeymen /1 Apprentice (Including Setting HVAC Duct & System Installs)

Fabricates, assembles, installs and repairs sheet metal products, including sheet metal roof (also see Roofer). Operates soldering and welding equipment to join together sheet metal parts. Seals seams and joints with sealant. Installs roof sheets, trims, flashing, gutters down spouts and other related items. Performs other related duties.

Sprinkler Fitter (Fire) * - Ratio 1 Journeyman /1 Apprentice

Lays out, assembles, installs, and maintains pipe systems, pipe supports, and related hydraulic and pneumatic equipment for steam, hot water, heating, cooling, lubricating, sprinkling, and industrial production and processing systems, applying knowledge of system operation, and following blueprints: Selects type and size of pipe, and related materials and equipment, such as supports, hangers, and hydraulic cylinders, according to specifications. Inspects work site to determine presence of obstructions and to ascertain that holes cut for pipe will not cause structural weakness. Plans installation or repair to avoid obstructions and to avoid interfering with activities of other workers. Cuts pipe, using saws, pipe cutter, hammer and chisel, cutting torch, and pipe cutting machine. Threads pipe, using pipe-threading machine. Bends pipe, using pipe bending tools and pipe bending machine. Assembles and installs variety of metal and nonmetal pipes, tubes, and fittings, including iron, steel, copper, and plastic. Connects pipes, using threaded, caulked, soldered, brazed, fused, or cemented joints, and hand tools. Secures pipes to structure with brackets, clamps, and hangers, using hand tools and power tools. Installs and maintains hydraulic and pneumatic components of machines and equipment, such as pumps and cylinders, using hand tools. Installs and maintains refrigeration and air-conditioning systems, including compressors, pumps, meters, pneumatic and hydraulic controls, and piping, using hand tools and power tools, and following specifications and blueprints. Increases pressure in pipe system and observes connected pressure gauge to test system for leaks. May weld pipe supports to structural steel members. May observe production machines in assigned area of manufacturing facility to detect machinery malfunctions. May operate machinery to verify repair. May modify programs of automated machinery, such as robots and conveyors, to change motion and speed of machine, using teach pendant, control panel, or keyboard and display screen of robot controller and programmable controller.

Tile Finisher

Supplies and mixes construction materials for TILE SETTER (construction) 861.381-054, applies grout, and cleans installed tile: Moves tiles, tile setting tools, and work devices from storage area to installation site manually or using wheelbarrow. Mixes mortar and grout according to standard formulas and request from TILE SETTER (construction), using bucket, water hose, spatula, and portable mixer. Supplies TILE SETTER (construction) with mortar, using wheelbarrow and shovel. Applies grout between joints of installed tile, using grouting trowel. Removes excess grout from tile joints with wet sponge and scrapes corners and crevices with trowel. Wipes surface of tile after grout has set to remove grout residue and polish tile, using nonabrasive materials. Cleans installation site, mixing and storage areas, and installation machines, tools, and equipment, using water and various cleaning tools. Stores tile setting materials, machines, tools, and equipment. May apply caulk, sealers, acid, steam, or related agents to caulk, seal, or clean installed tile, using various application devices and equipment. May modify mixing, grouting, grinding, and cleaning procedures according to type of installation or material used. May assist TILE SETTER (construction) to position and secure metal lath, wire mesh, or felt paper prior to installation of tile. May cut marked tiles to size, using power saw or tile cutter.

Tile Setter

Applies tile to walls, floors, ceilings, and promenade roof decks, following design specifications: Examines blueprints, measures and marks surfaces to be covered, and lays out work. Measures and cuts metal lath to size for walls and ceilings with tin snips. Tacks lath to wall and ceiling surfaces with staple gun or hammer. Spreads plaster base over lath with trowel and levels plaster to specified thickness, using screed. Spreads concrete on sub floor, with trowel and levels it with screed. Spreads mastic or other adhesive base on roof deck, using serrated spreader to form base for promenade tile. Cuts and shapes tile with tile cutters and biters. Positions tile and taps it with trowel handle to affix tile to plaster or adhesive base.

Truck Driver

Drives truck with capacity of more than 3 tons, to transport materials to and from specified destinations: Drives truck to destination, applying knowledge of commercial driving regulations and area roads. Prepares receipts for load picked up. Collects payment for goods delivered and for delivery charges. May maintain truck log, according to state and federal regulations. May maintain telephone or radio contact with supervisor to receive delivery instructions. May load and unload truck. May inspect truck equipment and supplies, such as tires, lights, brakes, gas, oil, and water. May perform emergency roadside repairs, such as changing tires, installing light bulbs, tire chains, and spark plugs. May position blocks and tie rope around items to secure cargo during transit.

Laborers

Common Laborer

Performs any combination of the following tasks in erecting, repairing and wrecking buildings; dig, spread and level dirt and gravel; lift carry and hold building materials, tools and supplies; clean tools, equipment, materials and work areas; mix, pour and spread concrete, asphalt, gravel and other materials; join, wrap and seal sections of pipe; routine non-machine tasks such as removing forms from set concrete, filling expansion joints with asphalt, and placing culverts in trench. May also signal construction equipment operators; measure distances from grade stakes, drive stakes and stretch lines; bolt, nail align and block up under forms; mix and finish poured concrete, erect scaffolding; spread paint or coating to seal surfaces; caulking compounds to seal surfaces; remove projections from concrete, and mount pipe hangers.

Mason Tender Brick

Mason Tender Cement

Pipe layer

Lay pipe for storm or sanitation sewers, drains, and water mains. Perform any combination of the following tasks: grade trenches or culverts, position pipe, or seal joints.

Plaster Tender

Tends machine that pumps plaster or stucco through spray gun for application to ceilings, walls, and partitions of buildings: Starts and stops machine on signals from PLASTERER (construction). Fills hopper of machine with plaster. Turns valves to regulate pump and compressor. Assists in erecting scaffolds.

Power Equipment Operator:

Asphalt Paver (operator)

Operator; bituminous-paving-machine operator; blacktop-paver operator; blacktop spreader; mechanical-spreader operator; paving-machine operator, asphalt or bituminous. Operates machine that spreads and levels hot-mix bituminous paving material on sub grade of highways and streets: Bolts extensions to screed to adjust width, using wrenches. Lights burners to heat screed. Starts engine and controls paving machine to push dump truck and maintain constant flow of asphalt into hopper. Observes distribution of paving material along screed and controls direction of screed to eliminate voids at curbs and joints. Turns valves to regulate temperature of asphalt flowing from hopper when asphalt begins to harden on screed.

Backhoe (operator)

Operates power-driven machine, equipped with movable shovel, to excavate or move coal, dirt, rock, sand, and other materials: Receives written or oral instructions from supervisor regarding material to move or excavate. Pushes levers and depresses pedals to move machine, to lower and push shovel into stockpiled material, to lower and dig shovel into surface of ground, and to lift, swing, and dump contents of shovel into truck, car, or onto conveyor, hopper, or stockpile. Observes markings on ground, hand signals, or grade stakes to remove material, when operating machine at excavation site.

Crane (operator)

Operates electric-, diesel-, gasoline-, or steam-powered guy-derrick or stiff-leg derrick (mast supported by fixed legs or tripod), to move products, equipment, or materials to and from quarries, storage areas, and processes, or to load and unload trucks or railroad cars: Pushes and pulls levers and depresses pedals to raise, lower, and rotate boom and to raise and lower load line in response to signals.

Forklift (operator)

Drives gasoline-, liquefied gas-, or electric-powered industrial truck equipped with lifting devices, such as forklift, boom, scoop, lift beam and swivel-hook, fork-grapple, clamps, elevating platform, or trailer hitch, to push, pull, lift, stack, tier, or move products, equipment, or materials in warehouse, storage yard, or factory: Moves levers and presses pedals to drive truck and control movement of lifting apparatus. Positions forks, lifting platform, or other lifting device under, over, or around loaded pallets, skids, boxes, products, or materials or hooks tow trucks to trailer hitch, and transports load to

Information Booths Hobby
Project No. PN 941

**WAGE SCALE
FOR BUILDING CONSTRUCTION**

designated area. Unloads and stacks material by raising and lowering lifting device.

Slab & Wall Saw (See Related Power Equipment Operator Above)
Use associated power equipment operators already defined.

Apprentices

Apprentices may be used in any of the crafts listed above where noted, if they are currently certified in a program recognized by the Bureau of Apprenticeship and Training, U.S. Department of Labor, providing the proper ratio between journeyman and apprentice is observed. Apprentice certification certificates must be supplied with the first weekly payroll upon which the apprentice's name appears.

Welder - Receive rate prescribed for craft performing operation to which welding is incidental.

Pipe fitters * Apprentice Schedule (Excluding HVAC Pipe)

Journeyman	Indentured Apprentice	Apprentice Applicant	Total
1	1	0	1 to 1
3	2	1	3 to 3
5	3	2	5 to 5
8	4	3	8 to 7
12	5	4	12 to 9
16	6	5	16 to 11
20	7	6	20 to 13
25	8	7	25 to 15
30	9	8	30 to 17
40	10	9	40 to 19
50	11	10	50 to 21

NOTE: Continue after 50 Journeyman — ONE (1) Indentured Apprentice and one (1) Apprentice Applicant for every ten (10) Journeyman

*** When Apprentices are shown, Helpers cannot be utilized**

APPRENTICES (see definitions)

Registered Apprenticeship Ratios

For All Apprentices

Apprentice duties consist but are not limited to reading blue prints, lay out, fabrication, installation, and assembly. Other duties are the setting up and operation of fabrication machines, using hand tools, power tools, lifting/handling devices, sealing if necessary according to their particular craft. Apprentices also are trained in the preparation process of a job that include but not limited to staging, planning, distribution, and sectioning of materials. Apprentices may be used in any of the crafts listed where noted on the Prevailing Wage Rate Schedule, if they are currently certified in a program recognized by the Bureau of Apprenticeship and Training, U.S. Department of Labor, providing the proper ratio between journeyman and apprentice is observed. Apprentice certification certificates must be supplied with the first weekly payroll upon which the apprentice's name appears. Laborers cannot be utilized when Apprentices are shown

Asbestos Worker / Insulator

City of Houston allows the use of 1 Journeyman and 1 Apprentice, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 2th Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman.

- 1 Journeyman w/ 1 Apprentice
- 2 Journeymen w/ 2 Apprentices

Boilermakers

City of Houston allows the use of 5 Journeymen and 1 Apprentice, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 6th Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman.

- 1-5 Journeymen w/ 1 Apprentice
- 6-10 Journeymen w/ 2 Apprentices

Carpenter

City of Houston allows the use of 2 Journeymen and 1 Apprentice, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 4th Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman.

- 1-2 Journeymen w/ 1 Apprentice
- 3-4 Journeymen w/ 2 Apprentices
- 5-6 Journeymen w/ 3 Apprentices

Electrician

City of Houston allows the use of 3 Journeymen and 2 Apprentices, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 3rd Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman. All Journeymen and Apprentices must hold a current license from the State of Texas.

- 1 Journeyman w/ 1 Apprentice
- 2 Journeymen w/ 1 Apprentice
- 3 Journeymen w/ 2 Apprentices
- 4 Journeymen w/ 3 Apprentices
- 5 Journeymen w/ 3 Apprentices
- 6 Journeymen w/ 4 Apprentices
- 7 Journeymen w/ 4 Apprentices
- 8 Journeymen w/ 4 Apprentices
- 9 Journeymen w/ 4 Apprentices
- 10 Journeymen w/ 5 Apprentices

Plumbers

City of Houston allows the use of 3 Journeymen and 2 Apprentices, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 3rd Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman. All Journeymen and Apprentices must hold a current license from the State of Texas.

- 1 Journeyman w/ 1 Apprentice
- 2 Journeymen w/ 1 Apprentice
- 3 Journeymen w/ 2 Apprentices
- 4 Journeymen w/ 3 Apprentices
- 5 Journeymen w/ 3 Apprentices
- 6 Journeymen w/ 4 Apprentices
- 7 Journeymen w/ 4 Apprentices
- 8 Journeymen w/ 4 Apprentices
- 9 Journeymen w/ 4 Apprentices
- 10 Journeymen w/ 5 Apprentices

Sprinkler Fitter

City of Houston allows the use of 1 Journeyman and 1 Apprentice, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 2th Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman.

- 1 Journeyman w/ 1 Apprentice
 - 2 Journeymen w/ 2 Apprentices
- Sheetmetal Worker

City of Houston allows the use of 2 Journeymen and 1 Apprentice, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 4th Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman.

- 1-2 Journeymen w/ 1 Apprentice
- 3-4 Journeymen w/ 2 Apprentices
- 5-6 Journeymen w/ 3 Apprentices

Pipefitter

City of Houston allows the use of 1 Journeymen and 1 Apprentice, the Apprentice can be used with the first Journeyman. No other Apprentices can be added until the 4th Journeyman is added. All Apprentices are to be under the direct supervision of a Journeyman.

- 1 Journeyman w/ 1 Apprentice
- 2 Journeymen w/ 1 Apprentice
- 3 Journeymen w/ 2 Apprentices
- 4 Journeymen w/ 3 Apprentices
- 5 Journeymen w/ 3 Apprentices
- 6 Journeymen w/ 4 Apprentices
- 7 Journeymen w/ 4 Apprentices
- 8 Journeymen w/ 4 Apprentices
- 9 Journeymen w/ 4 Apprentices
- 10 Journeymen w/ 5 Apprentices

Welders

Receive rate prescribed for craft performing operation in which welding is incidental

Pipefitters * Apprentice Schedule (Excluding HVAC Pipe)

NOTE: Continue after 50 Journeyman - ONE (1) Indentured Apprentice and one (1) Apprentice Applicant for every ten (10) Journeyman

Journeyman	Indentured Apprentice	Apprentice Applicant	Total
1	1	0	1 to 1
3	2	1	3to 3
5	3	2	5 to 5
8	4	3	8 to 7
12	5	4	12 to 9
16	6	5	16 to 11
20	7	6	20 to 13
25	8	7	25 to 15
30	9	8	30 to 17
40	10	9	40 to 19
50	11	10	50 to 21

When Apprentices are shown, Helpers cannot be utilized

If there are questions as to the classification of a worker, contact the Contract Compliance Officer in writing with a description of the work to be performed. After reviewing the Contract Compliance Officer will respond in writing with the classification and wage rate to be paid the worker in question.

EXHIBIT "B"

**CERTIFICATE FROM CONTRACTOR APPOINTING OFFICER OR EMPLOYEE
TO SUPERVISE PAYMENT OF EMPLOYEES**

Project Name _____

Project WBS#: _____ Date _____

Email Address: _____

(I) (We) hereby certify that (I am) (we are) the **Prime Contractor** for _____

(specify type of job)

in connection with construction of the above-mentioned Project, and that (I) (we) have appointed _____, whose signature appears below, to supervise the payment of (my) (our) employees beginning _____, 20____; that he/she is in a position to have full knowledge of the facts set forth in the payroll documents and in the statement of compliance required by the Copeland Act and the City of Houston, which he/she is to execute with (my) (our) full authority and approval until such time as (I) (we) submit to the City of Houston a new certificate appointing some other person for the purposes hereinabove stated.

(Identifying Signature of Appointee) Phone: _____

Attest: _____
(Name of Firm or Corporation)

By: _____
(Signature)

By: _____
(Signature)

(Title)

(Title)

NOTE: This certificate must be executed by an authorized officer of a corporation or by a member of a partnership, and shall be executed prior to and be submitted with the first payroll. Should the appointee be changed, a new certificate must accompany the first payroll for which the new appointee executes a statement of compliance required by the Copeland Act and the City of Houston.

EXHIBIT "C"

CERTIFICATE FROM SUBCONTRACTOR APPOINTING OFFICER OR EMPLOYEE TO
SUPERVISE PAYMENT OF EMPLOYEES

Project Name _____

Project WBS#: _____ Date _____

Email Address: _____

(I) (We) hereby certify that (I am) (we are) the **Sub Contractor** for _____

(specify type of job)

in connection with construction of the above-mentioned Project, and that (I) (we) have appointed _____, whose signature appears below, to supervise the payment of (my) (our) employees beginning _____, 20____; that he/she is in a position to have full knowledge of the facts set forth in the payroll documents and in the statement of compliance required by the Copeland Act and the City of Houston, which he/she is to execute with (my) (our) full authority and approval until such time as (I) (we) submit to the City of Houston a new certificate appointing some other person for the purposes hereinabove stated.

(Identifying Signature of Appointee) Phone: _____

Attest: _____
(Name of Firm or Corporation)

By: _____
(Signature)

By: _____
(Signature)

(Title)

(Title)

NOTE: This certificate must be executed by an authorized officer of a corporation or by a member of a partnership, and shall be executed prior to and be submitted with the first payroll. Should the appointee be changed, a new certificate must accompany the first payroll for which the new appointee executes a statement of compliance required by the Copeland Act and the City of Houston.

END OF DOCUMENT



Pay or Play Program Operating Procedures

Background

The Pay or Play Program was established with Ordinance 2007-534 on July 1, 2007 and is governed by Executive Order 1-7. The Pay or Play Program (POP) creates a more level playing field and enhances fairness in the bid process between competing contractors that choose to offer health benefits to their workforce and those who do not. The program also recognizes and accounts for the fact that there are costs associated with providing health care for the uninsured citizens of Houston and Harris County area.

Administration:

- Vendors are required to begin complying with POP within 30 days of contract award by utilizing the designated system, *B2G Workforce Module*, at <https://houston.mwdbe.com> to complete/review POP activities.
- Vendors are required to utilize *JP Morgan Chase Pay Connexion (Pay Connexion)* portal that will accept POP payments electronically. B2G Workforce Module will provide a direct link to *Pay Connexion* where contractors may submit payment via Debit Card, Credit Card, Automated Clearing House (ACH) and/or Electronic Checks (e-checks). Contractors will be charged a convenience fee per transaction.
- Vendors who onboard new employees are allowed a 60-day waiting period upon each new employee's start date to begin participating in POP. After the 60-day period has lapsed, Vendor must include the employee in POP reporting.
- The Office of Business Opportunity (OBO) has citywide administrative oversight of the program, including audit responsibilities. Vendor's compliance with POP requirements will be directly managed by the City Department with whom Vendor has contracted (Contracting Department). Questions about POP should be referred to the Contracting Department's POP Liaison. A contact list for POP Liaisons is available at <http://www.houstontx.gov/obo/popforms.html> or by contacting the OBO POP Administrator at 832-393-0633 or Brianne.Maxwell@houstontx.gov.



Pre-bid/Pre-Proposal Forms:

- Vendors must complete and return the following forms before contract award by the Contracting Department:
 - *Acknowledgment Form* (POP-1)
 - *Certification of Compliance* (POP-2)
 - *Participating Subcontractors Form* (POP-3)

Prime/Subcontractor Waiver Request (Form POP-4):

- Completed by Contracting Department prior to City Council approval contract award, for contract(s) that may meet exemption criteria as stated in EO 1-7. Form POP-4 must be signed by Contracting Department and forwarded, along with supporting documentation, to OBO POP Administrator for final decision.
- A new Form POP-4 is not needed for contract amendments and/or extensions, as the POP requirements in the original contract continues to apply.
- Contractors that utilize self-employed, owner/operator individuals to complete services (e.g., Truck Drivers, Day Laborers, 10-99, etc.) are POP exempt.
- Vendors should not submit a Form POP-4 for contracts enumerated in section 4.2 of EO 1-7, as those contracts are not covered under POP.

Pay Option Reporting (Workforce Audit):

- Vendors will create a *Workforce Employee List* showcasing all active employees working on the City of Houston project. Vendors will complete a weekly workforce audit by the end of each month. Vendors must provide the Total Hours Worked and individual Hours Worked by each covered employee as part of the weekly workforce audit.
 - Total Hours Worked = Total Number of Hours Employee worked for Employer.
 - Hours Worked = Total Number of Hours Employee worked on COH project.

Invoice Submission:

- Invoices are created from monthly *Workforce Audits* reports. Payments are due to the contracting department 30 business days after receipt of invoice. Payments



may be made through the *Pay Connexion*. Prime Vendor is responsible to the City for compliance of covered employees of covered subcontractors.

- Vendors will “Pay” by contributing \$1.00 per covered employee per regular hour for work performed under the contract with the City, not to exceed \$40.00 per employee.
 - POP will not accept partial payments; invoices must be paid in full.

Play Option Reporting (Workforce Audit):

- Vendors will create a *Workforce Employee List* showcasing all active employees working on the City of Houston project.
- Vendors will complete a quarterly workforce audits by month end of October, January, April, and July by providing proof of insurance for all active and covered employees for previous three (3) months.
- Vendors will “Play” by providing health benefits to covered employees. Health benefits must meet or exceed the following standards:
 - The employer will contribute no less than 75% of the monthly premium toward the total premium cost covered employee per month.
 - The employee contribution, if any amount, will be no greater than 25% of the monthly premium cost.

Note: Proof of coverage (in the form of the most current Company Insurance invoice or individual employee insurance card) for POP covered employees that work on the City Project.

Employee Waiver Request (Form POP-8):

- Vendor may request employee POP program waiver by submitting a request on the City of Houston Pay or Play (POP) *Employee Waiver Request* (Form POP-8); if a covered employee has refused health coverage through their employer or if a covered employee has acquired health coverage on their own.
 - Vendor will attach approved Form POP-8 to respective employees’ workforce profile in the designated system.



Self-Insured Contractor Request (Form POP-9):

- Vendor may request for Self-Insured Status if the employer is using their own money to cover their employees' claims.
- Vendors awarded Self-Insured Status will be PLAY participants and required to report once a year.



ATTACHMENT “ ”

Sample Letter of Intent

THIS AGREEMENT IS SUBJECT TO BINDING ARBITRATION ACCORDING TO THE TEXAS GENERAL ARBITRATION ACT.

To: City of Houston
Administering Department

Date: _____

Project Name and Number _____

Bid Amount: _____ M/W/DBE Goal: _____

=====

_____ agrees to enter into a contractual agreement
Prime Contractor

with _____, who will provide the following goods/
MWBE Subcontractor

services in connection with the above referenced contract:

for an estimated amount of \$ _____ or _____ % of the total contract value.

_____ is currently certified with the City of Houston's
(M/W/DBE Subcontractor) Office of Business of Opportunity Office to function in the
aforementioned capacity.

Prime Contractor

M/W/DBE Subcontractor

intend to work on the above-named contract in accordance with the M/W/DBE Participation Section of the City of Houston Bid Provisions, contingent upon award of the contract to the aforementioned Prime Contractor.

Signed (Prime Contactor)

Signed (M/W/DBE Subcontractor)

Printed Signature

Printed Signature

Title Date

Title Date

Attachment “ ”

CITY OF HOUSTON CERTIFIED MWBE SUBCONTRACT TERMS

Contractor shall ensure that all subcontracts with M/WBE subcontractors and suppliers are clearly labeled **“THIS CONTRACT IS SUBJECT TO BINDING ARBITRATION ACCORDING TO THE TEXAS GENERAL ARBITRATION ACT”** and contain the following terms:

1. _____(M/WBE subcontractor) shall not delegate or subcontract more than 50% of the work under this subcontract to any other subcontractor or supplier without the express written consent of the City of Houston’s Office of Business Opportunity (“the Director”).
2. _____(M/WBE subcontractor) shall permit representatives of the City of Houston, at all reasonable times, to perform 1) audits of the books and records of the subcontractor, and 2) inspections of all places where work is to be undertaken in connection with this subcontract. Subcontractor shall keep such books and records available for such purpose for at least four (4) years after the end of its performance under this subcontract. Nothing in this provision shall affect the time for bringing a cause of action or the applicable statute of limitations.
3. Within five (5) business days of execution of this subcontract, Contractor (prime contractor) and Subcontractor shall designate in writing to the Director an agent for receiving any notice required or permitted to be given pursuant to Chapter 15 of the Houston City Code of Ordinances, along with the street and mailing address and phone number of such agent.
4. As concluded by the parties to this subcontract, and as evidenced by their signatures hereto, any controversy between the parties involving the construction or application of any of the terms, covenants or conditions of this subcontract shall, on the written request of one party served upon the other or upon notice by the Director served on both parties, be submitted to binding arbitration, under the Texas General Arbitration Act (Tex. Civ. Prac. & Rem. Code Ann., Ch. 171 – “The Act”). Arbitration shall be conducted according to the following procedures:
 - a. Upon the decision of the Director or upon written notice to the HR Director from either party that a dispute has arisen, the Director shall notify all parties that they must resolve the dispute within thirty (30) days or the matter may be referred to arbitration.
 - b. If the dispute is not resolved within the time specified, any party or the Director may submit the matter to arbitration conducted by the American Arbitration Association under the rules of the American Arbitration Association, except as otherwise required by the City’s contract with the American Arbitration Association on file in the Office of the City’s Office of Business Opportunity.

- c. Each party shall pay all fees required by the American Arbitration Association and sign a form releasing the American Arbitration Association and its arbitrators from liability for decisions reached in the arbitration.
- d. In the event the American Arbitration Association no longer administers Office of Business Opportunity arbitration for the City, the Director shall prescribe alternate procedures as necessary to provide arbitration by neutrals in accordance with the requirements of Chapter 15 of the Houston City Code of Ordinances.

These provisions apply to goal-oriented contracts. A goal-oriented contract means any contract for the supply of goods or non-professional services in excess of \$100,000.00 for which competitive proposals are required by law; not within the scope of the MBE/WBE program of the United States Environmental Protection Agency or the United States Department of Transportation; and which the City Purchasing Agent has determined to have significant MWBE subcontracting potential in fields which there are an adequate number of known MBEs and/or WBEs to compete for City contracts.

The MWBE policy of the City of Houston will be discussed during the pre-proposal conference. For information, assistance, and/or to receive a copy of the City's Office of Business Opportunity Policy and/or Ordinance, contact the Office of Business Opportunity Division at 713.837.9000, 611 Walker Street, 7th Floor, Houston, Texas 77002.

SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project description.
- B. Work description.
- C. City occupancy.
- D. Contractor-salvaged products.
- E. Separate contracts and work by City.
- F. Extra copies of Contract Documents.
- G. Permits, fees and notices.

1.02 THE PROJECT

The Project is at William P. Hobby Airport in Houston, Texas.

1.03 GENERAL DESCRIPTION OF THE WORK

- A. Construct the Work under a single general construction contract as follows:
- B. Construct the Work in a single stage.
- C. The Work is summarized as the replacement and update of information booths in various locations in the Terminal at HOU. This scope is for both the millwork booths as well as the data infrastructure and video components.
 - 1. Cut and patch existing construction designated or required to remain and to receive new construction, following Section 01731- Cutting and Patching, and Section 01761 – Protection of Existing Services.
- D. Contract limit lines are shown diagrammatically on Drawings.

1.04 CITY OCCUPANCY

The City will occupy the premises as required to maintain full functionality within Terminal during the entire period of construction for the conduct of normal operations..

- A. Cooperate with the City to reduce conflict, and to facilitate the City's operations. Coordinate Contractor's activities with City Operations or Maintenance personnel through City Engineer.

SUMMARY OF WORK

B. Schedule Work to fit these requirements.

1.05 EXTRA COPIES OF CONTRACT DOCUMENTS

Use reproducible documents, furnished by City following Document 00700 Paragraph 2.2.2, to make extra copies of Contract Documents (dialo prints of Drawings and electrostatic copies of Project Manual) as required by Contractor for construction operations, and for Contractor's records following Sections 01726 - Base Facility Survey and 01770 - Contract Closeout. Follow Document 00700 Paragraph 1.3.

1.06 PERMITS, FEES AND NOTICES

Refer to Document 00700 Paragraph 3.14. Reimburse City for City's payment of fines levied against City or its employees because of Contractor's failure to obtain proper permits, pay proper fees, and make proper notifications. Reimbursement will be by Change Order, reducing the Contract Price as based upon the dollar amount of fines imposed.

PART 2 EXECUTION (NOT USED)

END OF SECTION

SECTION 01145
CONTRACTOR'S USE OF PREMISES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rights-of-way and access to the Work.
- B. Property and Base Facility outside contract limits.
- C. General requirements for exterior work.
- D. Work in AOA, including electrical lockout/tagout program.
- E. Interior work.
- F. Control of access into security areas.

1.02 SUBMITTALS

- A. Show start dates and duration of closures and impediments on construction schedule following Section 01325 - Construction Schedules.
- B. Prepare written requests, using Document 00931 - Request for Information, and submit requests at least 7 days before access is required, for following:
 - 1. Roadway, street, driveway, curbside and building main entrance/exit closures or impediments. Do not close or impede emergency exits intended to remain.
 - 2. Access to property outside contract limits, required to extend or connect work to utilities or environmental system controls in non-contract areas.
- C. For work involving electrical energy or other hazardous energy sources, submit a Lockout/Tagout Program.

1.03 RIGHTS-OF-WAY AND ACCESS TO THE WORK

- A. Confine access and operations and storage areas to contract limits and other areas provided by City, following Document 00700. Do not trespass on non-City-owned property or on airport occupants' spaces.
- B. Airport operates "around the clock." In cases of conflicts with construction operations, airport operations take precedence. Airport roads, streets, drives, curbsides and sidewalks, and ticketing, baggage claim, security check points, concessions, restrooms, aircraft gates

CONTRACTOR'S USE OF PREMISES

and similar passenger-related areas are intended for year-round uninterrupted use and access by the public and airport operations. Maintain uninterrupted traffic movement.

1. Aircraft and emergency vehicles have right-of-way in AOA.
 2. Private vehicles, public transportation and emergency vehicles have right-of-way on roads, streets, driveways and curbsides.
 3. Passengers have right-of-way in public spaces. Occupants have right-of-way in other occupied areas.
- C. Follow instructions of the City Engineer, Airport Manager and of ATCT. Follow FAA procedures.
- D. FAA will review Contractor's submittals for compliance with FAA requirements. Attend meetings with FAA to assist the City Engineer in obtaining approvals.
- E. Continued violations of or flagrant disregard for policies may be considered default, and individuals disregarding requirements may be determined as objectionable by the City Engineer, following provisions of Document 00700.

Do not close or impede rights-of-way without City Engineer approval.

- F. City Engineer may approve temporary storage of products, in addition to areas shown on Drawings, on-airport areas if storage piles do not interfere with airport operations.
1. No permission will be granted for this type of storage in Terminal roadway areas.

1.04 PROPERTY AND BASE FACILITY OUTSIDE CONTRACT LIMITS

- A. Do not alter condition of property or Base Facility outside contract limits.
- B. Means, methods, techniques, sequences, or procedures which may result in damage to property outside of contract limits are not permitted.
- C. Repair or replace damage to property outside contract limits to condition existing at start of the Work, or better.

1.05 GENERAL REQUIREMENTS FOR EXTERIOR WORK

- A. Obtain permits and City Engineer's approval prior to impeding or closing roadways, streets, driveways, Terminal curbsides and parking areas.
- B. Maintain emergency vehicle access to the Work and to fire hydrants, following Section 01505 - Temporary Facilities.

- C. Do not obstruct drainage ditches or inlets. When obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.
- D. Locate by Section 01726 - Base Facility Survey and protect by Section 01505 - Temporary Facilities which may exist. Repair or replace damaged systems to condition existing at start of Work, or better.
- E. Public, Temporary, and Construction Roads and Ramps:
 - 1. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of the Work.
 - 2. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment or exceptionally large or heavy trucks or equipment.
 - 3. Construct and maintain access roads and parking areas following Section 01505 - Temporary Facilities.
- F. Excavation in Streets and Driveways:
 - 1. Do not hinder or needlessly impede public travel on roadways, streets or driveways for more than two blocks at any one time, except as approved by City Engineer.
 - 2. Obtain the City Traffic Management and Maintenance Department and City Engineer's approval when the Work requires closing of off-airport roadways, streets or driveways. Do not unnecessarily impede abutting property.
 - 3. Remove surplus materials and debris and open each block for public use as work in that block is complete. Acceptance of any portion of the Work will not be based on return of street to public use.
 - 4. Provide temporary crossings, or complete work in one continuous operation. Minimize duration of obstructions and impediments at drives or entrances.
- G. Provide barricades and signs following Sections 01505 - Temporary Facilities and 01507 - Temporary Signs.
- H. Traffic Control: Follow Section 01555 - Traffic Control and Regulation.
- I. Surface Restoration:
 - 1. Restore site to condition existing before construction, following Section 01731 - Cutting and Patching, to satisfaction of City Engineer.

1.07 GENERAL REQUIREMENTS FOR INTERIOR WORK

- A. Obtain City Engineer's approval and permits prior to impeding or closing building entrances, corridors, and areas around passenger service functions (ticketing, baggage check and claim, security screening, waiting, aircraft enplaning and deplaning).
- B. Maintain emergency access to the Work and to fire hose and extinguisher cabinets, following Section 01505 - Temporary Facilities.
- C. Do not obstruct fire exits. When obstruction is unavoidable due to requirements of the Work, provide fire-retardant enclosures to maintain unimpeded flow, following Section 01505 - Temporary Facilities.
- D. Locate by Section 01726 - Cutting and Patching and protect by Section 01505 - Temporary Facilities **utility and communications or data systems** which may exist. Repair or replace damaged systems to condition existing at start of Work, or better.
- E. Provide temporary facilities and controls following Section 01505 - Temporary Facilities.
- F. Provide signs following Section 01507 - Temporary Signs.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01241
CONTRACTOR'S VALUE ENGINEERING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for Contractor proposing construction cost reductions for projects exceeding \$100,000.00 in original contract value.
 - 1. Following work is not eligible for value engineering:
 - a. Basic design of a pavement type.
 - b. Runway and taxiway lighting.
 - c. Visual aids.
 - d. Hydraulic capacity of drainage facilities.
 - e. Grade or alignment that reduces the geometric standards of the Work.
 - 2. Do not propose value engineering if resulting work will impair in any manner the essential functions or characteristics of the project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, design and safety standards, or increase contract value or time.
- B. City's procedures for review and approval of Contractor's proposals.

1.02 DEFINITIONS

- A. *Net Savings*: The difference in costs between the original contract value, as agreed by Contractor and City Engineer, for original work related to value engineering and the costs resulting from actual value-engineered work.

1.03 SUBMITTALS

- A. Five copies of Document 00931 - Request for Information specifically identified as a value engineering proposal, and including:
 - 1. Written description of both then-current contract requirements.
 - 2. Written description of proposed changes, with documentation following Section 01630 - Product Options and Substitutions.

CONTRACTOR'S VALUE ENGINEERING

3. Statement of the period of time the proposal is valid, and statement of the time by which a change order incorporating the proposal must be executed.
4. Detailed estimate of the cost of performing work under the then-current contract and under the proposed change.
5. Statement of the effect adoption of the proposal will have on the time for completion of the contract.
6. Items of work affected by the proposed changes, including quantity variation attributable to changes.

1.04 PROCEDURES FOR SUBMITTAL, REVIEW AND NOTICE OF ACCEPTANCE

- A. Prepare and submit documentation following Paragraph 1.03.
- B. Continue to perform work following then current Contract Documents during City's review.
- C. City Engineer or Designer or both will review proposals and indicate decisions thereon following Section 01630 - Product Options and Substitutions.
- D. Notice of acceptance of value engineering proposals will be made by City Engineer by issuance of an appropriate form of contract modification, including revisions to Contract Documents as required to describe changes, following Section 01255 - Modification Procedures, and specifically stating that it is executed pursuant to this Section.

1.05 COST SHARING

- A. The Contractor shall share 50 percent of City's costs of investigating value-engineering proposals, deducting that value from change orders attributable to value-engineered work.
- B. The Contractor shall share 50 percent of the value of net savings resulting from value-engineered work, creditable by change orders corresponding to the value-engineered work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01255
MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Signatories on behalf of City and Contractor.
- B. Contractor's documentation.
- C. Change Orders.
- D. Requests for Proposal.
- E. Work Change Directives.
- F. Execution of Modifications.
- G. Resolving Discrepancies.
- H. Requests for Information or Clarification.
- I. Correlation of Submittals.

1.02 SIGNATORIES

- A. Submit at the Preconstruction Conference (Section 01312 - Coordination and Meetings) a letter indicating the name and address of Contractor's personnel authorized to execute Modifications, and with responsibility for informing others in Contractor's employ or Subcontractors of same.

1.03 REFERENCES

- A. Blue Book: "Dataquest" Rental Rate Blue Book for Construction Equipment.
- B. Rental Rate: The full unadjusted base rental rate for the applicable item of equipment.

MODIFICATION PROCEDURES

1.04 CONTRACTOR'S DOCUMENTATION

- A. Maintain detailed records of changes in the Work. Provide full information required for identification and evaluation of proposed changes, and to substantiate costs of changes in the Work.
- B. Furnish sufficient data to allow City Engineer's evaluation of Contractor's responses to proposed changes.
- C. Include with each proposal the following minimum information (as applicable to form of Contract Price):
 - 1. Quantities of original Bid Schedule unit price work items (with additions, reductions, deletions, and substitutions).
 - 2. When work items are not included in Document 00410 - Bid Tabulation Form, provide unit prices for the new items, with proper supporting information.
 - 3. For Stipulated Price changes, furnish breakdown of labor, products, taxes, insurance, bonds, temporary facilities and controls as applicable, and overhead and profit.
 - 4. Justification for change, if any, in Contract Time.
 - 5. Additional data upon request.
- D. Payment for rented equipment will be made to the Contractor by actual invoice cost for the duration of time required to complete additional work. If additional work comprises only a portion of the rental invoice where the equipment would otherwise be on the site, compute the hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and one week equals 40 hours.) Operating costs shall not exceed the estimated operating costs given for the item of equipment in the Blue Book.
- E. For changes in the Work performed on a time-and-materials basis using Contractor-owned equipment, compute rates with the Blue Book as follows:
 - 1. Multiply the appropriate Rental Rate (the lowest cost combination of hourly, daily, weekly or monthly rates) by an adjustment factor of 70 percent plus the full rate shown for operating costs. Use 150 percent of the Rental Rate for double shifts (one extra shift per day) and 200 percent of the Rental Rate for more than two shifts per day. No other rate adjustments apply.
 - 2. Standby Rates: 50 percent of the appropriate Rental Rate shown in the Blue Book. Operating costs are allowed.

1.05 CHANGE ORDERS

MODIFICATION PROCEDURES

- A. Changes to Contract Price or Time are made only by execution of a Change Order.
- B. Stipulated Price Change Order: Stipulated Price Change Orders are based on an accepted Proposal/Contract Modification including the Contractor's lump sum price quotation.
- C. Unit Price Change Order:
 - 1. Where Unit Prices for the affected items of Work are included in Document 00410 - Bid Tabulation Form, Unit Price Change Orders are based on unit prices as originally bid, subject to requirements in Articles 7 and 9 of Document 00700 - General Conditions.
 - 2. Where unit prices of Work are not pre-determined in Document 00410 - Bid Tabulation Form, Request for Proposal or Work Change Directive will state the unit prices to use.
- D. Time-And-Material Change Order:
 - 1. Provide an itemized account and supporting data after completion of change, within time limits indicated for claims in Document 00700 - General Conditions.
 - 2. City Engineer will determine the change allowable in Contract Price and Contract Time following Document 00700 - General Conditions.
 - 3. For changes in the Work performed on a time-and-material basis, furnish the following in addition to information specified in Paragraph 1.04.C:
 - a. Quantities and description of products and tools.
 - b. Taxes, insurance and bonds.
 - c. Overhead and profit, following Document 00700 - General Conditions Paragraphs 7.3.2.2.6 or Document 00800 - Supplementary Conditions.
 - d. Dates and times of work performance, and by whom.
 - e. Time records and certified copies of applicable payrolls.
 - f. Invoices and receipts for products, rented tools, and Subcontracts, similarly documented.

1.06 REQUEST FOR PROPOSAL

- A. City Engineer may issue a Request for Proposal, including a detailed description of proposed changes, supported by revised Drawings and Specifications, if applicable. Prepare and submit Contractor's response to the Request for Proposal within 7 days or as specified in the request.
- B. This document does not authorize work to proceed.

MODIFICATION PROCEDURES

- C. Follow instructions on back of the Request for Proposal.

1.07 WORK CHANGE DIRECTIVE (WCD)

- A. City Engineer may issue a WCD instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. City Engineer may issue minor changes in the Work, not involving an adjustment to Contract Price or Time by using a WCD.
- C. The document will describe changes in the Work and will designate a method of determining change, if any, in Contract Price or Time. When properly executed, this document authorizes work to proceed. Follow instructions on back of the WCD.
- D. Promptly execute changes in the Work following the directions from the Work Change Directive.

1.08 RESOLVING DISCREPANCIES

- A. Complete Base Facility survey following Section 01726 - Base Facility Survey prior to preparation of submittal data and commencing main construction operations. Submit survey data of inaccessible concealed conditions as cutting and patching or demolition operations proceed.
- B. Prepare and submit a Request for Information for each separate condition with a written statement of substantive discrepancies, including specific scope, location and discrepancy discovered.
- C. Based upon the Contractor's knowledge of Base Facility conditions "as-found" and the requirements for the Work, propose graphic or written alternatives to Drawings and Specifications to correct discrepancies. Include as supplementary data to the Request for Information.
- D. Modifications due to concealed conditions are allowed only for conditions which are accessible only through cutting or demolition operations.
 - 1. No changes in the Contract Sum or Time are permitted for sight-exposed conditions or conditions visible by entry into access doors or panels and above lay-in or concealed spline acoustical ceilings, or by conditions described in Documents 00320 - Geotechnical Information or 00330 - Existing Conditions.

1.09 REQUEST FOR INFORMATION OR CLARIFICATION

- A. The Request for Information or Clarification does not authorize work that changes the Contract Price or Time.

MODIFICATION PROCEDURES

- B. Request clarification of Contract Documents or other information by using the Request for Information or Clarification.
 - 1. If additional work is required, then the requirement will be requested by the City Engineer's issuance of a Request for Information or Clarification; Request for Proposal; Work Change Directive.
 - 2. This document does not authorize work to proceed.
- C. Changes may be proposed by the Contractor only by submitting a Request for Information following Paragraph 1.08.
- D. The City Engineer may issue minor changes in the Work, not involving an adjustment to Contract Price or Time using a Request for Information or Clarification and following Document 00700 - General Conditions.
- E. Follow directions on back of the Request for Information or Clarification.

1.10 CORRELATION OF SUBMITTALS

- A. For Stipulated Price Contracts, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price, following Section 01290 - Payment Procedures.
- B. For Unit Price Contracts, revise the next monthly estimate of work after acceptance of a Change Order to include new items not previously included and the appropriate unit rates.
- C. Promptly revise progress schedules to reflect any change in Contract Time, revise schedules to adjust time for other items of work affected by the change and resubmit for review following Section 01325 - Construction Schedules.
- D. Promptly record changes on record documents following Section 01770 - Contract Closeout.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

MODIFICATION PROCEDURES

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

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.
- B. Measurement by Volume:

MEASUREMENT AND PAYMENT

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 designation 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.

MEASUREMENT AND PAYMENT

- 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 PRODUCT

- 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 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01290
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Schedule of Values.
- B. Billing forecast.
- C. Value/ time log.
- D. Expenditure of Cash Allowances.
- E. Applications for Payment.
- F. Payment for mobilization work.
- G. Final payment.

1.02 DEFINITIONS

- A. *Schedule of Values*: Itemized list, prepared by the Contractor, establishing the value of each part of the Work for a Stipulated Price contract, or for Major Stipulated Price items for a Unit Price contract. The Schedule of Values is the basis for preparing applications for payment. Quantities and unit prices may be included in the schedule when approved or required by City Engineer.
- B. *Major Stipulated Price Item*: Item listed in Document 00410 - Bid Tabulation Form which qualifies as Major Unit Price Work following Document 00700 - General Conditions Paragraph 9.1.5.

1.03 SUBMITTALS

- A. The Contractor must utilize, a web-based system run by the Houston Airport System, to submit Invoices. Before doing so, the Contractor must attend a brief mandatory training session, which will be conducted by a member of HAS. The Contractor must contact the designated HAS trainer prior to the start of construction to schedule a time for training. Access to will not be given to the Contractor's team until training is completed. All document collaboration will be done using a web-based system.

PAYMENT PROCEDURES

- B. Submit electronic version in native format of preliminary Schedule of Values at the Preconstruction Conference (Section 01312 - Coordination and Meetings). Submit electronic copy in native format of final and updated Schedule of Values with each copy of Application for Payment.
- C. Submit electronic version in native format of Billing Forecast and Value/Time Log at first Progress Meeting (Section 01312 - Coordination and Meetings). Obtain approval before making first application for payment. Coordinate this submittal with Master Schedule specified in Section 01325 - Construction Schedules.
- D. Produce electronic document for Billing Forecast and Value/Time Log on 8 1/2 by 11-inch white bond paper.

1.04 SCHEDULE OF VALUES

- A. Prepare Schedule of Values as follows:
 - 1. Prior to the submission of the initial Application for Payment, Contractor shall obtain Project Manager approval for the format and content of the schedule of values for all invoices including the grouping of costs along the lines of specific equipment, asset or deliverable produced as a result of the work performed.
 - 2. For Stipulated Price contracts, use the Table of Contents of the Project Manual as the outline for listing the value of work by Sections.
 - 3. For Unit Price contracts, use Document 00410 as the outline. Include a proportional share of Contractor's overhead and profit in each Unit Price item so the sum of all items equals the Contract Price.
 - 4. List mobilization, bonds, insurance, accepted Alternates and Cash Allowances as separate items.
- B. Round off values for each item to the nearest \$100.00, except for the value of one item of the Contractor's choice, if necessary, to make the total of all items in the Schedule of Values equal the Contract Price.
- C. At direction of City Engineer revise the Schedule of Values and resubmit for items affected by Modifications, at least 10 days prior to submitting the next Application for Payment. List each Change Order as a separate item.

1.05 BILLING FORECAST

Prepare an electronic graphic or tabular Billing Forecast of estimated monthly applications for payment for the Work.

- A. This information is not required in the monthly updates, unless significant changes in work require resubmittal of the schedule. Allocate the units indicated in the bid schedule or the schedule of values to Construction Schedule activities (weighted allocations are acceptable, where appropriate). Spread the dollar value associated with each allocated unit across the duration of the activity on a monthly basis. Indicate the total for each month and cumulative total.
- B. Billing forecast is only for planning purposes of City Engineer. Monthly payments for actual work completed will be made by City Engineer following Document 00700 - General Conditions.

1.06 VALUE/ TIME LOG

Prepare an electronic Value/ Time Log as a slope chart, showing:

- A. Original Contract Time/ Modified Contract Time: x coordinate, in weeks.
- B. Original Contract Value/ Modified Contract Value: y coordinate, in thousands of dollars.

1.07 EXPENDITURE OF CASH ALLOWANCES

- A. Verify with City Engineer that work and payment requested is covered by Cash Allowance.
- B. Prepare electronic version of Document 00685 - Request for Information following Section 01726 - Base Facility Survey, include following minimum data to support Contractor's request for expenditure of Cash Allowances listed in Section 01210 - Cash Allowances, and process in a timely manner to allow detailed review by City Engineer:
 - 1. Statement of fact indicating reason(s) expenditure is required. Include photographs or video following Section 01321 - Construction Photographs documenting existing conditions.
 - 2. Quantity survey, made from on-site measurements, of quantity and type of work required to properly complete work.
 - 3. Cost of work, including detailed proposals from trade(s) responsible. For work governed by unit prices, applying unit prices following this Section.
 - 4. Trade(s) responsible for corrective work.
 - 5. Change in Contract Time.
 - 6. Administrative data, including contract name and number, and Contractor's name.
- C. Do not commence affected work without written authorization.

PAYMENT PROCEDURES

- D. Process approved expenditures following Section 01255 - Modification Procedures and Application for Payment process below.

1.08 APPLICATIONS FOR PAYMENT

- A. Submit each Application for Payment following Document 00700 and as directed via SharePoint which utilizes an electronic version of the American Institute of Architects Document G702 including G703 continuation sheets.

1.09 PAYMENT FOR MOBILIZATION WORK

- A. Measurement for mobilization is on a lump sum basis if included as a unit price in Document 00410.

- B. Mobilization payments paid upon application by Contractor subject to:

- 1. Authorization for payment of 50 percent of the contract price for mobilization will be made upon receipt and approval by City Engineer of the following submittal items, as applicable:

- a. Schedule of values.
- b. Trench safety program.
- c. Construction schedule.
- d. Photographs.
- e. Submit QC Program

- C. Authorization for payment of the remaining 50 percent of the Contract Price for mobilization will be made upon completion of Work amounting to 5 percent of the Contract Price less the mobilization unit price.

- D. Mobilization payments are subject to retainage amounts stipulated in the Document 00700.

1.10 FINAL PAYMENT

- A. When Contractor considers the Work is complete, submit written certification that:

- 1. Work is fully inspected by the Contractor for compliance with Contract Documents.
- 2. Work follows the Contract Documents, and deficiencies noted on the Punch List are corrected.

PAYMENT PROCEDURES

3. Products are tested, demonstrated and operational.
 4. Work is complete and ready for final inspection.
- B. In addition to submittals required by Document 00700 and other Sections:
1. Furnish submittals required by governing authorities, such as Certificate of Occupancy and Certificates of Inspection.
 2. Submit a final statement of accounting giving total adjusted Contract Price, previous payments, and sum remaining due (final Application for Payment).
- C. When the Work is accepted, and final submittals are complete, a final Certificate for Payment will be issued.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01292
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation and submittal of Schedule of Values for Stipulated Price Contracts or for Major Unit Price Work on Unit Price Contracts.

2.01 PREPARATION

- A. For Stipulated Price Contracts, subdivide the Schedule of Values into logical portions of the Work, such as major work items or work in contiguous construction areas. Use Section 01325 • Construction Schedule as a guide to subdivision of work items. Directly correlate Items in the Schedule of Values with tasks in the Construction Schedule. Organize each portion using the Project Manual Table of Contents as an outline for listing value of the Work by Sections. A pro rata share of mobilization, Bonds, and insurance may be listed as separate items for each portion of the Work.
- B. For Unit Price Contracts, items should include a proportional share of Contractor's overhead and profit so that total of all items will equal Contract Price.
- C. For lump sum equipment items, where submittal of operation and maintenance data and testing are required, include separate items for equipment operation and maintenance data where:
 - 1. submittal of maintenance data is valued at five percent of the lump sum amount for each equipment item and
 - 2. submittal for testing and adjusting is valued at five percent of the lump sum amount for each equipment item.

Round off figures for each item listed to the nearest \$100. Set the value of one item, when necessary, to make total of all values equal the Contract Price for Stipulated Price Contracts or the lump sum amount for Unit Price Work.

3.01 SUBMITTAL

- A. Submit the Schedule of Values, in accordance with requirements of Section 01330 - Submittal Procedures, at least 10 days prior to processing of the first Certificate for Payment.

SCHEDULE OF VALUES

- B Submit the Schedule of Values in an approved electronic spreadsheet file and an 8 1/2•inch by 11•inch print on white bond paper.
- C. Revise Schedule of Values for items affected by Contract Modifications. After City Engineer has reviewed changes, resubmit at least 10 days prior to the next scheduled Certificate for Payment date.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SCHEDULE OF VALUES

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SECTION 01312

COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General coordination is required throughout the documents and the Work. Refer to all of the Contract Documents and coordinate as required to maintain communications between Contractor, City and Designer; Subcontractors and Suppliers. Assist City with communications between Contractor and City's separate contractors.
- B. Preconstruction conference.
- C. Progress meetings.
- C. Daily briefings.

1.02 SUBMITTALS

In addition to submittals related to meetings and described elsewhere in this Section, see following Sections for submittals prepared under those Sections, but submitted under this Section:

- A. Section 01255 - Modification Procedures: Individual authorized to execute Modifications.
- B. Section 01506 - Temporary Controls: "Airport Construction Control Plans", containing submittals prepared under Section 01506 and other Sections referenced therein.

1.03 RESPONSIBILITIES FOR MEETINGS

- A. City Engineer may act directly or through designated representatives identified by name at the Preconstruction Conference, and will schedule, chair, prepare agenda, record and distribute minutes and provide facilities for conferences and meetings.
- B. Contractor:
 - 1. Present status information and submittal data for applicable items.
 - 2. Record and distribute Contractor's corrections to meeting minutes.
 - 3. Provide submittal data for attendees. Prepare, reproduce and issue Contractor's documents to support conferences and meetings. Issue typically as part of each session unless more frequent publication is necessary. Issue one copy to each conference attendee, and to others as directed by City Engineer and as required by Contractor.
 - a. Transmit documents requiring urgent action by email or messenger.

COORDINATION AND MEETINGS

- b. Provide electronic and/or hard copies as required to properly document the project or project actions. The Contractor shall coordinate the submittal format with the City Engineer.
- c. Initiate and provide facilities for Coordination Meetings as required in 1.04. H.1.
- d. Costs for documentation are the Contractor's responsibility.

1.04 CONTRACTOR COORDINATION

- A. Coordinate scheduling, submittals, and work of Sections to achieve efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify characteristics of products are compatible with existing or planned construction. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing products in service.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. Conceal pipes, ducts, wiring and fasteners in finished areas, except as otherwise indicated. Coordinate locations of fixtures and outlets with finish elements. Locate work requiring accessibility to coordinate with existing access panels and doors.
- E. Coordinate completion and clean up of work for Substantial Completion and for portions of the Work designated for partial occupancy.
- F. Coordinate access to site and within the work area(s) for correction of nonconforming work. Minimize disruption of occupants' activities where work areas are occupied.
- G. Do not proceed with affected work until discrepancies in contract requirements are resolved and unsatisfactory substrate and site conditions are corrected.
- H. Coordination Drawings: Before materials are fabricated or Work begun, prepare coordination Drawings including plans, elevations, sections, and other details as required to clearly define relationships between sleeves, piping, ductwork, conduit, ceiling grid, lighting, fire sprinkler, HVAC equipment and other mechanical, plumbing and electrical equipment with other components of the building such as beams, columns, ceilings, and walls.
 - 1. Hold Coordination Meetings with trades providing the above Work, to coordinate Work of the trades for each floor and mechanical areas.
 - 2. Prepare coordination Drawings to 1/4" = 1'-0" scale for general layout and 3/8" = 1' -0" for plans and sections in congested areas such as equipment spaces.
 - 3. Resolve conflicts between trades, prepare composite coordination Drawings and obtain

COORDINATION AND MEETINGS

signatures on original composite coordination Drawings.

4. When conflicts cannot be resolved, Contractor shall request clarification prior to proceeding with that portion of the Work affected by such conflicts or discrepancies. Prepare interference Drawings to scale and include plans, elevations, sections, and other details as required to clearly define the conflict between the various systems and other components of the building such as beams, columns, and walls, and to indicate the Contractor's proposed solution.
5. Submit Drawings for approval whenever job measurements and an analysis of the Drawings and Specifications by the Contractor indicate that the various systems cannot be installed without significant deviation from the intent of the Contract. When such an interference is encountered, cease Work in the general areas of the conflict until a solution to the question has been approved by the project Architect/Engineer.
6. Submit original composite coordination Drawings as part of record document submittals specified in Section 01770.

1.05 PRECONSTRUCTION CONFERENCE

- A. Attendance Required: City Engineer's representatives, Construction Manager (when so employed), Designer(s), Contractor, Contractor's Superintendent, and major Subcontractors.
- B. Submittals for review and discussion at this conference:
 1. Draft Schedule of Values, following Section 01290 - Payment Procedures.
 2. Bound draft of Airport Construction Plans, following Sections 01506 - Temporary Controls and 01555 - Traffic Control and Regulation.
 3. Draft construction schedule(s), following Section 01325 - Construction Schedules.
 4. Draft Submittal Schedule, following Sections 01325 - Construction Schedules and 01340 - Shop Drawings, Product Data and Samples.
- C. Agenda:
 1. Status of governing agency permits.
 2. Procedures and processing of:
 - a. Submittals (Section 01340 - Shop Drawings, Product Data and Samples).
 - b. Permitted substitutions (Section 01630 - Product Options and Substitutions).
 - c. Applications for payment (Section 01290 - Payment Procedures).
 - d. Document 00685- Request for Information.

COORDINATION AND MEETINGS

- e. Modifications Procedures (Section 01255 - Modification Procedures).
 - f. Contract closeout (Section 01770 - Contract Closeout).
3. Scheduling of the Work and coordination with other contractors (Sections 01325 - Construction Schedules, 01326 - Construction Sequencing and this Section).
 4. Agenda items for Site Mobilization Conference, if any, and Progress Meetings.
 5. Procedures for Daily Briefings, when applicable.
 6. Procedures for City's acceptance testing (Sections 01450 - Contractor's Quality Control, 01455 - City's Acceptance Testing, 01241 - Contractor's Value Engineering, and 01457 - Estimating Percentage of Product Within Specification Limits).
 7. Record documents procedures (Section 01770 - Contract Closeout).
 8. Finalization of Contractor's field office and storage locations (Section 01505 - Temporary Facilities).
 9. Use of premises by City and Contractor (Section 01145 - Use of Premises).
 10. Status of surveys (01726 - Base Facility Survey).
 11. Review of temporary controls and traffic control (Sections 01506 - Temporary Controls and 01555 - Traffic Control and Regulation).
 12. Construction controls provided by City.
 13. Temporary utilities and environmental systems (Section 01505 - Temporary Facilities).
 14. Housekeeping procedures (Section 01505 - Temporary Facilities).

1.06 PROGRESS MEETINGS

- A. City Engineer will hold Progress Meetings weekly, or at other frequency determined by progress of the Work, at Department of Aviation office at

111 Standifer Street (at George Bush Intercontinental Airport/ Houston), Houston, Texas
77338 (281) 233-3000.
- B. Attendance Required: Contractor's Superintendent, major Subcontractors' and Suppliers' superintendents, City Engineer representatives, and Designer(s), as appropriate to agenda topics for each meeting.
- C. Submittals for review and discussion at this conference:
 1. Project schedule (Section 01325 - Construction Schedules).

COORDINATION AND MEETINGS

2. Submittal Log (Section 01340 - Shop Drawings, Product Data and Samples).
3. Log of Document 00685 - Request for Information.

D. Agenda:

1. Review minutes of previous meetings to note corrections and to conclude unfinished topics.
2. Review of: progress schedule; coordination issues if any; corrective measures if any to regain planned progress; planned progress during succeeding work period; off-site fabrication and product delivery schedules.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress and Contractor's proposals for resolution.
5. Review of submittals schedule and status of submittals.
6. Review of RFI status.
7. Review of Request for Proposal, Work Change Directive and Change Order status.
8. Closings and impediments (Section 01145 - Contractor's Use of Premises).
9. Maintenance of quality and work standards (Sections 01450 - Contractor's Quality Control and 01455 - City's Acceptance Testing).
10. Effect of proposed changes on progress schedule and coordination.
11. Other items affecting completion of the Work within contracted cost and time.

1.07 DAILY BRIEFINGS

- A. In addition to Progress Meetings, hold briefings as frequently as required, at place designated by the City Engineer, to coordinate details of construction and airport operations. Discuss specific requirements, procedures and schedule changes, and closures and impediments.
- B. When required, hold briefing before start of work each day, to confirm that required activities are properly allocated and unchanged.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

COORDINATION AND MEETINGS

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SECTION 01321

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Progress photographs to supplement Applications for Payment.
- B. Detail photographs and video to supplement Request for Information.

1.02 MEASUREMENT AND PAYMENT

- A. Cost of photographs is incidental to the Contract Price. No additional costs will be paid for other than administrative costs of extra copies and photographs resulting from additional station points.
- B. Following work will be paid on a Unit Price basis:
 - 1. Extra Prints: Per print.
 - a. Extra prints provided direct from the photographer to parties authorized by the City Engineer up to date of Substantial Completion, priced at prevailing local commercial rates. Include photographer's costs and Contractor's administrative costs only.
 - b. Extra prints provided direct from the photographer to the City Engineer up to 3 years after the date of Substantial Completion, priced at prevailing local commercial rates. Include photographer's costs but not Contractor's costs for this service.
 - 2. Additional Station Points: Per stationpoint, for photographs made during same trips as Paragraph 2.01.
- C. Emergencies: Per trip to site. Take additional photographs or video, as appropriate to conditions, within 24 hours of the City Engineer's request. This applies to professional photography required by conditions stated in Paragraph 8.2.1 in Document 00700 - General Conditions.
- D. Following photography will be commissioned by Modification: Publicity photographs; special events at site; photographs taken at fabrication locations off-site.

1.03 SUBMITTALS

- A. Station point Plan: One copy of the Site Plan, marked to show plan, altitude and cone-of-view of each stationpoint selected by the City Engineer or Designer. Submit at least 10 days prior to taking Preconstruction Photographs.

CONSTRUCTION PHOTOGRAPHS

- B. Preconstruction Photographs: Same as Paragraph B., except one-time only, and marked as such.
- C. Progress Photographs: 3 prints (or digital copies) on approved media of each view. Submit 2 prints and 1 color aerial photograph of the project site (or digital copies) with each Application for Payment. Retain 1 print (or digital copy) by the Contractor at the work site and available at all times for reference. Retain photographic digital files, at the photographer's office, for 3 years after Substantial Completion.
- D. Photographs and Video Supporting RFI: Identify following with RFI number and date of photographs:
 - 1. Submit 1 copy of 3x5 inch prints on white card stock in clear plastic sleeves.
 - 2. Submit video on CD's or other approved media. Include video identification number, date of record, approximate location, and brief description of record.
- E. Contract Closeout: Follow Section 01770, Contract Closeout to:
 - 1. Return electronic copies of RFI photographs and video on CD's or other approved media device, identified by Project name, Contractor, and date photographs were taken.
 - 2. Return video on CD's or other approved media device, identified with contents, by RFI number, and each CD or other approved media device numbered sequentially and with "Date From/ To" on each.
- F. Aerial Progress Photographs: Submit 5 prints and 1 CD of 2 consistent oblique views with each Application for Payment. Retain 1 print by the contractor at the work site and available at all times for reference. The photos shall be large format oblique angles taken from a height and viewpoint to be selected by the City Engineer.

1.04 QUALITY ASSURANCE

- A. Timely take and produce photographs from proper station points and provide proper image quality.
- B. Cooperate with the photographer's work. Provide reasonable auxiliary services as requested, including access and use of temporary facilities including temporary lighting.
- C. Qualifications of Photographer for General Progress Photographs: A firm or individual of established reputation regularly engaged as a professional building or scene photographer for not less than 3 years.
- D. Qualifications of Photographer for RFI Photographs and Video: An employee of the Contractor knowledgeable in photography and videotaping technique, including proper use

CONSTRUCTION PHOTOGRAPHS

of video pan-zoom, close-ups, lighting, audio control, clear narrative, smooth transition between subjects, and steady camera support.

- E. Qualifications of Aerial Photographer: A firm or individual of established reputation, regularly engaged in aerial photography with prior experience at IAH.

PART 2 PRODUCTS

2.01 MEDIA

- A. Fixed-Film: 35mm color print film or color slide film, as determined by City Engineer; ASA 100 minimum, higher when required by lighting conditions.
- B. Paper Prints:
 - 1. For Progress Photographs: 8x10 inch matte-finish color, in clear plastic envelop with reinforced 3-ring binding.
 - 2. For RFI Photographs: 3x5 inch minimum size, matte-finish color, contact-mounted on flexible white paper card stock in clear plastic envelop with reinforced 3-ring binding.
- C. Video: Approved playable PC digital format; record at slowest speed or speed capable of freezing a clear image on "Pause"; date and time stamp as part of recording process. Use audio function for slate data below.
 - 1. Provide color playback equipment at Contractor's site office, with minimum 13-inch (diagonal) screen size.
- D. Bitmapped (Digital) Images: TIFF, JPG, PNG, GIF, JPEG, BMP, TGA, or TIFF format, maximum 1280x480 and minimum 480x480 pixels, digitally date and time stamped.

2.02 PRECONSTRUCTION, PROGRESS AND RFI PHOTOGRAPHS

- A. Preconstruction Photographs: Prior to beginning on-site construction, take five sets of fixed-film photographs of the project area from approved stationpoints. Show condition of existing site area, and particular features as directed, within contract limits.
 - 1. At exterior views, surrounding situs, showing streets, curbs, esplanades, landscaping, runway, taxiway and apron pavement.
 - 2. At interior views, surrounding situs, showing floors, walls, ceilings and architectural signs.
 - 3. Take pan-view photographs as required to encompass existing conditions.

- B. Progress Photographs for Applications for Payment: Take 3 fixed-film photographs from each of 2 station-points (same station points each time to show a time-lapse sequence), coinciding with the cutoff date associated with each application for payment, and at Substantial Completion of each stage of the Work.
- C. Photographs and Video for Request for Information: Take photographs and video as required to support Document 00685, Request for Information:
 - 1. Details of existing conditions before construction begins.
 - 2. Details of construction.
 - 3. Details of damage or deficiencies in existing construction and work of separate contractors.
 - 4. Take number of images as required to fully show conditions.

PART 3 EXECUTION

3.01 GENERAL

- A. Do not record over previous video records.
- B. Provide clear, sharp, vibration-less video data and clear audio without detrimental background noise.

END OF SECTION

SECTION 01325
CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.
- C. City of Houston (City) Policies, Standards and Procedures, as applicable.

2.01 SECTION INCLUDES

- A. Project Schedules and Progress Reporting
- B. Construction Sequencing and Phasing

3.01 DEFINITIONS

- A. Contractor: With respect to the Division 01 requirements, the entity contracted by the City to deliver the preconstruction and construction services defined in the Contract Documents.
- B. Design Consultant - Person or firm and its authorized representatives, under contract with the City, to provide professional services during pre-construction and construction.
- C. Project Scheduling Techniques
 - 1. CPM: Critical Path Method
 - 2. PDM: Precedence Diagramming Method
- D. Section Definitions
 - 1. **Activity:** A discrete element of Work or task performed during the course of the Project. Each schedule activity shall be clearly defined depicting duration, start and finish dates, logic links to predecessor and successor activities and supported by defined resources where applicable. The activities shall be detailed in such a way,

CONSTRUCTION SCHEDULES

- that they shall support the planning and measurement of physical percent complete for the purposes of Earned Value Management reporting.
2. **Baseline Schedule:** The schedule prepared by the Contractor and approved by the City which is the basis for representing the full scope of Work, the time scales and phasing for delivery, providing a means against which progress can be determined.
 3. **Commissioning and Integration Testing Schedule:** Activities contained within the Project Schedule depicting startup, testing and commissioning phase of the Project, including activities associated with the transition to revenue service and required for achievement of Final Acceptance.
 4. **Constraint:** Scheduling restriction imposed on start or finish of an activity. A constraint restricts the movement of an activity based on the type of constraint and the date used and may override the logic relationship also assigned to the activity.
 5. **Construction Schedule:** Activities within the Project Schedule which depicts the construction activities performed or to be performed by the Contractor as a part of the Project.
 6. **Contractor's Project Management Plan:** A formal document prepared by the Contractor and approved by the City which describes how the Project will be planned and progressed and delivered by the Contractor and the necessary reviews and acceptances by the City.
 7. **Cost Breakdown Structure:** The breakdown structure the Contractor shall use to distribute contract costs in the various estimates, Schedule of Values and in alignment to the Work Breakdown Structure.
 8. **Critical Path Method (CPM):** Scheduling technique utilizing activities, durations, and interrelationships/dependencies (logic), such that activities are interrelated with logic ties from the beginning of Project to Final Acceptance.
 9. **Data Date:** Date when the status of schedule activities is determined for a Monthly Progress Schedule report. Any data prior to the Data Date is considered historical information and data after is the forecast of remaining work.
 10. **Design Schedule:** Activities within the Project Schedule which includes the design activities of the Project. The Design Schedule shall demonstrate the interdependence between design activities and the Owner's requirements. The Design Schedule shall also demonstrate the relationships between design activities and the requirements to successfully deliver the activities within the Construction Schedule.
 11. **Float:** The term "float" shall refer to "end float", also called "terminal float" End or terminal float is the period by which the finish of the longest path through a schedule

CONSTRUCTION SCHEDULES

- (the critical path) can be delayed, brought forward, or extended without affecting the completion date.
12. **Float Suppression:** Any technique that causes an activity to show less float, including but not limited to, as late as possible constraints and unnecessary lags.
 13. **Fragnet:** A group of interrelated activities taken from or to be added to a Schedule that can stand on their own representing only a portion of a CPM schedule. For example, a Fragnet can be used to portray a scope of work being added to, or changed from, a Project Schedule.
 14. **Key Plans:** Graphic representations on prints of Contract Documents of Contractor's planned breakdown of Project for scheduling purposes. Key plans shall clearly define boundaries of work for each designated segment, locations, and sub-locations. Alphanumeric codes on plans shall match code values for activity code designation in the Project Schedule.
 15. **Lag:** Time that an activity follows or is offset from the start or finish of its predecessor.
 16. **Materials Plan:** A plan for purchase, fabrication, delivery, storage and issuing of materials and products to the Project which must be integrated into the Project Schedule.
 17. **Look-Ahead Schedule:** An element schedule prepared by the Contractor detailing the status of the work as of the Progress Date and Contractor's plan for executing the remaining work before recalculation and/or re-sequencing.
 18. **Longest Path:** The Longest Path is the Path through a Project network from start to finish where the total duration is longer than any other path. The Longest Path is determined by the string of activities, relationships that push the Project to its latest early finish dates.
 19. **Monthly Progress Schedules:** The updates to the Project Schedules prepared by Contractor and submitted to the City on a monthly basis with the Application for Payment. There are two versions of Monthly Progress Schedules submitted; a Progress Only (PO) version and a Contractor Adjusted (CA) version.
 20. **Preconstruction Schedule:** An element of the Project Schedule prepared by the Contractor which includes activities prior to approval to proceed with construction activities.
 21. **Project Schedule:** A CPM Schedule prepared by the Contractor that includes all elements of the Scope of Work of the Contract. The Project Schedule clearly identifies all relationships that exist within the Scope of Work. The Project Schedule

CONSTRUCTION SCHEDULES

- communicates the sequencing of the multiple phases of work. The Project Schedule identifies interfaces, both internal and external to the Scope of Work of the Contract. The Project Schedule encompasses the Baseline Schedule, Look Ahead Schedules, Delivery Phase Schedules (Design, Procurement, Detailing, Fabrication, Shipment, Installation, Construction, Startup, Testing and Commissioning), updated or revised Baseline Schedules. The Project Schedule also includes Monthly Progress Schedules, Proposed Schedules, Schedule Fragnets, Recovery Schedules.
22. **Program Schedule:** When multiple Projects are logically linked into a Program, the Program Schedule is prepared by the City and incorporates all the interrelated projects by combining the individual Project Schedules. Project Schedules become element schedules of the Program Schedule.
 23. **Proposed or Preliminary Schedule:** A schedule prepared by Contractor, prior to approval of the schedule by the City and subsequent incorporation into the Project Schedule. Also referred to as Draft or Initial Schedule.
 24. **Recovery Schedule:** A schedule prepared by the Contractor and to be approved by the City which details the Contractor's plan for recovery of time lost on the Project and associated costs.
 25. **Revised Baseline Schedule:** A revision to the Baseline Schedule that is necessitated to accurately reflect a significant change in scope or phasing of the scheduled Activities. The Baseline Schedule shall not be revised without prior approval by the City.
 26. **Status Data Date:** The "as-of" date up to which all progress has been updated and reflected in the Status report. The Status Data Date is also the date from which a Look-ahead Schedule predicts future activities and progress.
 27. **Submittal Schedule:** A register (list) of the Submittals to be made for materials, products, shop drawings, plans which is prepared by the Contractor and includes durations needed for submittal, reviews and processing. The dates and durations are to be coordinated with the associated activities within the Project Schedule.
 28. **Delay Analysis:** Technique that demonstrates comparison of time impact for each schedule revision or proposed revision against the current Project Schedule. Methodology shall follow Association for the Advancement of Cost Engineering International (AACEI) Delay Analysis as applied in Construction (Recommended Practice No. 52R-06.) as a guideline or method submitted by the Contractor and approved by the PMT.
 29. **Work Breakdown Structure (WBS):** A deliverable-oriented breakdown of a project into decreasingly smaller components, also described as a hierarchical decomposition of the project team's work into manageable sections.

CONSTRUCTION SCHEDULES

30. **Working Day:** Day scheduled for active execution of Work in the Project Schedule Calendar in accordance with the Contract and as approved by the City.

4.01 SUMMARY

A. Acceptance of Schedule Requirements by Contractor

1. The Contractor accepts the responsibility to complete the project on time as called for in the contract.

B. Schedule Requirements

1. The Contractor is responsible for determining the sequence of activities, the time estimates for the detailed construction activities and the means, methods, techniques and procedures to be employed. The Project Schedule shall represent the Contractor's plan of how it will prosecute the Work in compliance with the Contract requirements. Contractor shall ensure that the Project Schedule is current and accurate and is properly and timely monitored, updated and revised as Project conditions may require and as required by the Contract Documents. Unless the context indicates otherwise, the term "schedule" used herein will be read to include updated schedules.

2. Schedules shall contain logic and necessary components to perform Critical Path Method (CPM) network analysis. Contractor's schedule shall also be able to illustrate Precedence Diagramming Method (PDM).

3. Contractor shall include in the Project schedule contractual milestones and all interface points with City, Design Consultant(s), Subcontractors, Suppliers, and other Contractors. These points shall be in the form of Start Milestones for deliverables due to the Contractor from others, and as Finish Milestones for deliverables that Contractor must supply to City, Design Consultant(s), Subcontractors, Suppliers and other Contractors. Finish milestones must be determinate by predecessor activity, not by constrain.

4. Schedule shall contain activities for preparation and approval of contractor's design and submittal deliverables. Procurement, fabrication and delivery of mayor materials and long lead items. Obtain permits and construction activities.

5. Contractor shall allocate duration uncertainty to the scheduled activities within the contract schedule to enable a Quantitative Schedule Risk Analysis (QSRA) to be performed by the Program Management Team. Duration uncertainty (minimum duration, maximum duration, most likely duration) according to the relevant risk exposure shall be captured by the contractor against the scheduled activities. The PMT must rely on the data being supplied by the Contractor and incorporated and updated in line with the monthly schedule update process.

6. Contractor shall utilize the most current version of Primavera P6 (15.1 or Later) for all schedules governed by these provisions.
7. The Contractor is responsible for assigning appropriate material, equipment and labor resource loading of the key quantities necessary to execute the activity. This will demonstrate realistic productivity rates as well as measure and report Key Performance Indicators (KPIs).
8. The City Engineer reserves the right to reject any schedule or report that fails to realistically or satisfactorily reflect completion of the Project scope of work or any agreed intermediate milestone. Failure of the Contractor to deliver satisfactory schedules or reports as required in the Contract Documents may result in actions by the City General Conditions.
9. The schedule shall show all activities in Work Days, with allowance for holidays or other periods when work is not permitted to be performed.
10. Detailed schedule requirements shall be contained within the City Policies, Standards and Procedures).
11. Contractor shall prepare schedules which assure that all work sequences are logical, and the network shows a coordinated plan for complete performance of the Work. Failure of the Contractor to include any element of work required for performance of the Contract in the network shall not excuse the Contractor from completing all Work within the Contract Time.
12. Contractor must have an approved workhour plan as noted in the approved Work Authorization Notification (WAN) prior to commencing work on the project site. Changes to the approved work-hours plan shall require 48-hour written notice and subsequent written approval by the City.

5.01 SUBMITTAL REQUIREMENTS

The Contractor must utilize the City's web-based application management system for submittals. The Project Manager will coordinate training and access to the web-based application management system. The submittal processes are further defined in Section 01330 Submittal Procedures and in the City Policies, Standards and Procedures, as applicable.

- A. In addition to the PDF versions of the schedule required in this Section, submit one electronic copy of schedule in Primavera compressed format (.XER). Filename shall have a unique identifier and shall include a sequential number for each monthly update. PDF prints and reports shall be generated from same version of the Schedule that is provided in electronic form.
- B. Submittal of Contractor Schedules

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1. Submit Preconstruction Schedule for approval within 30 days of NTP for Preconstruction Services
2. Submit the initial proposed Project Schedule for approval as a Baseline Schedule within 30 days of NTP for Construction Services.
3. Submit Monthly Progress Schedule and Narrative no later than 12:00 noon (local time) on the Wednesday before the last Friday of the month. The Data Date for the Monthly Progress is 00:00 hours on the Saturday following the last Friday of the Month. The Monthly Progress Schedule is required for each Application for Payment. Contractor may request to meet with the City prior to the submittal of the Monthly Progress Schedule and Application for Payment to resolve issues prior to submittal.
4. The weekly 3 weeks Look-Ahead Schedule shall be submitted every Tuesday at 08:00 hours with the previous week's progress updated. The Status Date of the Look-Ahead Schedule shall be the previous Saturday at 00:00 hours, progressed weekly.
5. Submit Delay Analysis per the ACEI recommended practice 52R-06 as follows:
 - a. Within ten work days after receipt of written change modification.
 - b. Within ten work days after receipt of written notice by City.
 - c. Within ten work days from beginning of delay caused by unforeseeable circumstances.
6. Submit Recovery Schedule following the event of a forecast delay. Contractor shall submit a Recovery Schedule within the 21 calendar days of Contractor receiving City's written request that is resource and cost justified indicating how the Contractor will recoup the impacted contract time.
7. Submit an As-Built Schedule within 30 work days after the City's Final Acceptance of the Work.
8. Submit a Submittal Log as a supplement documents for Monthly Progress Schedule, showing all submittals for products, materials, plans, and shop drawings, RFI's and administrative submittals required per the Technical Specifications including associated Specification Section numbers and headings.
 - a. Include durations and dates for processing by Reviewers and/or other parties as required. Indicate submittals requiring special processing such as short-duration reviews.
 - b. The Contractor shall coordinate packaging of individual submittals in a logical and organized fashion so that they may be reviewed in part or in whole with related

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elements of work with the Reviewers.

- c. Include durations and dates based on frequency of Contractor's submittals to City for items such as of administrative submittals such as Applications for Payment, Labor Reports, Safety Reports, MWBE Reports.

6.01 SCHEDULE CONTROL PROCEDURES AND QUALITY ASSURANCE

A. Control Procedures

1. Procedures for schedule control shall be included in the Contractor's Project Management Plan as part of the plan implementation and reporting requirements. Prior to submission of Monthly Progress Schedule contractor should call for scheduling workshop with Houston Airports to propose schedule changes to remove out of sequence logic and to present accurate critical path. Allowed changes are only for removing or adding logic links. Changes in original durations, resources etc. are not permitted. After approval of schedule changes contractor can proceed with Monthly Progress Schedule submission. All changes must be recorded in schedule change control log and submitted as supplementary document in Monthly progress report.
2. If any in-progress activity is delayed for any reason, that activity will be split to track the reason for the delay. A separate activity for the delay will be created and placed in between the split.
3. Procedures for preparing and monitoring the Project Schedule and other required reporting.,
4. Procedures for performing quality oversight of the schedule review/forecast.
5. Earned Valued Methodology Procedures shall be implemented for performance measurement using data from the schedule to provide an effective means of comparing Work scheduled/planned versus Work performed. Please see Section 0 Section 01 32 16, 1.3.D1.Provide, as a minimum, a continuous review of actual progress against the most recent Project Schedule. This is to assure that revised resource allocation and/or other corrective action can be considered and undertaken proactively and as early as possible.

B. Qualifications of Contractor's Scheduler

1. Contractor shall have within its employ or under separate Contract, throughout the execution of the Work under this Contract, such expertise in CPM scheduling and P6 software so as to insure its effective and efficient performance under this Specification. It shall be the responsibility of the Contractor to prepare input information for the Contract Schedule, monitor progress, provide input for updating

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and revising logic diagrams when necessary and otherwise fulfilling its obligations hereunder. Contractor shall submit the qualifications of the CPM Specialist for acceptance by the City.

7.01 SCHEDULING PRINCIPLES AND REQUIREMENTS

A. General

1. Contractor shall prepare the Schedules identified in this Section during the performance of Contract. The Schedules shall:
 - a. Be detailed, time-scaled, computer-generated schedules, using the Critical Path Method, that accurately depict activities representing each portion of the Work from the current Data Date through Final Acceptance.
 - b. Be used for planning and coordinating the Work.
 - c. Be the basis for reporting all the Work to be performed in fulfillment of the Contract Documents.
 - d. Accurately depict the Contractor's current logical activity sequences and activity durations necessary to complete the Work in accordance with the requirements of the Contract Documents.
 - e. Assist Contractor and City in preparation and evaluation of Contractor's monthly progress payments.
 - f. Assist the City in evaluating progress (including payment) of the Work.
 - g. Assist Contractor and City in monitoring progress of Work and evaluating proposed changes to the Contract and requests for additional contract time.
 - h. Provide for optimum coordination by Contractor of its trades, Subcontractors, and Suppliers, and of its Work with the Work or services provided by any separate Contractors.
 - i. Permit the timely prediction or detection of events or occurrences which may affect the timely prosecution of the Work.
 - j. Provide a mechanism or tool for use by the City, and Contractor in determining and monitoring any actions of the Contractor which may be required in order to comply with the requirements of the Contract Documents relating to the completion of the various portions of the Work by the Contract Time specified in the Contract Documents.
2. Contractor shall include in the Contract schedule all interface points with City, Design

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- Consultant(s), Subcontractors, Suppliers, and other Contractors. These points shall be in the form of Start Milestones for deliverables due to the Contractor from others, and as Finish Milestones for deliverables which Contractor must supply to City, Design Consultant(s), Subcontractors, Suppliers and other Contractors. The PMT will assist in obtaining the relevant data from other parties when required.
3. Contractor shall provide to the City duration uncertainty and risk events for scheduled activities within the contract schedule to enable a Quantitative Schedule Risk Analysis (QSRA) to be performed by the City. Duration uncertainty (minimum duration, maximum duration, most likely duration) according to the relevant risk exposure shall be captured by the contractor against the scheduled activities.
 4. Calendar
 - a. Anticipated work and non-work periods shall be included for each activity.
 - b. Agreed Holidays shall be included as non-work days assigned to the appropriate day as they occur.
 - c. Anticipated Weather Lost Days
 - d. As the basis for establishing a “Weather Calendar”, use the National Oceanic and Atmosphere Administration’s (NOAA) historical monthly averages for days with precipitation, using a nominal 30- year, greater than 2.5 mm 0.10-inch amount parameter, as indicated on the Station Report for the NOAA location closest to the project site. In addition, incorporate into the Weather Calendar, other non-workdays such as Saturdays, Sundays and Federal Holidays.
- B. Activities
1. Contractor shall use and/or implement generally accepted recommended industry practices and the City Policies, Standards and Procedures, as applicable.
 2. Schedule activities shall be sufficiently named or titled to include what is to be accomplished and identified by the applicable work areas. Activities shall be grouped to assist in the understanding of the activity sequence. Examples of the types of activities to include in each schedule are as follows:
 - a. Design Activities: If and when Contractor has responsibility for the design as a part of the Contract, design activities shall be logically tied to the Construction Activities without constraints and Contractor shall develop an agreed design progress and performance measurement system based on design package deliverables and division of responsibilities. At a minimum, design work shall be divided to have an agreed number of deliverables per area/facility/system/subsystems and the governing jurisdictions. Actual design

packaging scheme shall be agreed upon with the City prior to implementation. When Contractor does not have responsibility for design as a part of the Contract the design activities shall be logically tied to the Construction Activities as start Milestones. Include Contractor's agreed design packaging scheme to support timely procurement of material, obtaining permits, and construction plan and include:

- 1) Agency review and approval cycles based on applicable Governmental Persons, Authority(s) Having Jurisdiction (AHJ) and other applicable Laws, Regulations, and Ordinances.
 - 2) Activities for each design phase (Concept, Schematic (30%), Design Development (60%) and Issued for Permit and Issued for Construction (100%) documents.
 - 3) Application for, and receipt, of required permits.
 - 4) Contractor's submittal of design and construction documents for City review and approval.
 - 5) Design review cycles and logical ties to subsequent fabrication, delivery, and construction activities.
 - 6) Other design related deliverables.
- b. Procurement Activities: Contractor's procurement activities included in schedules shall be logically tied with no constraints and shall be resource and cost loaded. Examples of Procurement activities include, but are not limited to:
- 1) Bid and award cycles.
 - 2) Shop Drawing development and approval.
 - 3) Equipment and Materials submittal preparation and approval
 - 4) Equipment and Materials, fabrication, factory acceptance testing, and delivery.
 - 5) Purchased and Stored Material/Equipment.
 - 6) Material/Equipment delivery requirements by the City.
- c. City Activities: Activities of City and other third-party activities shall be clearly identified in the Project Schedule. These activities include, but are not limited to, the following and the precursor processes:

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- 1) Right-of-Way property acquisition and site access.
 - 2) Submittal reviews.
 - 3) Inspections and tests as necessary.
 - 4) Environmental permit approvals by regulators.
 - 5) Notice to Proceed.
 - 6) Delivery of City-furnished material/equipment.
- d. Construction Activities: Construction activities shall be resource and cost loaded as described in this Section and shall include, but not be limited to:
- 1) Mobilization or demobilization.
 - 2) Installation of temporary and permanent Work by trades, areas, and facilities as described in the Contract Documents.
 - 3) Activities to describe the Work in sufficient detail identified according to the WBS.
 - 4) Testing and inspections of installed work by technicians, inspectors or engineers as well as the outages.
 - 5) Final clean-up.
 - 6) Scheduled Substantial Completion.
- e. Commissioning and Integration Testing Activities shall be resource and cost loaded and shall include, but not be limited to:
- 1) Start-up and Testing of equipment and systems.
 - 2) Commissioning of building and related systems.
 - 3) Scheduling of specified manufacturer's representatives.
 - 4) Dynamic Testing Readiness.
 - 5) Pre-Final inspection.
 - 6) Final Acceptance inspection.

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- 7) System Demonstration Performance Tests.
- 8) Training to be provided.
- 9) Administrative tasks and processes necessary to start, proceed with, accomplish, or finalize the Work.

C. Activity Durations:

1. Contractor shall maintain individual schedule activity durations of 20 work days or less.
2. Activities exceeding 20 work days in duration shall contain appropriate production projections so that entries can be maintained, and remaining durations adjusted according to physical progress.
3. Items such as Procurement, Fabrication, and Delivery activities may exceed 20 work days with the approval of City.
4. The Contractor is not permitted to modify (increase or decrease) an activity's original duration after it is approved by the City. During the monthly updating process, only the activity's remaining duration may be modified.

D. Summary Level Activities

1. Contractor may use Summary Level activities to represent the Work under the following conditions:
 - a. In the Preconstruction Schedule, those activities starting at least 180 days after the NTP or as otherwise agreed with the City.
 - b. In the Project Schedule and Monthly Progress Schedules, those activities starting at least 360 days after the NTP or as otherwise agreed with the City.
 - c. Summary Level activities should not exceed 90 work days without City approval and shall match the Work Breakdown Structure.
 - d. All Summary Level activities shall be detailed and supported by appropriate key resource information resource and cost loaded as agreed to in the Scheduling Conference.
 - e. Contractor shall replace Summary Level activities in the Preconstruction and Proposed Project Schedule with detailed activities through an updating process as the information becomes available and as the above-defined or agreed day limits roll forward.

2. Activity Relationships/Use of Constraints, Lags and Milestones
 - a. Except for the Notice to Proceed and Project Completion milestone activities, no activities shall be open-ended, open-start or open finish. Each activity shall have predecessor and successor relationships to present sequence of work and movement of resources (hard and soft logic). Once an activity exists on an approved Project Schedule it may not be deleted, renamed, or renumbered, unless approved by City.
 - b. Finish-to-Start relationships shall be the primary relationship used in all Project Schedules unless valid reasons are demonstrated for other logic relationships. Start-to-Start with lags shall be permitted provided the lag is updated and no gaps exist between contiguous activities due to the lag. Activities linked to successors only with Start-to-Start relationships shall not be permitted and must also include a Finish-to-Start or Finish-to-Finish relationship with one or more successors. Finish to Start relationship with lag shall not be permitted.
 - c. Lags shall not be used when the creation of an activity will perform the same function (e.g., concrete cure time). Use of lag must be minimized and restricted to only those situations where it is not possible to properly define the start or finish of an activity by the use of a normal Finish-to-Start, Start-to-Start or Finish-to-Finish relationship. Duration of a lag shall not exceed the duration of the predecessor activity. Negative lags shall not be permitted. Contractor shall identify any lag proposed and provide an explanation for the purpose of the lag in the activity notebook and Narrative Report.
 - d. Date/time constraints, other than those required by the Contract Documents, shall not be used unless jointly agreed to by City and Contractor. If Contractor seeks approval to include constraints in the schedule, Contractor shall identify any constraints proposed and provide an explanation for the purpose of the constraint in the activity notebook and Narrative Report.
 - e. Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates shall be included on the Monthly Progress Schedule and shall be consistent with other project reporting, such as daily reports, and the Contractor's monitoring and performance measuring system. In-progress activities will be updated by revising the activity's remaining duration according to actual measured or estimated work progression.
 - f. Allowable activity dates are early start, late start, early finish, late finish, actual start, and actual finish. Use of activity dates such as "expected" are prohibited.
 - g. Float Suppression techniques (i.e. as late as possible constraints) shall not be allowed. All Float shall be shown in the Project Schedule. Float shall be

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monitored, accounted for, and maintained in accordance with this Section.

- h. Activity constraints or use of activity durations, logic ties and sequences unapproved by the City shall not be used in any Project Schedule.
3. Resource Loading Project Schedule
 - a. The Activities within the construction schedule shall be resource loaded with key quantities and updated on a weekly basis to track the production of construction activities. The update of key quantities will be used to track Key Performance Indicators (KPIs) set forth by the PMT.
- E. Software Settings
1. De-Link Remaining Duration and Percent Complete. Construction activity progress will be calculated using Remaining Duration and Physical Percent Complete.
 2. Set Resource Data to “Two decimal places”.
 3. All activity durations and Float values will be shown in days.
 4. Schedule calculations and Out-of-Sequence progress (if applicable) shall be handled through Retained Logic, not Progress Override and not Actual Dates. Out-of-Sequence activities shall be updated to reflect actual project conditions.
 5. Date format will be DDMMYY (i.e., 01DEC15.)
 6. Default activity type will be set to “Task Dependent”.
 7. The Duration Type for each activity shall be set to "Fixed Duration and Units" before assigning any costs or resources to the activity.
- F. Activity IDs
1. The naming and coding of activities will strictly be per the City policies, standards and procedures, as applicable. Activity IDs shall be provided for each Activity with up to 15 characters as detailed in the City Policies, Standards and Procedures, as applicable. The purpose of the structure for the Activity ID is for easier identification and for improved organization in all Project Schedules. Each part of the ID will also need to be included in the schedule as an activity code.
 2. Activity IDs shall not be deleted and/or re-assigned. If during the course of the project, an activity is needed to be deleted, that Activity shall move to the inactive WBS titled “Deleted Activities” in order to avoid re-using of the same Activity IDs, should the need of adding new activities arise.

3. Activities to be deleted: Remove logic, relationships and Activity Codes.

G. Activity Names

1. Activity

- a. Location - Verb Names shall be brief but shall convey the scope of work described. Non- Standard abbreviations shall be explained in the Narrative Report. Percentages shall not be used in activity descriptions (e.g., Pour West Footing (0 - 50%)) unless the City agrees with the use of percentage for a particular activity. Contractor shall submit samples of activity names for approval prior to establishing the schedule.
- b. All activities shall have a unique activity name/description.
- c. Activity names can only be modified to add detail describing an activity's scope, correct the spelling or grammar, or to improve for clarity, but cannot be revised to completely change the scope of the activity.
- d. Each activity name should follow the following format:
 - (1) Noun.
 - (2) Station numbers, column numbers, or other description for the location, may be included at the end of the activity name if it will provide a better description of the activity.
- e. Example values for Location include but are not limited to:
 - (1) Segment Number.
 - (2) Column Line Numbers.
 - (3) Stationing Value.
 - (4) Other Unique Identification schemes.
- f. Examples of Verbs include, but are not limited to:
 - (1) Design.
 - (2) Install.
 - (3) Procure.

- (4) Fabricate.
- (5) Deliver.
- (6) Erect.
- (7) Describe the work being performed.

H. Work Breakdown Structure

1. Activities in Project Schedules shall be tied to the Work Breakdown Structure as provided in the City Policies, Standards and Procedures, as applicable.

I. Activity Codes

1. The purpose of the activity codes is to further sort and filter the schedule activities to enhance reporting capability. The activity codes required include both those that are already part of the Activity ID and those that are not.
2. Activities shall be coded as indicated in the City Policies, Standards and Procedures, as applicable.

J. Resource Loading

1. Resource loading shall be done on every construction activity, representing quantifiable work or materials of that Work Package.
2. Each resource-loaded activity shall have an estimate of the key quantities.
3. Failure to incorporate resource loading and establish planned productivity and/or production rates (defined as the planned quantity of work to be executed in a given time), may result in the Contractor's waiver of any right to compensation and time extension for loss of productivity. Submission of any such claim may be rejected for failure to establish baseline productivity by which any claimed loss would be measured.
4. Failure to incorporate resource loading and establish planned productivity may also result in the rejection of any schedule by the City Engineer.

K. Schedules as the Basis for Payment

1. The approved Project Schedule of Values shall be the basis for monitoring and calculating the Contractor's progress during each update period and therefore the amount of each progress payment. Lack of an approved Project Schedule or Monthly Progress Schedule Update will result in the inability of the City to evaluate contract

progress for the purposes of payment. Failure of the Contractor to provide all information, as specified in this Section, will result in the disapproval of the Monthly Progress Schedule (City Engineer may decline to certify payment and may withhold request for payment in whole or in part as set forth in the General Conditions, Article 9, Subparagraph 9.7.3.).

2. Percent complete for activities in the Schedule of Values shall be based on proportion of the overall quantity of the physical work complete. Contractor and City to jointly assess and agree on actual values for easily discernible units of measure (square feet, each, linear feet) on a weekly basis.

L. Cash Flow Report

1. The Contractor shall generate Cash Flow Reports based on each submitted Project Progress Schedule. Report shall be grouped and formatted to be consistent with the approved schedule of values from the contract. Reports shall indicate a time-phased distribution of Schedule of Values. Alternate Cash Flow Reports, if requested by the PMT, shall be submitted for approval prior to submission of the first report.
2. The Cash Flow Report shall display in tabular and graphic format, projections of monthly values of anticipated cost. Each schedule of values line item is to be represented within the project. The Cash Flow Report should also contain the adjusted forecast of estimated costs to achieve completion of the project.

M. Use of Float

1. Float shall be monitored and accounted for. The Float in any schedule shall not be considered for the exclusive use of either the City or Contractor; rather it is for the benefit of the Project. As such, Float is considered an expiring resource available to both parties on a nondiscriminatory basis, so long as the parties act in good faith and work in the best interests of completing the Project on time.

N. Contractor and City Responsibilities for Schedules and Acceptance

1. Any schedule or schedule update rejected or otherwise marked by the City as requiring revision and resubmission shall be revised by the Contractor and resubmitted within 5 days of such revision or resubmission Notice by the Project Manager. Any schedule or schedule update that has not been approved or accepted is presumed lacking a reasonable degree of accuracy and will not be considered by the City to be reasonable, feasible, or accurate when used by Contractor as a basis for a Time Impact Analysis or other type of delay analysis or claim.
2. If Contractor fails to submit its initial construction schedule or monthly schedule updates, or any such schedule or updates are not acceptable to the City, the City Engineer or Director may take such action to decline certifying payment and may

withhold request for payment in whole or part) as set forth in Article 9 - General Conditions, §9.7.3 or any other remedy set forth in the Contract or at law of equity.

3. Contractor Responsibilities

- a. Contractor shall have the responsibility to develop and update the schedules according to all requirements described herein. All schedules shall accurately represent to the City the Contractor's plan for execution of Work. Contractor shall use the most current Project Schedule to execute the Work in compliance with Contract Documents.
- b. In developing and updating the Project Schedules, Contractor represents that it shall require its Subcontractors to actively participate in such development and updating processes. The Contractor represents that all schedules are consistent with Contractor-approved Subcontractor schedules with sufficient agreed details.
- c. Contractor is required to provide its Subcontractors' schedules and updates in native format upon request by City.
- d. Costs incurred by the Contractor in complying with the requirements of this Section or other scheduling obligations contained in the Contract Documents, including but not limited to Contractor's Scheduler, and preparation of all Project Schedules, creation of Recovery Schedules, and the preparation of Time Impact Analysis shall be included in the Contract Price, and shall not be the subject of requests to the City for contractual relief.

4. City's Responsibilities

- a. All Project Schedules shall be submitted to the City for review and approval, consistent with the specific requirements set forth herein. The City shall have the right to disapprove any schedule if the schedule fails to comply with the requirements herein, provided, that such disapproval is based on a reasonable determination by the City that such schedule contains deviations from the specifications. City shall have the right to waive what it considers to be, in its sole discretion, minor defects in a schedule. City recognizes its responsibility to act in a reasonable manner with respect to approvals and agrees that approvals shall not be unreasonably withheld (i.e. for matters that do not impact the effective functioning of the schedule.)
- b. Any approval by City of the schedules submitted by the Contractor to City shall mean that in the opinion of the City, Contractor has complied with the requirements of this Section. No such review shall release or relieve the Contractor from full responsibility for the accurate and complete performance of the Work, including the accuracy and completeness of the schedules, or any other duty, obligation or liability imposed on it by the Contract including, the responsibility

for completing the Work within the time set forth in the Contract. The review or approval will not constitute a representation by City that the Contractor will be able to proceed or complete the Work in accordance with the dates contained in submitted schedule.

- c. In reviewing schedules submitted by designers, contractors, or others, the City will review the schedules to determine if the respective schedule appears “feasible and reasonable”; and, determine if the services or work could logically be accomplished in the time frames allotted in the schedule. Approving, accepting, or assenting to (hereafter referred to collectively as “approval” or “approving”) a schedule only means that the City considers that the schedule appears “feasible and reasonable.”
 - d. By approving a schedule, the City is not agreeing that the work or services will be accomplished according to and within times set forth in the schedule. Nor by approving a schedule does the City accept or bear some responsibility or liability if the work or services are not accomplished according to and within times set forth in the schedule or if factors upon which the schedule is based thereafter change during the execution of the works or services. Approval of any schedule showing completion beyond milestone dates and/or beyond contract completion times indicated in the contract shall not change any milestone or completion times in the contract and approval of a schedule is without any prejudice to the rights of the City.
- O. Schedule Workshops and Review Meetings
1. A record of all Schedule Workshops and Schedule Review Meetings shall be made by the Contractor stating the place and time of the meeting, the names and identification of those present, and a description of the topics discussed, and the agreements reached. Meeting minutes for these meetings, subject to the City’s review and approval, shall be prepared immediately after the meeting and issued within three days, with distribution to the City and all attendees.
 2. Project Scheduling Workshops:
 - a. Proposed Schedule Workshop
 - b. Contractor shall meet with the City within 14 days after the Notice to Proceed for Preconstruction Services to conduct a Post-Award Kick-Off Meeting and Project Scheduling Workshop to review and coordinate schedule requirements including, but not limited to, the following:
 - (1) Review software limitations and content and format for reports.
 - (2) Verify availability of qualified personnel needed to develop and update

schedule.

- (3) Discuss physical constraints to the project, including phasing, work stages, area separations, and interim milestones.
- (4) Review delivery dates for City-furnished products.
- (5) Review of Contractor and Subcontractor procurement cycles and their work plans.
- (6) Review schedule for work of the City's separate contracts.
- (7) Review submittal requirements and procedures.
- (8) Review time required for review of submittals and re-submittals.
- (9) Review requirements for tests and inspections by independent testing and inspecting Governmental Authority(s)
- (10) Review time required for Project closeout and City startup procedures, including commissioning activities.
- (11) Review and finalize list of construction activities to be included in schedule.

c. Baseline Schedule Workshop

- (1) Contractor shall meet with the City within 30 days after the Notice to Proceed for Construction Services to conduct another Post Award Kick-Off Meeting and Project Scheduling Workshop. This Workshop shall involve scheduling personnel from Contractor and City with the objective of working together to establish procedures for the development of the Baseline Schedule, and to ensure that the City requirements are satisfied and to review and coordinate schedule requirements Contractor shall present the draft Baseline Schedule including a description of intended methodology and assumptions used to accomplish the Work. Presentation shall include:
 - (a) Contract scope.
 - (b) Submittals with City's review.
 - (c) Activity durations.
 - (d) Logic.
 - (e) Activity coding.

- (f) Weather assumptions.
- (g) Resource Loading
- (h) Cost Loading and Resource Loading
- (i) Performance and Progress measurement.
- (j) Consequence of potential risks including:
 - (i) Long lead times (procurement/deliveries).
 - (ii) Labor and materials shortages.
 - (iii) Accidents.
- (k) Environmental factors.
- (l) Contractor's plan to mitigate any potential risks should they occur.
- (m) Establish Key Performance Indicators (KPI's) for actual progress compared to projected progress.
 - (i) Workshops shall be conducted no more than every 14 calendar days, until the Baseline Schedule is accepted and approved by City.

P. Joint Monthly Progress Schedule Review Meetings

1. Joint Project Status and Monthly Progress Schedule Review Meetings will be held between the City and Contractor consistent with the Contractor's submission of a Monthly Progress Schedule. Contractor is responsible for gathering all supporting documentation, presenting the data for the applicable Monthly Progress Schedule and recording the meeting minutes. The primary purpose of these meetings shall be to review the Monthly Progress Schedule, the monthly Pay Application, and construction progress, including but not limited to:
 - a. Actual start and finish dates of work accomplished, or actual start date and physical percent complete. Identify activities started and completed during the previous period and enter the Actual Start and Actual Finish dates. It shall be understood that Actual Start is defined as the date that work begins on an activity with the intent to pursue the work represented by the activity to its substantial completion, and Actual Finish is defined as the date that the activity's work is complete.
 - b. The amount of the Work remaining for the next period as incorporated in the

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schedule. Indicate activity progress and/or revise remaining duration (in workdays) to update each activity started, but not completed (remaining duration.) The remaining duration of an activity shall over-ride the calculated percent complete of an activity's duration when preparing the Monthly Progress Schedule.

- c. Changes in the critical path(s) of the schedule.
 - d. Modifications that affect durations, sequencing or logic of activities for which the City, Governmental Authority(s) or other third parties are responsible.
 - e. The assessment of any delays to Longest Path(s).
 - f. Determination of delays, and, as applicable, adjustment of Force Majeure Reserve.
 - g. All other schedule changes as reflected in the accompanying narrative will be reviewed for relevance and effect on remaining Work.
 - h. Resource constraints, if any and proposed work-around sequences.
 - (i) Review proposed schedule changes, future Work and potential problems or impact.
 - (j) Review the Application for Payment to determine the accuracy of, in accordance with the Project Schedule, all progress achieved, the satisfaction all requirements relating to invoicing for Stored Materials, Time and Material (T&M) Change Orders, and whether it is otherwise complete and accurate.
- Q. Modifications – Time Impact Analysis
- 1. Proposed modifications, including potential delays that are anticipated or experienced shall be submitted to City. Contractor has a duty to mitigate delays through modified sequences to minimize cost and time impact caused by the change or potential delay.
 - 2. The Contractor shall prepare a Delay Analysis for each modification, potential delay, delay event, or Contractor request that may affect the Scheduled Substantial Completion Date. The Delay Analysis shall be developed and submitted in accordance with Contract Documents or as requested by City and shall conform to all scheduling principles described in this Section. Preparation of Time Impact Analyses is considered part of construction process and shall be performed at no additional cost to City.
 - 3. Delay Analysis methodology shall follow the guidelines contained in the Association for the Advancement of Cost Engineering International (AACEI) Time Impact Analysis as Applied in Construction.

4. City will strive to approve or reject each Delay Analysis within ten Work Days after receipt of each Time Impact Analysis, unless subsequent negotiations are required, or multiple analyses are submitted at one time. Upon Approval, a copy of the Time Impact Analysis signed by City shall be returned to Contractor and incorporated into Schedule at next Monthly Progress Schedule update which will then become the current approved Schedule.
5. Delay Analysis shall meet requirements for submittal of Schedules including a Fragnet, with sufficient supporting documentation to enable City to make a determination of Contractor's request for a time extension.
6. Upon execution of a Change Order adjusting the Schedule Substantial Completion Date, the agreed upon event and impact shall be included in the next Monthly Progress Schedule if the parties agree to the extent of the impact. Changes in the schedule should be clearly identifiable by specific Activity IDs and activity coding and Work Breakdown Structure for changes as agreed upon with City. Inclusion of changed conditions shall conform to all scheduling principles noted in this Section. Changes included as an adjustment to the existing schedule activity durations are not allowed.
7. Once the Delay Analysis has been approved, the activities associated with that Time Impact Analysis should be added to the next Monthly Progress Schedule or Look-Ahead Schedule.
8. If the parties are unable to reach an agreement about how to forward-look the effect of the impact on the Monthly Progress Schedule's Critical Path(s), City may allow the Contractor to insert a Fragnet into the schedule on a preliminary basis following agreement of the proposed Fragnet activities. The duration of the Fragnet activities and/or the impact to the Scheduled Substantial Completion Date will be adjusted through the monthly update process as the actual duration of the delay becomes known.

R. Other Schedules

1. The Contractor may use other schedules and report in other formats to manage its work on a day-to-day basis, but these other schedules do not represent or replace the Project Schedules as specified in this Section.

8.01 PRE-CONSTRUCTION SCHEDULE

- A. When Preconstruction Services are to be provided by the Contractor, upon receipt of the NTP for Preconstruction Services, Contractor shall prepare a Preconstruction Schedule which includes those activities prior to approval to proceed with construction activities.
- B. The Preconstruction Schedule shall include the activities described in the plans developed during Preconstruction including design plans, subcontracting plans, procurement plan,

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construction plans and development and negotiation of a Guaranteed Maximum Price (if applicable) at a summary level which can be replaced with detailed information as the Project Schedule is finalized and the construction is authorized.

8.02 PROJECT SCHEDULES

A. Proposed Project Schedule

1. Prepare an initial Proposed Project Schedule (Proposed Schedule) representing the Contractor's plan for the Work in accordance with the requirements of this Section. The Proposed Project Schedule will include the elements of the Preconstruction Schedule and be the initial draft of the Project Schedule. The Proposed Schedule will be the basis for Monthly Progress Schedules and monthly Pay Applications until the approval of the Baseline Schedule.
2. The Proposed Schedule shall be updated on a monthly basis until the approval of the Baseline Schedule after which the Baseline Schedule becomes the Project Schedule.

B. Baseline and Project Schedule

1. The Baseline Schedule is the Project Schedule at the point in time when the Contractor and City agree and approve the Proposed Schedule as the accepted basis for the Project. Requirements described in this subsection shall apply to the all Baseline Schedule submissions.
2. Baseline Schedule submitted by Contractor and approved by the City shall contain no progress for any activities and shall have a Data Date of the Notice to Proceed date.
3. Prepare a draft Baseline Schedule after the Baseline Schedule Workshop has been conducted.
4. Within 14 calendar days after the draft Baseline Schedule is accepted the Contractor shall provide its final Baseline Schedule for City's review and comments.
5. The final Baseline Schedule submission shall include the following:
 - a. The approved final Baseline Schedule shall be version 00.
 - b. One full-color time-scaled network document in PDF format organized by WBS. Print sizes shall be 11 inches by 17 inches standard sized sheets. Provide following information on the document:
 - (i) Activity ID.
 - (ii) Activity Description.

CONSTRUCTION SCHEDULES

- (iii) Original Duration.
 - (iv) Remaining Duration.
 - (v) Duration Percent Complete.
 - (vi) Early Start.
 - (vii) Early Finish.
 - (viii) Late Start.
 - (ix) Late Finish
 - (x) Total Float
 - (xi) Activities Gantt Chart
6. The Baseline Schedule narrative which shall address the following:
- a. Description of the Contractor's plan to perform the work through the entire contract performance period.
 - b. Description of primary, secondary and tertiary Critical Paths.
 - c. Explanation of calendars used, including days of the week, holidays, etc.
 - d. Discuss calendar assignment to activities.
 - e. Description of major pieces of equipment that will be used on the site.
 - f. Discuss procurement of long lead items.
 - g. A discussion of monthly cash flow planned costs, and cumulative expenditures.
 - h. A general description of the means and methods proposed for the execution of the Work including, but not limited to:
 - (1) Discussion of operating areas and the proposed sequences.
 - (2) Description of the planned crews - sizes, equipment used, etc.
 - (3) Number of shifts to perform the Work.
 - (4) Significant activities that may inhibit the Work.

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- (5) A listing of all milestones.
 7. Contractor shall represent that the final Baseline Schedule is an accurate representation of Contractor's plan for performing the entire Work and that Contractor intends to use such schedule to execute the Work in compliance with the Contract Documents. Once the final Baseline Schedule is accepted it shall be the initial Project Schedule and used as the baseline in the Monthly Progress Schedules.
- C. Monthly Progress Schedules
1. Monthly Progress Schedules are Project Schedules with progress achieved indicated for each Activity.
 2. Project Schedules shall be progressed (updated) on a monthly basis until Final Acceptance is accomplished. Progress of Schedule activities shall be a physical percent complete as agreed with the City.
 3. The Contractor shall not reduce activity durations in an attempt to reduce negative float. If the Contractor intends to execute activities quicker than the original duration, this shall be mentioned in the float analysis.
 4. Approved Changes shall be included in each Monthly Progress Schedule.
 5. Contractor shall meet with City each month in a Joint Monthly Progress Schedule Meeting,
 6. Contractor shall make two submittals (Progress Only and Contractor's Adjusted) of the Project Schedule each month:
 - a. Shall incorporate the Contractor's Monthly Update (i.e. logic, durations, and calendar) made to the schedule including progress update information. This submission shall follow the scheduling principles described in this Section.
 7. Each version of the Monthly Progress Schedule submitted by the Contractor shall require approval by City.
 8. The Data Date for the Monthly Progress Schedule is 00:00 hours on Saturday following the last Friday of the Month. For each update of the Proposed and Baseline Schedules, the Version number shall increase by 1, and the previous schedule shall be archived to permit an audit trail.
 - a. Designations for the Progress Only (PO) and the Contractor's Adjusted (CA) shall clearly define the submission.
 - b. City will review and approve Monthly Progress Schedules based on remaining

durations provided for each activity.

- c. Each Monthly Progress Schedule (PO and CA) shall contain activity progress measured through the Data Date and shall be submitted to the City for its review.
9. The City will review the Monthly Progress Schedule and provide comments at the Joint Monthly Progress Schedule Meeting to be held five working days after submission of the Monthly Progress Schedule.
 10. Monthly Progress Schedule submissions shall be comprised of the following:
 - a. One full-color time-scaled network document in PDF format organized by WBS. Print sizes shall be 11 inches by 17 inches standard sized sheets.

Provide following information on the document:

- (1) Activity ID.
 - (2) Activity Description.
 - (3) Original Duration.
 - (4) Remaining Duration.
 - (5) Duration Percent Complete.
 - (6) Early Start.
 - (7) Early Finish.
 - (8) Late Start.
 - (9) Late Finish.
 - (10) Total Float.
- b. The Monthly Progress Schedule narrative shall address the following:
 - (1) Description of the Work completed by the Contractor in the past performance period and Contractor's plan to perform the work through the entire next performance period, including shift work.
 - (2) Description of primary, secondary, and tertiary Critical Paths.
 - (3) Description of problem areas and anticipated problem areas and an

explanation of corrective actions taken or planned to be taken.

- (4) Current and anticipated delays including cause of delay, corrective actions taken, and impact of delay on other activities, milestones, and completion dates.
- (5) Pending items (Minor Changes in the Work, Change Orders, Time Impact Analyses) and status thereof.
- (6) A list of fully executed Changes issued by the Wednesday of the week before the last Friday of every reporting period.
- (7) A description of any changes made to the schedule and reasons.
- (8) A narrative to show revisions since previous submissions for changes in scope of work, sequencing and other identifiable changes.
- (9) Progress made on critical activities indicated on CPM schedule.
- (10) Status of critical project components (percent complete, amount of time ahead or behind schedule) and if delays have occurred provide an analysis of how they may be mitigated.
- (11) Explanations for any lack of work on critical path activities planned to be performed during last month. Identify any changes to the critical path and the drivers for each change.
- (12) List of critical activities scheduled to be performed next month.
- (13) Status of major material and equipment procurement.
- (14) Any delays encountered during the reporting period.
- (15) Updated schedule duration uncertainty to coincide with the Project status and risk exposures.

D. Look-Ahead Schedules:

1. The Look-Ahead Schedule shall be the actual detailed work plan used by the Contractor in meeting the Contract schedule and milestones. The Look-Ahead Schedule shall be an element of the Contractor's Project Schedule.
2. The Look-Ahead Schedule shall be the basis of the weekly Progress Meetings.
3. The Look-Ahead Schedule shall display:

CONSTRUCTION SCHEDULES

- a. Past Week Activities
 - b. Current Week Activities
 - c. Three Week Look ahead Activities
4. Look-Ahead Schedules shall include as-built data, forecasted activity sequences, activity durations, through the Scheduled Substantial Completion Date and Final Acceptance, demonstrating the entire scope of Work.
 5. In months coinciding with a Look-Ahead Schedule submission, PO Monthly Progress Schedule shall be based on the last approved Monthly Progress Schedule
 6. Submission of Look-Ahead Schedules shall not replace the requirement for Contractor to prepare a Time Impact Analysis indicating delay to Scheduled Substantial Completion Date.
- E. Commissioning and Integration Testing Schedule:
1. Testing and Commissioning is expected to be carried as a summary activity in the Baseline Schedule and Project Schedules until a draft Commissioning and Integration Testing Schedule shall be submitted not later than 90 days prior to the first testing / commissioning before the Scheduled Substantial Completion Date.
 2. A final Commissioning and Integration Testing Schedule shall be submitted no later than 60 days prior to the first testing / commissioning activity before the Scheduled Substantial Completion Date and upon approval shall be incorporated into the Project Schedule with a Monthly Progress Schedule.
 3. The Commissioning and Integration Testing Schedule shall display scheduled Work so that each activity is shown with duration of no more than 15 workdays.
- F. Recovery Schedule
1. Should any of the following conditions exist, City may require the Contractor to prepare, at no extra cost to City, a plan of action and a Recovery Schedule as to how the Contractor plans to reorganize its work and resources to complete the Work by the Scheduled Substantial Completion Date and recover any lost time and/or delays that have been determined by the City to be caused by the Contractor:
 - a. Contractor's monthly progress report indicates delays that are, as determined by City, of sufficient magnitude that the Contractor's ability to complete the Work by the Scheduled Substantial Completion Date is brought into question.
 - (1) If the Work is delayed on the Critical Path item for a period which exceeds

the greater of either a) thirty (-30) days in the aggregate, or b) that number of days in the aggregate equal to five percent of the days remaining until the approved Substantial Completion. For example, If the remaining duration during the period update is 300 Days, then five percent of the remaining 300 Days is 15 Days. The greater of (-30) days or (-15) days is (-15) days.

- (2) Contractor 's performance and resource utilization are not as planned to result in unnecessary consumption of the float.
 - (3) Contractor desires to make changes in the logic (sequencing of Work) or the planned duration of future activities in the schedule to recover lost time.
- b. Contractor shall submit a Recovery Schedule according to the requirements described in this Section. A Recovery Schedule, when required, shall be submitted to City for review and approval within 21 calendar days of Contractor receiving City's written request.
- c. Changes included in Recovery Schedule shall be documented. Contractor shall submit to City an audit report that has been prepared using schedule comparison software (i.e. Claim Digger, Project Investigator, or other software approved by City.
- d. If a recovery schedule is required hereunder, the City, at its sole discretion, may withhold the Contractor's Fee for that period in the Payment Application until such time the Contractor has prepared, and the City has accepted such recovery schedule.
- e. The Recovery Schedule submission shall include the following:
- (1) Detailed narrative describing (with an explanation for the reason of) any revised sequences, durations, and resources.
 - (2) Anticipated effect of revision on the current Project Schedule and Scheduled Substantial Completion Date, including describing change in affected activities' Total Float value.
 - (3) Contractor shall furnish sufficient labor, resources and equipment to ensure the prosecution of the Work meets the current Scheduled Substantial Completion Date. If in the opinion of City, Contractor falls behind in the prosecution of the Work as indicated in the current Schedule, Contractor shall take such steps as may be necessary to improve its progress. City may require Contractor to increase the number of shifts, days of work, and/or the amount of plant and equipment, all without additional cost to City.
 - (4) If Contractor fails or refuses to implement such measures to bring the Work back to conformity within the Scheduled Substantial Completion Date, City

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shall have the right to declare such failure or refusal a Contractor Event of Default under the Contract.

G. Revised Baseline Schedule

1. Either City or Contractor may request a Revised Baseline Schedule (Re-Baseline Schedule). The Monthly Progress Schedule to reflect actual progress shall not be considered as a Revised Baseline Schedule.
2. A Revised Baseline Schedule is considered necessary under the following conditions:
 - a. Additions, deletions, or revisions to activities required by Contract modification.
 - b. City determines there is reasonable doubt that milestones or the Scheduled Substantial Completion Date will be met. A Schedule Revision shall demonstrate how Contractor intends to reschedule remaining work by the Scheduled Substantial Completion Date. There shall not be additional cost to City, through re-sequencing and reallocating its forces to complete Work by Scheduled Substantial Completion Date.
3. Revised Baseline Schedule, when required, shall be submitted to City for review and approval within 21 days of Contractor receiving City's written request.
4. Revised Baseline Schedule shall conform to all requirements described in this Section for Project Schedules and shall include:
 - a. An audit report that has been prepared using schedule comparison software (i.e. Claim Digger, Project Investigator, or other software approved by the City.)
 - b. Detailed narrative explaining reason for revision.
 - c. Anticipated effect of the Revised Baseline Schedule on the Scheduled Substantial Completion Date, including describing change in affected activities Total Float value.
 - d. Appropriate Fragnet demonstrating the necessary changes.

H. As Built Schedule

1. Contractor shall prepare and submit an As-Built Schedule documenting actual start and actual finish dates for all activities and logic ties for all activities to show actual sequence in which Work was performed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01326
CONSTRUCTION SEQUENCING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work periods.
- B. Mobilization and demobilization.
- C. Construction sequence.

1.02 WORK PERIODS

- A. No work is permitted at HOU during the following periods:
 - 1. Beginning at 6:00 a.m. CST (0600 hours) on Tuesday prior to Thanksgiving Day and to 10:00 p.m. CST (2000 hours) the following Monday.
 - 2. Beginning at 6:00 a.m. CST (0600 hours) one week prior to Christmas Day and to 11:59 p.m. CST (2359 hours) January 2 following.
 - 3. Beginning at 6:00 a.m. CST (0600 hours) on Friday prior to Houston Area Spring Break, and to 11:59 p.m. CST (2359 hours) the following Monday. These dates maybe adjusted by HAS operations depending on scheduling of Spring Break for Houston Area School Districts.

No pavements shall be closed during these periods. The Contractor shall prepare any closed pavements to be opened during these periods, including, but not limited to, removal of all barricades and pavement closure devices, replacement of pavement markings. Coordinate requirements with HAS operations. This work shall be considered subsidiary to the cost of the project and shall not be measured or paid for separately.

- B. For purposes of on-site construction operations for exterior work within the AOA, work shall conform to the following:
 - 1. The contractor shall not perform lane closures with the Terminal Roadways unless approved in advance and in writing by HAS Airport Operations.
 - 2. Fire station access must be maintained at all times.
 - 3. Maintain access through work zone to terminal buildings and garages at all times unless indicated on the plans. Temporary closures of any access must only be completed between the hours of 10:00 p.m. CST (2200 hours) to 6:00 a.m. CST (0600 hours) on

CONSTRUCTION SEQUENCING

weekend days unless indicated on the plans. Temporary closures of delivery entrances and exits may only occur from 8:00 p.m. CST (2000 hours) to 4:00 a.m. CST (0400 hours) on weekend days unless indicated on the plans.

4. The contractor shall coordinate staging areas for equipment with HAS Airport operations.
5. See additional traffic control sequencing notes in the plans.

1.03 MOBILIZATION AND DEMOBILIZATION

- A. Payment for mobilization is specified in Section 01290 - Payment Procedures.
- B. General mobilization applicable to the Work, regardless of construction sequencing specified herein includes:
 1. Construction and Submittal Schedule processing following Sections 01325 - Construction Schedules and 01340 - Shop Drawings, Product Data and Samples.
 2. Obtain and pay for permits.
 3. Submittal of other documents following Section 01312 - Coordination and Meetings.
 4. Survey Base Building Following Section 01726- Base Facility Survey and process related Document 00685- Request for Information, including accessibility by cutting, following Section 01731- Cutting and Patching, into concealed areas.
 5. Security badging following Section 01506 - Temporary Controls.
 6. Approval of construction schedules following Section 01325 - Construction Schedules.
 7. Product acquisition for other tasks; except products with short lead times may be acquired later as required to maintain schedule performance.
 8. Acquisition of major construction equipment and set-up of on-site storage and office space.
 9. Other activities necessary to maintain schedule performance.
 10. Construction of exterior and interior barricades and enclosures following Section 01505 - Temporary Facilities.
- C. Demobilization:
 1. Processing of closeout documents, following Section 01770 - Contract Closeout, and activities not otherwise completed at the end of previous tasks.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures for:

1. Construction Schedules and Cash Flow Curve (billing forecast).
2. Shop Drawings, Product Data and Samples
3. Manufacturer's Certificates
4. Construction Photographs
5. Project Record Documents and monthly certification.
6. Design Mixes

1.02 SUBMITTAL PROCEDURES

A. Scheduling and Handling:

1. The Contractor must utilize Microsoft SharePoint, and/or a web-based system run by the Houston Airport System, to submit RFIs, Submittals and Invoices. Before doing so, the Contractor must attend a brief mandatory SharePoint training session, which will be conducted by a member of HAS. The Contractor must contact the designated HAS trainer prior to the start of construction to schedule a time for training. Access to SharePoint will not be given to the Contractor's team until training is completed. All document collaboration will be done using SharePoint.
2. Submit Shop Drawings, Data and Samples for related components as required by Specifications and Project Manager.
3. Schedule submittals well in advance of need for construction Products. Allow time for delivery of Products after submittal approval.
4. 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

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depending on complexity and quantity of data submitted.

5. 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.
 6. Submit five copies of documents unless otherwise specified.
 7. Revise and resubmit submittals as required. Identify all changes made since previous submittal.
 8. 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.
 5. 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

SUBMITTAL PROCEDURES

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. "REVIEWED AS SUBMITTED" 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. "MAKE CORRECTIONS AS NOTED WHEN EXCEPTIONS DO NOT REQUIRE FUTURE CHANGES" 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. "REVISE AND RESUBMIT" when submittal do 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.

SUBMITTAL PROCEDURES

- 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. General procedural requirements for submittal data:
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Samples, including control samples.
 - 4. Product certifications and compliance statements.
 - 5. Submittal logging.
- B. Submittal quantities specified in other Sections supersedes those specified herein.
- C. Product interface control documents.

1.02 GENERAL PROCEDURES

- A. Review submittal data and indicate results of review on documents submitted to Designer.
 - 1. Obtain review and indicate results of Subcontractors' and applicable Separate Contractors' reviews before submittal to Designer.
 - 2. Include on each shop drawing, sample or product data submittal the following minimum language, signed (by individuals authorized to make binding agreements on behalf of their respective firms) and dated on behalf of each responsible party:

"The Subcontractor and the Contractor named below hereby certify this submittal has been checked prior to submission to Designer and conforms to the requirements of the Contract Documents for work represented hereby. This submittal does not deviate from requirements of the Contract Documents. It has been checked for: field conditions; correlation of dimensions and quantities; safety precautions; construction means, methods, techniques, schedules, sequences, procedures and fabrication processes; for errors and omissions in this submittal; and for coordination of the work of the trades.

(Subcontractor Firm)

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

(Authorized Signature)
(Date)

-
This submittal has also been checked by the following Subcontractors and Separate Contractors for coordination of substrate/superstrate conditions and applicable product interfaces.

(List company names, place authorized signature and date for each.)

-

(Contractor)
(Authorized Signature)
(Date)"

- B. Transmit submittals under original transmittal to Designer, with a copy of the transmittal only to City Engineer. Number each submittal by specification number, for future reference.
1. Furnish number of copies specified herein or in other Sections, for Designer's and City Engineer's records, plus additional copies as the Contractor requires for construction operations and coordination of the Work.
 2. Identify Project, Contractor, Subcontractor, Supplier, and generic name of component or system. Allow space on submittal data to accommodate required stamps by Contractor, applicable Subcontractors, applicable Separate Contractors, Designers, and other reviewers.
 3. Indicate applicable Drawing detail and Section number.
 4. For submittals using SI (metric) measure as the manufacturer's or fabricator's standard, include corresponding Imperial measure conversions. Follow requirements in Section 01610.
- C. After Designer's review, revise and resubmit until resubmittal is no longer required; identify and log changes made to previous submittals.
- D. Distribute copies of reviewed submittals to concerned parties, including Separate Contractors. Instruct recipients to promptly report inability to comply with requirements indicated therein.
- E. Shop Drawings, Product Data and Samples: Follow Contractor's progress schedule for submittals related to work progress. Coordinate submittal of related items. Partial submittals will be returned unreviewed.
- F. Transmit submittals far enough in advance to provide time required for reviews, for securing necessary approvals, for revisions and resubmittals. Allow 14 days after receipt for

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- Designer's review, except where shorter processing time is approved due to extraordinary conditions.
- G. Do not submit data where no submittal requirements occur. Unsolicited submittals will be returned unreviewed.
- H. Incomplete, uncoordinated, inaccurate and illegible submittals, and submittals without evidence of review by Contractor, applicable Subcontractors and applicable Separate Contractors will be returned unreviewed.
- I. Responsibility for costs of Designer's additional reviews resulting from improper submittal data remains with the Contractor, deductible from the Contract Sum or Time by Change Order.
- .03 SHOP DRAWINGS
- A. Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 11 by 17 inches , but no larger than 30 by 42 inches.
 - a. Shop Drawings to be transmitted digitally in PDF Format.
- D. Prepare shop drawings by qualified drafters, accurately and distinctly showing:
1. Field and erection dimensions clearly identified as such.
 2. Arrangement and section views.
 3. Relation to adjacent materials or structure including complete information for making connections between work under this Contract and work under other contracts.
 4. Kinds of materials and finishes.
 5. Parts list and descriptions.

6. Assembly drawings of equipment components and accessories showing their respective positions and relationships to the complete equipment package.
7. Where necessary for clarity, identify details by reference to drawing sheet and detail numbers, schedule or room numbers as shown on the Contract Drawings.

E. Drawing to scale, and accurately represent specific products furnished.

1.04 PRODUCT DATA/MANUFACTURERS' LITERATURE

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Notation of coordination requirements.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - b. Submit product data before shop drawings and before or concurrently with samples.

1.05 CONTRACTOR-PREPARED SAMPLES

- A. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

1.07 PRODUCT INTERFACE CONTROL DOCUMENTS

- A. Following requirements apply where specified in other Sections.
- B. Prepare submittal data as required, to indicate proper interface between work of Subcontractors and Separate Contractors, for products of one Section or Contract required to be supported by or affixed or connected to products of another Section or Contract. Follow Section Paragraph 1.02 for review and processing requirements.
 1. Fully describe mating surfaces between products.
 2. Fully describe predecessor and successor staging and sequencing of product fabrications and installations.
- C. Field corrections to mating surfaces are not permitted, unless field modification is specified in Sections.

1.08 CERTIFICATIONS AND COMPLIANCE STATEMENTS

- A. Submit 4 original copies plus additional copies required for Contractor's use. Designer will retain three copies for distribution to City. Distribute remaining copies. Include original signature and applicable original seal(s) on each copy.
- B. Certifications may be in the form of recent test results, research reports, reference data, or affidavits, as applicable to certifications required.

1.09 SUBMITTAL LOG

- A. If approved, submittal log may be incorporated into submittal schedules following Section 01325 - Construction Schedules.
- B. Coordinate shop drawings, samples, product data and certifications schedule in Section 01325 - Construction Schedules. Log submittals showing proposed submittal number and expected processing period for each.
- C. Denote submittals requiring special attention, such as requested shorter review time due to extraordinary conditions. Indicate reasons for special attention.
- D. Update and distribute following Sections 01312 - Coordination and Meetings and 01325 - Construction Schedules.

1.10 DESIGNER'S ACTIONS

- A. Comments may be added by Designer to submittal data, to inform the Contractor of detected failure of submittal data to follow contract requirements and the design concept expressed therein.
- B. Commencing work governed by submittal requirements without proper processing of required submittals is the risk of the Contractor.
 - 1. Cost increases attributable thereto are the sole responsibility of the Contractor without increase in Contract Sum.
 - 2. Time increases attributable thereto are the sole responsibility of the Contractor under provisions of Article 9.13 (Liquidated Damages) in Document 00700 - General Conditions.
- C. Responsibility for Contractor's errors and omissions or construction of defective or deficient work remains with the Contractor and is not relieved by Designer's review.
- D. Following is an example of Designer's submittal review statement, which may be affixed to Contractor's submittal by stamp, label, or separate sheet:

RDLR ARCHITECTS, INC. Submittal Review	
Project Name:	COH - PWE NE Quadrant Building
Project Number:	1394
Submittal ID:	125000.02
Received On:	4/14/2020
Reviewed On:	5/21/2020
Reviewed By:	Daniel Ortiz
Action:	Approved
Architect's review of submittals is for conformance with the design intent of the project and with the information contained within the Contract Documents. The Contractor is responsible for verification of field dimensions, quantities, shop fabrication processes, field construction techniques, and the coordination of trades and their work. Contractor's responsibility for errors and omissions, or deviations from the requirements of the contract documents is not relieved by Architect's review.	

END OF DESIGNER'S SUBMITTAL REVIEW STATEMENT

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CONTROL SAMPLES

- A. Reinstall control samples following Section 01731 - Cutting and Patching.

END OF SECTION

SECTION 01350

MOCK-UPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control sample mock-ups of following to demonstrate finished visual and other aesthetic qualities of completed work. If approved, these mock-ups may be built as part of the completed work.
 - 1. Cement Plastering, Section 092400; as indicated in that section.
 - 2. Painting and Staining, Section 099000; provide a 50 SF sample for each color and type shown in the documents.
- B. Systems integration mock-ups of following to demonstrate dimensional or ergonomic qualities. These mock-ups are not permitted as final work.
 - 1. Traffic Coatings, Section 071800 provide a 50 SF sample of complete system. Test for adhesion.
- C. Provide required mock-ups after award of contract(s) for each section of work affected by this Section.
- D. Provide full-size mock-ups.

1.02 QUALITY ASSURANCE

- A. Provide joinery, attachments, same generic materials, and other components to comply with requirements of final construction.
 - 1. By way of example only, if transparent finished wood material is required in completed construction, the Contractor may substitute a lower "visual" quality wood of compressive and yield strength equal to the finished product for systems integration mockups but use of actual products is required for control sample mockups.
- B. Reduction of quality, specified in applicable Sections, for control sample mock-ups is not permitted.

1.03 SITE CONDITIONS

- A. Protect from damage until directed to remove mock-ups.

MOCK-UPS

1.04 COORDINATION WITH SECTION 01340- SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Mock-ups are specialized submittal data in the form of full-sized "samples".
- B. Provide mock-ups after processing of shop drawings, product data and hand-held-size samples specified in applicable Sections is complete.
- C. If changes are required as a result of fabrication or installation processes, or as a result of review and demonstration results, modify submittal data and fabrication and installation processes accordingly. Submit revised submittals following Section 01340 - Shop Drawings, Product Data and Samples.
 - 1. Refer to Parts 2 and 3 herein for relationship of changes to Section 01610- Basic Product Requirements.

PART 2 PRODUCTS

2.01 GENERAL

- A. Fabricate mock-ups by same techniques and sequencing as expected for completed work.
 - 1. Use fabrication of mock-ups to validate shop techniques and sequencing.
 - 2. If, due to fabrication of mock-ups, changes required for proper function or are recommended by Contractor, follow Section 01610 - Basic Product Requirements for both work of this Section and of other Sections.

PART 3 EXECUTION

3.01 GENERAL

- A. Install products for mock-ups following applicable Sections.
- B. Install mock-ups where shown on Drawings.
- C. Install temporary or supplementary bracing or framing following Section 01505 - Temporary Facilities.
- D. Install mock-ups by same techniques and sequencing as expected for completed work.
 - 1. Validate field techniques and sequencing, interface at mating surfaces and other aspects of coordination between Sections and applicable Separate Contracts.

MOCK-UPS

2. If, due to installation of mock-ups, Contractor recommends changes, follow Section 01610 - Basic Product Requirements for both work of this Section and other Sections.

3.02 REVIEW AND DEMONSTRATIONS

- A. Notify City Engineer and Designer of date when mock-ups are ready for review and demonstration.
- B. Administer demonstrations of mock-ups. Include fabricator and installer.
- C. Take notes of review results and publish to City Engineer, Designer and attendees. Describe changes in construction resulting from discoveries during review and tests.
- D. Minimum review and proper demonstration of mock-ups:
 1. Effectiveness of light, water, sound and air seals, as applicable.
 2. Accessibility for maintenance of concealed or semi-exposed moving parts.
 3. Uniform of joint tolerances and visible treatment within individual or "panelized" items and between separate "panelized" components, and between substrates and completed work.
 4. Compliance of constructed sight lines and profiles with Drawings.
- F. Leave mock-ups in place until removal is authorized, but prior to the date of Substantial Completion.

END OF SECTION

SECTION 01410
TPDES REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Documentation to be prepared and signed by Contractor/Operator before conducting construction operations, in accordance with the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit Number TXR150000 issued on February 8, 2018 (the Construction General Permit).
- B. Implementation, maintenance inspection, and termination of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other appropriate practices shown on the Drawings or specified elsewhere in the Contract.
- C. Review of the Storm Water Pollution Prevention Plan (SWP3) implementation in a meeting with Project Manager prior to start of Construction.

1.02 DEFINITIONS

- A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavation activities, as well as other construction related activities (e.g. stock piling of fill material, demolition).
- B. Large Construction Activity: Project that:
 - 1. disturbs five acres or more, or
 - 2. disturbs less than five acres but is part of a larger common plan of development that will disturb five acres or more of land.
- C. Small Construction Activity: Project that:
 - 1. disturbs one or more acres but less than five acres, or
 - 2. are part of a larger common plan of development that will disturb at least 1 but less than 5 Ac.

TPDES REQUIREMENTS

D. TPDES Operator:

1. Operator - The person or persons associated with a large or small construction activity that is either a primary or secondary as defined below:
 - a. Primary Operator – the person or persons associated with a large or small construction activity that meets either of the following two criteria:
 - (1) the persons have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or, the person or persons have day-to-day operational control of those activities at a construction site that are necessary to ensure compliance with a storm water pollution prevention plan (SWP3) for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).
 - b. Secondary Operator –The person or entity, often the property owner, whose operational control is limited to:
 - (1) the employment of other operators, such as a general contractor, to perform or supervise construction activities, or
 - (2) the ability to approve or disapprove changes to construction plans and specifications, but who does not have day-to-day on-site operational control over construction activities at the site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWP3)

- A. Prepare a SWP3 following Part III of the Construction General Permit and the Storm Water Management Handbook for Construction Activities issued under City Ordinance Section 47-695(b). If conflicts exist between the Construction General Permit and the handbook, the more stringent requirement will apply.
- B. Update or revise the SWP3 as needed during the construction following Part III, Section E of the Construction General Permit.
- C. Submit the SWP3 and any updates or revisions to Project Manager for review and address comments prior to commencing, or continuing, construction activities.

3.02 NOTICE OF INTENT for Large Construction Activity

- A. Fill out, sign, and date TCEQ Form 20022 (03/06/2018) Notice of Intent (NOI) for an Authorization for Stormwater Discharges Associated with Construction Activity under TPDES General Permit TXR150000, ATTACHMENT 1 of this Section 01410.
- B. Transmit the signed Contractor's copy of TCEQ Form 20022 (03/06/2018), along with a \$325.00 check, made out to Texas Commission on Environmental Quality, and the completed Payment Submittal Form to Project Manager.
- C. Project Manager will complete a separate TCEQ Form 20022 (03/06/2018) for City's Notice of Intent, and will submit both Notices, along with checks for application fees, to the TCEQ.
- D. Submission of the Notice of Intent form by both the City and Contractor to CEQ if mailing is required a minimum of seven days before Commencement of Construction Activities.

3.03 CONSTRUCTION SITE NOTICE FOR SMALL CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date the Construction Site Notice, Attachment 2 to TPDES General Permit TXR150000, "Small Construction Site Notice", ATTACHMENT 2 of this Section 01410.
- B. Transmit the signed Construction Site Notice to Project Manager at least seven days prior to Commencement of Construction Activity.

3.04 CERTIFICATION REQUIREMENTS

- A. Fill out TPDES Operator's Information form, ATTACHMENT 3 of this Section 01410, including Contractor's name, address, and telephone number, and the names of persons or firms responsible for maintenance and inspection of erosion and sediment control measures. Use multiple copies as required to document full information.
- B. Contractor and Subcontractors shall sign and date the Contractor's/ Subcontractor's Certification for TPDES Permitting, ATTACHMENT 4 of this Section 01410. Include this certification with other Project certification forms.
- C. Submit properly completed certification forms to Project Manager for review before beginning construction operations.
- D. Conduct inspections in accordance with TCEQ requirements. Ensure persons or firms responsible for maintenance and inspection of erosion and sediment control measures read, fill out, sign, and date the Erosion Control Contractor's certification for Inspection and Maintenance. Use the City of Houston Storm Water Pollution Prevention Plan,

Construction Site Inspection Report, ATTACHMENT 5 of this Section 01410 to record maintenance inspections and repairs.

3.05 RETENTION OF RECORDS

- A. Keep a copy of this document and the SWP3 in a readily accessible location at the construction site from Commencement of Construction Activity until submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR150000). Contractors with day-to-day operational control over SWP3 implementation shall have a copy of the SWP3 available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SWP3. Upon submission of the NOT, submit all required forms and a copy of the SWP3 with all revisions to Project Manager.

3.06 REQUIRED NOTICES

- A. Post the following notices from effective date of the SWP3 until date of final site stabilization as defined in the Construction General Permit:
 - 1. Post the TPDES permit number for Large Construction Activity, with a signed TCEQ Construction Site Notice for large or Small Construction Activity. Signed copies of the City's and Contractor's NOI must also be posted.
 - 2. Post notices near the main entrance of the construction site in a prominent place where it is safely and readily available for viewing by General Public, Local, State, and Federal Authorities. Post name and telephone number of Contractor's local contact person, brief project description and location of the SWP3.
 - a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with Project Manager to conform to requirements of the Construction General Permit.
 - b. If Project is a linear construction project (e.g.: road, utilities, etc.), post notice in a publicly accessible location near active construction. Move notice as necessary.
 - 3. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction access area.
 - 4. Post a notice of waste disposal procedures in a readily visible location on site.

3.07 ON-SITE WASTE MATERIAL STORAGE

- A. On-site waste material storage shall be self-contained and shall satisfy appropriate local, state, and federal rules and regulations.

TPDES REQUIREMENTS

- B. Prepare list of waste material to be stored on-site. Update list as necessary to include up-to-date information. Keep a copy of updated list with the SWP3.
- C. Prepare description of controls to reduce pollutants generated from on-site storage. Include storage practices necessary to minimize exposure of materials to storm water, and spill prevention and response measures consistent with best management practices. Keep a copy of the description with the SWP3.

3.8 NOTICE OF TERMINATION

- A. Submit a NOT, ATTACHMENT 6 of this Section 01410, to Project Manager within 30 days after:
 - 1. Final stabilization has been achieved on all portions of the site that are the responsibility of the Contractor; or,
 - 2. Another operator has assumed control over all areas of the site that have not been stabilized; and
 - 3. All sit fences and other temporary erosion controls have either been removed, scheduled to be removed as defined in the SWP3, or transferred to a new operator if the new operator has sought permit coverage.
- B. Project Manager will complete City's NOT and submit Contractor and City's notices to the TCEQ and MS4 entities.

END OF SECTION

ATTACHMENT 1

TCEQ Office Use Only
 Permit No:
 CN:
 RN:



Notice of Intent (NOI) for an Authorization for Stormwater Discharges Associated with Construction Activity under TPDES General Permit TXR150000

IMPORTANT INFORMATION

Please read and use the General Information and Instructions prior to filling out each question in the NOI form.

Use the NOI Checklist to ensure all required information is completed correctly.
Incomplete applications delay approval or result in automatic denial.

Once processed your permit authorization can be viewed by entering the following link into your internet browser: http://www2.tceq.texas.gov/wq_dpa/index.cfm or you can contact TCEQ Stormwater Processing Center at 512-239-3700.

ePERMITS

Effective September 1, 2018, this paper form must be submitted to TCEQ with a completed electronic reporting waiver form (TCEQ-20754).

To submit an NOI electronically, enter the following web address into your internet browser and follow the instructions: <https://www3.tceq.texas.gov/steers/index.cfm>

APPLICATION FEE AND PAYMENT

The application fee for submitting a paper NOI is \$325. The application fee for electronic submittal of a NOI through the TCEQ ePermits system (STEERS) is \$225.

Payment of the application fee can be submitted by mail or through the TCEQ ePay system. The payment and the NOI must be mailed to separate addresses. To access the TCEQ ePay system enter the following web address into your internet browser: <http://www.tceq.texas.gov/epay>.

Provide your payment information for verification of payment:

- If payment was mailed to TCEQ, provide the following:
 - Check/Money Order Number: [REDACTED]
 - Name printed on Check: [REDACTED]
- If payment was made via ePay, provide the following:
 - Voucher Number: [REDACTED]
 - A copy of the payment voucher is attached to this paper NOI form.

RENEWAL (This portion of the NOI is not applicable after June 3, 2018)

Is this NOI for a renewal of an existing authorization? Yes No

If Yes, provide the authorization number here: TXR15 [redacted]

NOTE: If an authorization number is not provided, a new number will be assigned.

SECTION 1. OPERATOR (APPLICANT)

a) If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity? CN [redacted]

(Refer to Section 1.a) of the Instructions)

b) What is the Legal Name of the entity (applicant) applying for this permit? (The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)

[redacted]

c) What is the contact information for the Operator (Responsible Authority)?

Prefix (Mr. Ms. Miss): [redacted]

First and Last Name: [redacted] Suffix: [redacted]

Title: [redacted] Credentials: [redacted]

Phone Number: [redacted] Fax Number: [redacted]

E-mail: [redacted]

Mailing Address: [redacted]

City, State, and Zip Code: [redacted]

Mailing Information if outside USA:

Territory: [redacted]

Country Code: [redacted] Postal Code: [redacted]

d) Indicate the type of customer:

- Individual
- Limited Partnership
- General Partnership
- Trust
- Sole Proprietorship (D.B.A.)
- Corporation
- Estate
- Federal Government
- County Government
- State Government
- City Government
- Other Government
- Other: [redacted]

e) Is the applicant an independent operator? Yes No

(If a governmental entity, a subsidiary, or part of a larger corporation, check No.)

f) Number of Employees. Select the range applicable to your company.

- 0-20
- 21-100
- 101-250
- 251-500
- 501 or higher

g) Customer Business Tax and Filing Numbers: (**Required** for Corporations and Limited Partnerships. **Not Required** for Individuals, Government, or Sole Proprietors.)

State Franchise Tax ID Number: [REDACTED]
Federal Tax ID: [REDACTED]
Texas Secretary of State Charter (filing) Number: [REDACTED]
DUNS Number (if known): [REDACTED]

SECTION 2. APPLICATION CONTACT

Is the application contact the same as the applicant identified above?

- Yes, go to Section 3
- No, complete this section

Prefix (Mr. Ms. Miss): [REDACTED]
First and Last Name: [REDACTED] Suffix: [REDACTED]
Title: [REDACTED] Credential: [REDACTED]
Organization Name: [REDACTED]
Phone Number: [REDACTED] Fax Number: [REDACTED]
E-mail: [REDACTED]
Mailing Address: [REDACTED]
Internal Routing (Mail Code, Etc.): [REDACTED]
City, State, and Zip Code: [REDACTED]
Mailing information if outside USA:
Territory: [REDACTED]
Country Code: [REDACTED] Postal Code: [REDACTED]

SECTION 3. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

a) If this is an existing permitted site, what is the Regulated Entity Number (RN) issued to this site? RN [REDACTED]
(Refer to Section 3.a) of the Instructions)

- b) Name of project or site (the name known by the community where it's located): [REDACTED]
- c) In your own words, briefly describe the type of construction occurring at the regulated site (residential, industrial, commercial, or other): [REDACTED]
- d) County or Counties (if located in more than one): [REDACTED]
- e) Latitude: [REDACTED] Longitude: [REDACTED]
- f) Site Address/Location

If the site has a physical address such as 12100 Park 35 Circle, Austin, TX 78753, complete *Section A*.

If the site does not have a physical address, provide a location description in *Section B*.
 Example: located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1.

Section A:

Street Number and Name: [REDACTED]

City, State, and Zip Code: [REDACTED]

Section B:

Location Description: [REDACTED]

City (or city nearest to) where the site is located: [REDACTED]

Zip Code where the site is located: [REDACTED]

SECTION 4. GENERAL CHARACTERISTICS

- a) Is the project or site located on Indian Country Lands?
 - Yes, do not submit this form. You must obtain authorization through EPA Region 6.
 - No
- b) Is your construction activity associated with a facility that, when completed, would be associated with the exploration, development, or production of oil or gas or geothermal resources?
 - Yes. Note: The construction stormwater runoff may be under jurisdiction of the Railroad Commission of Texas and may need to obtain authorization through EPA Region 6.
 - No
- c) What is the Primary Standard Industrial Classification (SIC) Code that best describes the construction activity being conducted at the site? [REDACTED]
- d) What is the Secondary SIC Code(s), if applicable? [REDACTED]
- e) What is the total number of acres to be disturbed? [REDACTED]
- f) Is the project part of a larger common plan of development or sale?

Yes

No. The total number of acres disturbed, provided in e) above, must be 5 or more. If the total number of acres disturbed is less than 5, do not submit this form. See the requirements in the general permit for small construction sites.

g) What is the estimated start date of the project? [REDACTED]

h) What is the estimated end date of the project? [REDACTED]

i) Will concrete truck washout be performed at the site? Yes No

j) What is the name of the first water body(ies) to receive the stormwater runoff or potential runoff from the site? [REDACTED]

k) What is the segment number(s) of the classified water body(ies) that the discharge will eventually reach? [REDACTED]

l) Is the discharge into a Municipal Separate Storm Sewer System (MS4)?

Yes No

If Yes, provide the name of the MS4 operator: [REDACTED]

Note: The general permit requires you to send a copy of this NOI form to the MS4 operator.

m) Is the discharge or potential discharge from the site within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer, as defined in 30 TAC Chapter 213?

Yes, complete the certification below.

No, go to Section 5

I certify that the copy of the TCEQ-approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) that is included or referenced in the Stormwater Pollution Prevention Plan will be implemented. Yes

SECTION 5. NOI CERTIFICATION

a) I certify that I have obtained a copy and understand the terms and conditions of the Construction General Permit (TXR150000). Yes

b) I certify that the full legal name of the entity applying for this permit has been provided and is legally authorized to do business in Texas. Yes

c) I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed. Yes

d) I certify that a Stormwater Pollution Prevention Plan has been developed, will be implemented prior to construction and to the best of my knowledge and belief is compliant with any applicable local sediment and erosion control plans, as required in the Construction General Permit (TXR150000). Yes

Note: For multiple operators who prepare a shared SWP3, the confirmation of an operator may be limited to its obligations under the SWP3, provided all obligations are confirmed by at least one operator.

SECTION 6. APPLICANT CERTIFICATION SIGNATURE

Operator Signatory Name: [REDACTED]

Operator Signatory Title: [REDACTED]

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature (use blue ink): _____ Date: _____

NOTICE OF INTENT CHECKLIST (TXR150000)

Did you complete everything? Use this checklist to be sure!

Are you ready to mail your form to TCEQ? Go to the General Information Section of the Instructions for mailing addresses.

Confirm each item (or applicable item) in this form is complete. This checklist is for use by the applicant to ensure a complete application is being submitted. **Missing information may result in denial of coverage under the general permit.** (See NOI process description in the General Information and Instructions.)

APPLICATION FEE

If paying by check:

- Check was mailed **separately** to the TCEQs Cashier's Office. (See Instructions for Cashier's address and Application address.)
- Check number and name on check is provided in this application.

If using ePay:

- The voucher number is provided in this application and a copy of the voucher is attached.

RENEWAL

- If this application is for renewal of an existing authorization, the authorization number is provided.

OPERATOR INFORMATION

- Customer Number (CN) issued by TCEQ Central Registry
- Legal name as filed to do business in Texas. (Call TX SOS 512-463-5555 to verify.)
- Name and title of responsible authority signing the application.
- Phone number and e-mail address
- Mailing address is complete & verifiable with USPS. www.usps.com
- Type of operator (entity type). Is applicant an independent operator?
- Number of employees.
- For corporations or limited partnerships - Tax ID and SOS filing numbers.
- Application contact and address is complete & verifiable with USPS. <http://www.usps.com>

REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

- Regulated Entity Number (RN) (if site is already regulated by TCEQ)
- Site/project name and construction activity description
- County
- Latitude and longitude <http://www.tceq.texas.gov/gis/sqmaview.html>

- Site Address/Location. Do not use a rural route or post office box.

GENERAL CHARACTERISTICS

- Indian Country Lands -the facility is not on Indian Country Lands.
- Construction activity related to facility associated to oil, gas, or geothermal resources
- Primary SIC Code that best describes the construction activity being conducted at the site.
www.osha.gov/oshstats/sicser.html
- Estimated starting and ending dates of the project.
- Confirmation of concrete truck washout.
- Acres disturbed is provided and qualifies for coverage through a NOI.
- Common plan of development or sale.
- Receiving water body or water bodies.
- Segment number or numbers.
- MS4 operator.
- Edwards Aquifer rule.

CERTIFICATION

- Certification statements have been checked indicating Yes.
- Signature meets 30 Texas Administrative Code (TAC) §305.44 and is original.

Instructions for Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

GENERAL INFORMATION

Where to Send the Notice of Intent (NOI):

By Regular Mail:

TCEQ

Stormwater Processing Center (MC228)

P.O. Box 13087

Austin, Texas 78711-3087

By Overnight or Express Mail:

TCEQ

Stormwater Processing Center (MC228)

12100 Park 35 Circle

Austin, TX

Application Fee:

The application fee of \$325 is required to be paid at the time the NOI is submitted. Failure to submit payment at the time the application is filed will cause delays in acknowledgment or denial of coverage under the general permit. Payment of the fee may be made by check or money order, payable to TCEQ, or through EPAY (electronic payment through the web).

Mailed Payments:

Use the attached General Permit Payment Submittal Form. The application fee is submitted to a different address than the NOI. Read the General Permit Payment Submittal Form for further instructions, including the address to send the payment.

ePAY Electronic Payment: <http://www.tceq.texas.gov/epay>

When making the payment you must select Water Quality, and then select the fee category "General Permit Construction Storm Water Discharge NOI Application". You must include a copy of the payment voucher with your NOI. Your NOI will not be considered complete without the payment voucher.

TCEQ Contact List:

Application – status and form questions:

512-239-3700, swpermit@tceq.texas.gov

Technical questions:

512-239-4671, swgp@tceq.texas.gov

Environmental Law Division:

512-239-0600

Records Management - obtain copies of forms:

512-239-0900

Reports from databases (as available):

512-239-DATA (3282)

Cashier's office:

512-239-0357 or 512-239-0187

Notice of Intent Process:

When your NOI is received by the program, the form will be processed as follows:

- **Administrative Review:** Each item on the form will be reviewed for a complete response. In addition, the operator's legal name must be verified with Texas Secretary of State as valid and active (if applicable). The address(es) on the form must be verified with the US Postal service as receiving regular mail delivery. Do not give an overnight/express mailing address.

- **Notice of Deficiency:** If an item is incomplete or not verifiable as indicated above, a notice of deficiency (NOD) will be mailed to the operator. The operator will have 30 days to respond to the NOD. The response will be reviewed for completeness.
- **Acknowledgment of Coverage:** An Acknowledgment Certificate will be mailed to the operator. This certificate acknowledges coverage under the general permit.

or

Denial of Coverage: If the operator fails to respond to the NOD or the response is inadequate, coverage under the general permit may be denied. If coverage is denied, the operator will be notified.

General Permit (Your Permit)

For NOIs submitted **electronically** through ePermits, provisional coverage under the general permit begins immediately following confirmation of receipt of the NOI form by the TCEQ.

For **paper** NOIs, provisional coverage under the general permit begins **7 days after a completed NOI is postmarked for delivery** to the TCEQ.

You should have a copy of your general permit when submitting your application. You may view and print your permit for which you are seeking coverage, on the TCEQ web site <http://www.tceq.texas.gov>. Search using keyword TXR150000.

Change in Operator

An authorization under the general permit is not transferable. If the operator of the regulated project or site changes, the present permittee must submit a Notice of Termination and the new operator must submit a Notice of Intent. The NOT and NOI must be submitted no later than 10 days prior to the change in Operator status.

TCEQ Central Registry Core Data Form

The Core Data Form has been incorporated into this form. Do not send a Core Data Form to TCEQ. After final acknowledgment of coverage under the general permit, the program will assign a Customer Number and Regulated Entity Number, if one has not already been assigned to this customer or site.

For existing customers and sites, you can find the Customer Number and Regulated Entity Number by entering the following web address into your internet browser: <http://www15.tceq.texas.gov/crpub/> or you can contact the TCEQ Stormwater Processing Center at 512-239-3700 for assistance. On the website, you can search by your permit number, the Regulated Entity (RN) number, or the Customer Number (CN). If you do not know these numbers, you can select “Advanced Search” to search by permittee name, site address, etc.

The Customer (Permittee) is responsible for providing consistent information to the TCEQ, and for updating all CN and RN data for all authorizations as changes occur. For this permit, a Notice of Change form must be submitted to the program area.

INSTRUCTIONS FOR FILLING OUT THE NOI FORM

Renewal of General Permit. Dischargers holding active authorizations under the expired General Permit are required to submit a NOI to continue coverage. The existing permit number is required. If the permit number is not provided or has been terminated, expired, or denied, a new permit number will be issued.

Section 1. OPERATOR (APPLICANT)

a) Customer Number (CN)

TCEQ's Central Registry will assign each customer a number that begins with CN, followed by nine digits. **This is not a permit number, registration number, or license number.**

If the applicant is an existing TCEQ customer, the Customer Number is available at the following website: <http://www15.tceq.texas.gov/crpub/>. If the applicant is not an existing TCEQ customer, leave the space for CN blank.

b) Legal Name of Applicant

Provide the current legal name of the applicant. The name must be provided exactly as filed with the Texas Secretary of State (SOS), or on other legal documents forming the entity, as filed in the county. You may contact the SOS at 512-463-5555, for more information related to filing in Texas. If filed in the county, provide a copy of the legal documents showing the legal name.

c) Contact Information for the Applicant (Responsible Authority)

Provide information for the person signing the application in the Certification section. This person is also referred to as the Responsible Authority.

Provide a complete mailing address for receiving mail from the TCEQ. The mailing address must be recognized by the US Postal Service. You may verify the address on the following website: <https://tools.usps.com/go/ZipLookupAction!input.action>.

The phone number should provide contact to the applicant.

The fax number and e-mail address are optional and should correspond to the applicant.

d) Type of Customer (Entity Type)

Check only one box that identifies the type of entity. Use the descriptions below to identify the appropriate entity type. Note that the selected entity type also indicates the name that must be provided as an applicant for an authorization.

Individual

An individual is a customer who has not established a business, but conducts an activity that needs to be regulated by the TCEQ.

Partnership

A customer that is established as a partnership as defined by the Texas Secretary of State Office (TX SOS). If the customer is a 'General Partnership' or 'Joint Venture' filed in the county (not filed with TX SOS), the legal name of each partner forming the 'General Partnership' or 'Joint Venture' must be provided. Each 'legal entity' must apply as a co-applicant.

Trust or Estate

A trust and an estate are fiduciary relationships governing the trustee/executor with respect to the trust/estate property.

Sole Proprietorship (DBA)

A sole proprietorship is a customer that is owned by only one person and has not been incorporated. This business may:

1. be under the person's name
2. have its own name (doing business as or DBA)
3. have any number of employees.

If the customer is a Sole Proprietorship or DBA, the 'legal name' of the individual business 'owner' must be provided. The DBA name is not recognized as the 'legal name' of the entity. The DBA name may be used for the site name (regulated entity).

Corporation

A customer that meets all of these conditions:

1. is a legally incorporated entity under the laws of any state or country
2. is recognized as a corporation by the Texas Secretary of State
3. has proper operating authority to operate in Texas

The corporation's 'legal name' as filed with the Texas Secretary of State must be provided as applicant. An 'assumed' name of a corporation is not recognized as the 'legal name' of the entity.

Government

Federal, state, county, or city government (as appropriate)

The customer is either an agency of one of these levels of government or the governmental body itself. The government agency's 'legal name' must be provided as the applicant. A department name or other description of the organization is not recognized as the 'legal name'.

Other

This may include a utility district, water district, tribal government, college district, council of governments, or river authority. Provide the specific type of government.

e) Independent Entity

Check No if this customer is a subsidiary, part of a larger company, or is a governmental entity. Otherwise, check Yes.

f) Number of Employees

Check one box to show the number of employees for this customer's entire company, at all locations. This is not necessarily the number of employees at the site named in the application.

g) Customer Business Tax and Filing Numbers

These are required for Corporations and Limited Partnerships. These are not required for Individuals, Government, and Sole Proprietors.

State Franchise Tax ID Number

Corporations and limited liability companies that operate in Texas are issued a franchise tax identification number. If this customer is a corporation or limited liability company, enter the Tax ID number.

Federal Tax ID

All businesses, except for some small sole proprietors, individuals, or general partnerships should have a federal taxpayer identification number (TIN). Enter this number here. Use no prefixes, dashes, or hyphens. Sole proprietors, individuals, or general partnerships do not need to provide a federal tax ID.

TX SOS Charter (filing) Number

Corporations and Limited Partnerships required to register with the Texas Secretary of State are issued a charter or filing number. You may obtain further information by calling SOS at 512-463-5555.

DUNS Number

Most businesses have a DUNS (Data Universal Numbering System) number issued by Dun and Bradstreet Corp. If this customer has one, enter it here.

Section 2. APPLICATION CONTACT

Provide the name and contact information for the person that TCEQ can contact for additional information regarding this application.

Section 3. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

a) Regulated Entity Number (RN)

The RN is issued by TCEQ's Central Registry to sites where an activity is regulated by TCEQ. This is not a permit number, registration number, or license number. Search TCEQ's Central Registry to see if the site has an assigned RN at <http://www15.tceq.texas.gov/crpub/>. If this regulated entity has not been assigned an RN, leave this space blank.

If the site of your business is part of a larger business site, an RN may already be assigned for the larger site. Use the RN assigned for the larger site.

If the site is found, provide the assigned RN and provide the information for the site to be authorized through this application. The site information for this authorization may vary from the larger site information.

An example is a chemical plant where a unit is owned or operated by a separate corporation that is accessible by the same physical address of your unit or facility. Other examples include industrial parks identified by one common address but different corporations have control of defined areas within the site. In both cases, an RN would be assigned for the physical address location and the permitted sites would be identified separately under the same RN.

b) Name of the Project or Site

Provide the name of the site or project as known by the public in the area where the site is located. The name you provide on this application will be used in the TCEQ Central Registry as the Regulated Entity name.

c) Description of Activity Regulated

In your own words, briefly describe the primary business that you are doing that requires this authorization. Do not repeat the SIC Code description.

d) County

Provide the name of the county where the site or project is located. If the site or project is located in more than one county, provide the county names as secondary.

e) Latitude and Longitude

Enter the latitude and longitude of the site in degrees, minutes, and seconds or decimal form. For help obtaining the latitude and longitude, go to:

<http://www.tceq.texas.gov/gis/sqmaview.html>.

f) Site Address/Location

If a site has an address that includes a street number and street name, enter the complete address for the site in *Section A*. If the physical address is not recognized as a USPS delivery address, you may need to validate the address with your local police (911 service) or through an online map site used to locate a site. Please confirm this to be a complete and valid address. Do not use a rural route or post office box for a site location.

If a site does not have an address that includes a street number and street name, provide a complete written location description in *Section B*. For example: "The site is located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1."

Provide the city (or nearest city) and zip code of the site location.

Section 4. GENERAL CHARACTERISTICS

a) Indian Country Lands

If your site is located on Indian Country Lands, the TCEQ does not have authority to process your application. You must obtain authorization through EPA Region 6, Dallas. Do not submit this form to TCEQ.

b) Construction activity associated with facility associated with exploration, development, or production of oil, gas, or geothermal resources

If your activity is associated with oil and gas exploration, development, or production, you may be under jurisdiction of the Railroad Commission of Texas (RRC) and may need to obtain authorization from EPA Region 6.

Construction activities associated with a facility related to oil, gas or geothermal resources may include the construction of a well site; treatment or storage facility; underground hydrocarbon or natural gas storage facility; reclamation plant; gas processing facility; compressor station; terminal facility where crude oil is stored prior to refining and at which refined products are stored solely for use at the facility; a

carbon dioxide geologic storage facility; and a gathering, transmission, or distribution pipeline that will transport crude oil or natural gas, including natural gas liquids, prior to refining of such oil or the use of the natural gas in any manufacturing process or as a residential or industrial fuel.

Where required by federal law, discharges of stormwater associated with construction activities under the RRC's jurisdiction must be authorized by the EPA and the RRC, as applicable. Activities under RRC jurisdiction include construction of a facility that, when completed, would be associated with the exploration, development, or production of oil or gas or geothermal resources, such as a well site; treatment or storage facility; underground hydrocarbon or natural gas storage facility; reclamation plant; gas processing facility; compressor station; terminal facility where crude oil is stored prior to refining and at which refined products are stored solely for use at the facility; a carbon dioxide geologic storage facility under the jurisdiction of the RRC; and a gathering, transmission, or distribution pipeline that will transport crude oil or natural gas, including natural gas liquids, prior to refining of such oil or the use of the natural gas in any manufacturing process or as a residential or industrial fuel. The RRC also has jurisdiction over stormwater from land disturbance associated with a site survey that is conducted prior to construction of a facility that would be regulated by the RRC. Under 33 U.S.C. §1342(l)(2) and §1362(24), EPA cannot require a permit for discharges of stormwater from field activities or operations associated with {oil and gas} exploration, production, processing, or treatment operations, or transmission facilities, including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activities unless the discharge is contaminated by contact with any overburden, raw material, intermediate product, finished product, byproduct, or waste product located on the site of the facility. Under §3.8 of this title (relating to Water Protection), the RRC prohibits operators from causing or allowing pollution of surface or subsurface water. Operators are encouraged to implement and maintain best management practices (BMPs) to minimize discharges of pollutants, including sediment, in stormwater during construction activities to help ensure protection of surface water quality during storm events.

For more information about the jurisdictions of the RRC and the TCEQ, read the Memorandum of Understanding (MOU) between the RRC and TCEQ at 16 Texas Administrative Code, Part 1, Chapter 3, Rule 3.30, by entering the following link into an internet browser:

[http://texreg.sos.state.tx.us/public/readtac\\$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=16&pt=1&ch=3&rl=30](http://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=16&pt=1&ch=3&rl=30) or contact the TCEQ Stormwater Team at 512-239-4671 for additional information.

c) Primary Standard Industrial Classification (SIC) Code

Provide the SIC Code that best describes the construction activity being conducted at this site.

Common SIC Codes related to construction activities include:

- 1521 - Construction of Single Family Homes
- 1522 - Construction of Residential Buildings Other than Single Family Homes
- 1541 - Construction of Industrial Buildings and Warehouses

- 1542 - Construction of Non-residential Buildings, other than Industrial Buildings and Warehouses
- 1611 - Highway and Street Construction, except Highway Construction
- 1622 - Bridge, Tunnel, and Elevated Highway Construction
- 1623 - Water, Sewer, Pipeline and Communications, and Power Line Construction

For help with SIC Codes, enter the following link into your internet browser: <http://www.osha.gov/pls/imis/sicsearch.html> or you can contact the TCEQ Small Business and Local Government Assistance Section at 800-447-2827 for assistance.

d) Secondary SIC Code

Secondary SIC Code(s) may be provided. Leave this blank if not applicable. For help with SIC Codes, enter the following link into your internet browser: <http://www.osha.gov/pls/imis/sicsearch.html> or you can contact the TCEQ Small Business and Environmental Assistance Section at 800-447-2827 for assistance.

e) Total Number of Acres Disturbed

Provide the approximate number of acres that the construction site will disturb. Construction activities that disturb less than one acre, unless they are part of a larger common plan that disturbs more than one acre, do not require permit coverage. Construction activities that disturb between one and five acres, unless they are part of a common plan that disturbs more than five acres, do not require submission of an NOI. Therefore, the estimated area of land disturbed should not be less than five, unless the project is part of a larger common plan that disturbs five or more acres. Disturbed means any clearing, grading, excavating, or other similar activities.

If you have any questions about this item, please contact the stormwater technical staff by phone at 512-239-4671 or by email at swgp@tceq.texas.gov.

f) Common Plan of Development

Construction activities that disturb less than five acres do not require submission of an NOI unless they are part of a common plan of development or for sale where the area disturbed is five or more acres. Therefore, the estimated area of land disturbed should not be less than five, unless the project is part of a larger common plan that disturbs five or more acres. Disturbed means any clearing, grading, excavating, or other similar activities.

For more information on what a common plan of development is, refer to the definition of “Common Plan of Development” in the Definitions section of the general permit or enter the following link into your internet browser:

www.tceq.texas.gov/permitting/stormwater/common_plan_of_development_steps.html

For further information, go to the TCEQ stormwater construction webpage enter the following link into your internet browser: www.tceq.texas.gov/goto/construction and search for “Additional Guidance and Quick Links”. If you have any further questions about the Common Plan of Development you can contact the TCEQ Stormwater Team at 512-239-4671 or the TCEQ Small Business and Environmental Assistance at 800-447-2827.

g) Estimated Start Date of the Project

This is the date that any construction activity or construction support activity is initiated at the site. If renewing the permit provide the original start date of when construction activity for this project began.

h) Estimated End Date of the Project

This is the date that any construction activity or construction support activity will end and final stabilization will be achieved at the site.

i) Will concrete truck washout be performed at the site?

Indicate if you expect that operators of concrete trucks will washout concrete trucks at the construction site.

j) Identify the water body(s) receiving stormwater runoff

The stormwater may be discharged directly to a receiving stream or through a MS4 from your site. It eventually reaches a receiving water body such as a local stream or lake, possibly via a drainage ditch. You must provide the name of the water body that receives the discharge from the site (a local stream or lake).

If your site has more than one outfall you need to include the name of the first water body for each outfall, if they are different.

k) Identify the segment number(s) of the classified water body(s)

Identify the classified segment number(s) receiving a discharge directly or indirectly. Enter the following link into your internet browser to find the segment number of the classified water body where stormwater will flow from the site:

www.tceq.texas.gov/waterquality/monitoring/viewer.html or by contacting the TCEQ Water Quality Division at (512) 239-4671 for assistance.

You may also find the segment number in TCEQ publication GI-316 by entering the following link into your internet browser: www.tceq.texas.gov/publications/gi/gi-316 or by contacting the TCEQ Water Quality Division at (512) 239-4671 for assistance.

If the discharge is into an unclassified receiving water and then crosses state lines prior to entering a classified segment, select the appropriate watershed:

- 0100 (Canadian River Basin)
- 0200 (Red River Basin)
- 0300 (Sulfur River Basin)
- 0400 (Cypress Creek Basin)
- 0500 (Sabine River Basin)

Call the Water Quality Assessments section at 512-239-4671 for further assistance.

l) Discharge into MS4 – Identify the MS4 Operator

The discharge may initially be into a municipal separate storm sewer system (MS4). If the stormwater discharge is into an MS4, provide the name of the entity that operates the MS4 where the stormwater discharges. An MS4 operator is often a city, town, county, or utility district, but possibly can be another form of government. Please note that the Construction General Permit requires the Operator to supply the MS4 with a

copy of the NOI submitted to TCEQ. For assistance, you may call the technical staff at 512-239-4671.

m) Discharges to the Edwards Aquifer Recharge Zone and Certification

The general permit requires the approved Contributing Zone Plan or Water Pollution Abatement Plan to be included or referenced as a part of the Stormwater Pollution Prevention Plan.

See maps on the TCEQ website to determine if the site is located within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer by entering the following link into an internet browser:

www.tceq.texas.gov/field/eapp/viewer.html or by contacting the TCEQ Water Quality Division at 512-239-4671 for assistance.

If the discharge or potential discharge is within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer, a site-specific authorization approved by the Executive Director under the Edwards Aquifer Protection Program (30 TAC Chapter 213) is required before construction can begin.

For questions regarding the Edwards Aquifer Protection Program, contact the appropriate TCEQ Regional Office. For projects in Hays, Travis and Williamson Counties: Austin Regional Office, 12100 Park 35 Circle, Austin, TX 78753, 512-339-2929. For Projects in Bexar, Comal, Kinney, Medina and Uvalde Counties: TCEQ San Antonio Regional Office, 14250 Judson Rd., San Antonio, TX 78233-4480, 210-490-3096.

Section 5. NOI CERTIFICATION

Note: Failure to indicate Yes to all of the certification items may result in denial of coverage under the general permit.

a) Certification of Understanding the Terms and Conditions of Construction General Permit (TXR150000)

Provisional coverage under the Construction General Permit (TXR150000) begins 7 days after the completed paper NOI is postmarked for delivery to the TCEQ. Electronic applications submitted through ePermits have immediate provisional coverage. You must obtain a copy and read the Construction General Permit before submitting your application. You may view and print the Construction General Permit for which you are seeking coverage at the TCEQ web site by entering the following link into an internet browser: www.tceq.texas.gov/goto/construction or you may contact the TCEQ Stormwater processing Center at 512-239-3700 for assistance.

b) Certification of Legal Name

The full legal name of the applicant as authorized to do business in Texas is required. The name must be provided exactly as filed with the Texas Secretary of State (SOS), or on other legal documents forming the entity, that is filed in the county where doing business. You may contact the SOS at 512-463 5555, for more information related to filing in Texas.

c) Understanding of Notice of Termination

A permittee shall terminate coverage under the Construction General Permit through the submittal of a NOT when the operator of the facility changes, final stabilization has

been reached, the discharge becomes authorized under an individual permit, or the construction activity never began at this site.

d) Certification of Stormwater Pollution Prevention Plan

The SWP3 identifies the areas and activities that could produce contaminated runoff at your site and then tells how you will ensure that this contamination is mitigated. For example, in describing your mitigation measures, your site's plan might identify the devices that collect and filter stormwater, tell how those devices are to be maintained, and tell how frequently that maintenance is to be carried out. You must develop this plan in accordance with the TCEQ general permit requirements. This plan must be developed and implemented before you complete this NOI. The SWP3 must be available for a TCEQ investigator to review on request.

Section 6. APPLICANT CERTIFICATION SIGNATURE

The certification must bear an original signature of a person meeting the signatory requirements specified under 30 Texas Administrative Code (TAC) §305.44.

If you are a corporation:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(1) (see below). According to this code provision, any corporate representative may sign an NOI or similar form so long as the authority to sign such a document has been delegated to that person in accordance with corporate procedures. By signing the NOI or similar form, you are certifying that such authority has been delegated to you. The TCEQ may request documentation evidencing such authority.

If you are a municipality or other government entity:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(3) (see below). According to this code provision, only a ranking elected official or principal executive officer may sign an NOI or similar form. Persons such as the City Mayor or County Commissioner will be considered ranking elected officials. In order to identify the principal executive officer of your government entity, it may be beneficial to consult your city charter, county or city ordinances, or the Texas statute(s) under which your government entity was formed. An NOI or similar document that is signed by a government official who is not a ranking elected official or principal executive officer does not conform to §305.44(a)(3). The signatory requirement may not be delegated to a government representative other than those identified in the regulation. By signing the NOI or similar form, you are certifying that you are either a ranking elected official or principal executive officer as required by the administrative code. Documentation demonstrating your position as a ranking elected official or principal executive officer may be requested by the TCEQ.

If you have any questions or need additional information concerning the signatory requirements discussed above, please contact the TCEQ's Environmental Law Division at 512-239-0600.

30 Texas Administrative Code

§305.44. Signatories to Applications

(a) All applications shall be signed as follows.

(1) For a corporation, the application shall be signed by a responsible corporate officer. For purposes of this paragraph, a responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the

corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit or post-closure order applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

(2) For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this paragraph, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., regional administrator of the EPA).

Texas Commission on Environmental Quality General Permit Payment Submittal Form

Use this form to submit your Application Fee only if you are mailing your payment.

Instructions:

- Complete items 1 through 5 below:
- Staple your check in the space provided at the bottom of this document.
- *Do not mail this form with your NOI form.*
- *Do not mail this form to the same address as your NOI.*

Mail this form and your check to either of the following:

By Regular U.S. Mail

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
P.O. Box 13088
Austin, TX 78711-3088

By Overnight or Express Mail

Texas Commission on Environmental Quality
Financial Administration Division
Cashier's Office, MC-214
12100 Park 35 Circle
Austin, TX 78753

Fee Code: GPA General Permit: TXR150000

1. Check or Money Order No:
2. Amount of Check/Money Order:
3. Date of Check or Money Order:
4. Name on Check or Money Order:
5. NOI Information:

If the check is for more than one NOI, list each Project or Site (RE) Name and Physical Address exactly as provided on the NOI. **Do not submit a copy of the NOI with this form, as it could cause duplicate permit application entries!**

If there is not enough space on the form to list all of the projects or sites the authorization will cover, then attach a list of the additional sites.

Project/Site (RE) Name:

Project/Site (RE) Physical Address:

Staple the check or money order to this form in this space.

ATTACHMENT 2



SMALL CONSTRUCTION SITE NOTICE

FOR THE
 Texas Commission on Environmental Quality (TCEQ)
 Stormwater Program
TPDES GENERAL PERMIT TXR150000

The following information is posted in compliance with **Part II.E.2.** of the TCEQ General Permit Number TXR150000 for discharges of stormwater runoff from small construction sites. Additional information regarding the TCEQ stormwater permit program may be found on the internet at:

http://www.tceq.state.tx.us/nav/permits/wq_construction.html

Operator Name:	
Contact Name and Phone Number:	
Project Description: <i>Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized</i>	
Location of Stormwater Pollution Prevention Plan:	

For Small Construction Activities Authorized Under Part II.E.2. (Obtaining Authorization to Discharge) the following certification must be completed:

I _____ (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.E.2. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A stormwater pollution prevention plan has been developed and will be implemented prior to construction, according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title _____ Date _____

_____ Date Notice Removed

_____ MS4 operator notified per Part II.F.3.

ATTACHMENT 3

TPDES OPERATOR'S INFORMATION

Owner's Name and Address: City of Houston

Mr. _____
(City Official)

(Department)
1002 Washington Ave, 2nd FL
Houston, TX 77002
(832) 394-9108

Contractors' Names and Addresses:

General Contractor: _____

Telephone: _____

Site Superintendent: _____

Telephone: _____

Erosion Control and
Maintenance Inspection: _____

Telephone: _____

Subcontractors' Names and Addresses:

Phone: _____

Phone: _____

Note: Insert name, address, and telephone number of person or firms

ATTACHMENT 4

**CONTRACTOR'S / SUBCONTRACTOR'S
CERTIFICATION FOR TPDES PERMITTING**

I certify under penalty of law that I understand the terms and conditions of TPDES General Permit No. TXR150000 and the Storm Water Pollution Prevention Plan for the construction site identified as part of this certification.

Signature:

Name: (printed or typed)

Title:

Company:

Address:

Date:

Signature:

Name: (printed or typed)

Title:

Company:

Address:

Date:

Signature:

Name: (printed or typed)

Title:

Company:

Address:

Date:

ATTACHMENT 5



City of Houston
Storm Water Quality
Construction Site Activities Inspection Report

TCEQ Stormwater Discharge Permit Number _____

COH Storm Water Quality Permit Number _____

COH Building Permit Login Number _____

NAME _____ DATE _____

ADDRESS _____

- No exceptions noted.
The following deficiencies have been noted:
- NOI / Construction Site Notice Improperly Posted
- Stormwater Pollution Prevention Plan Incomplete or requires updating
- Copy of NOI / CSN not on site
- Storm Water Pollution Prevention Plan not on site
- Erosion and sediment controls improperly installed
- Erosion and sediment control devices improperly maintained
- Fueling/washout/chemical storage areas not properly protected
- Portocan or other sanitary facilities not properly protected or leaking
- Self-inspection and maintenance records incomplete
- Sediment from site outside area of construction
- Other (see description below)

The deficiencies must be corrected:
 immediately; within 48 hours;
 prior to re-inspection

Should the noted deficiencies not be corrected in the time frame indicated, further enforcement remedies will be sought.

For questions concerning the above:
Please contact the Storm Water Quality Group at
1002 Washington Avenue, 2nd Floor, Houston TX 77002
832-394-9108

Inspector's Name

Operator's Signature

Inspector's Cell Phone

Operator's Name
 not present

Distribution: white – Stormwater Quality Engineer gold – operator

ATTACHMENT 6

TCEQ Office Use Only
Permit No:
CN:
RN:
Region:



**Notice of Termination (NOT) for Authorizations under
TPDES General Permit TXR150000**

IMPORTANT INFORMATION:

Please read and use the General Information and Instructions prior to filling out each question in the form.

Effective September 1, 2018, this paper form must be submitted to TCEQ with a completed electronic reporting waiver form (TCEQ-20754).

ePermits: This form is available on our online permitting system.

Sign up for online permitting at: <https://www3.tceq.texas.gov/steers/>

What is the permit number to be terminated?

TXR15 [redacted] TXRCW [redacted]

Section 1. OPERATOR (Permittee)

a) What is the Customer Number (CN) issued to this entity?

CN [redacted]

b) What is the Legal Name of the current permittee?

[redacted]

c) Provide the contact information for the Operator (Responsible Authority).

Prefix (Mr. Ms. or Miss): [redacted]

First and Last Name: [redacted] Suffix: [redacted]

Title: [redacted] Credentials: [redacted]

Phone Number: [redacted] Fax Number: [redacted]

Email: [redacted]

Mailing Address: [redacted]

City, State, and Zip Code: [redacted]

Country Mailing Information, if outside USA: [redacted]

Section 2. APPLICATION CONTACT

This is the person TCEQ will contact if additional information is needed regarding this application.

Is the application contact the same as the permittee identified above?

Yes, go to Section 3.

No, complete section below

Prefix (Mr. Ms. or Miss): [REDACTED]

First and Last Name: [REDACTED] Suffix: [REDACTED]

Title: [REDACTED] Credentials: [REDACTED]

Phone Number: [REDACTED] Fax Number: [REDACTED]

Email: [REDACTED]

Mailing Address: [REDACTED]

City, State, and Zip Code: [REDACTED]

Country Mailing Information, if outside USA: [REDACTED]

Section 3. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

a) TCEQ issued RE Reference Number (RN): RN [REDACTED]

b) Name of project or site as known by the local community: [REDACTED]

c) County, or counties if more than 1: [REDACTED]

d) Latitude: [REDACTED] Longitude: [REDACTED]

e) Site Address/Location:

If the site has a physical address such as 12100 Park 35 Circle, Austin, TX 78753, complete Section 3A.

If the site does not have a physical address, provide a location description in Section 3B. Example: located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1.

Section 3A: Physical Address of Project or Site:

Street Number and Name: [REDACTED]

City, State, and Zip Code: [REDACTED]

Section 3B: Site Location Description:

Location description: [REDACTED]
[REDACTED]

City where the site is located or, if not in a city, what is the nearest city: [REDACTED]

Zip Code where the site is located: [REDACTED]

Section 4. REASON FOR TERMINATION

Check the reason for termination:

Final stabilization has been achieved on all portions of the site that are the responsibility of the Operator and all silt fences and other temporary erosion controls have been removed, or scheduled for removal as defined in the SWP3.

- Another permitted Operator has assumed control over all areas of the site that have not been finally stabilized, and temporary erosion controls that have been identified in the SWP3 have been transferred to the new Operator.
- The discharge is now authorized under an alternate TPDES permit.
- The activity never began at this site that is regulated under the general permit.

Section 5. CERTIFICATION

Signatory Name: [REDACTED]

Signatory Title: [REDACTED]

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature (use blue ink): _____ Date: _____

Instructions for Notice of Termination (NOT) for Authorizations under TPDES General Permit TXR150000

GENERAL INFORMATION

Where to Send the Notice of Termination (NOT):

BY REGULAR U.S. MAIL:

Texas Commission on Environmental Quality
Stormwater Processing Center (MC-228)
P.O. Box 13087
Austin, Texas 78711-3087

BY OVERNIGHT/EXPRESS MAIL:

Texas Commission on Environmental Quality
Stormwater Processing Center (MC-228)
12100 Park 35 Circle
Austin, TX 78753

TCEQ Contact List:

Application status and form questions:	512-239-3700, swpermit@tceq.texas.gov
Technical questions:	512-239-4671, swgp@tceq.texas.gov
Environmental Law Division:	512-239-0600
Records Management - obtain copies of forms:	512-239-0900
Reports from databases (as available):	512-239-DATA (3282)
Cashier's office:	512-239-0357 or 512-239-0187

Notice of Termination Process:

A Notice of Termination is **effective on the date postmarked for delivery to TCEQ.**

When your NOT is received by the program, the form will be processed as follows:

- 1) Administrative Review: The form will be reviewed to confirm the following:
 - the permit number is provided;
 - the permit is active and has been approved;
 - the entity terminating the permit is the current permittee;
 - the site information matches the original permit record; and
 - the form has the required original signature with title and date.
- 2) Notice of Deficiency: If an item is incomplete or not verifiable as indicated above, a phone call will be made to the applicant to clear the deficiency. A letter will not be sent to the permittee if unable to process the form.
- 3) Confirmation of Termination: A Notice of Termination Confirmation letter will be mailed to the operator.

Change in Operator:

An authorization under the general permit is not transferable. If the operator of the regulated entity changes, the present permittee must submit a Notice of Termination and the new operator must submit a Notice of Intent. The NOT and NOI must be submitted not later than 10 days prior to the change in Operator status.

INSTRUCTIONS FOR FILLING OUT THE FORM

The majority of permit information related to the current operator and regulated entity are available at the following website: http://www2.tceq.texas.gov/wq_dpa/index.cfm.

Section 1. Operator (Current Permittee):

- a) Customer Number (CN)
TCEQ's Central Registry assigns each customer a number that begins with CN, followed by nine digits. This is not a permit number, registration number, or license number. The Customer Number, for the current permittee, is available at the following website:
http://www2.tceq.texas.gov/wq_dpa/index.cfm.

- b) Legal Name of Operator
The operator must be the same entity as previously submitted on the original Notice of Intent for the permit number provided. The current operator name, as provided on the current authorization, is available at the following website:
http://www2.tceq.texas.gov/wq_dpa/index.cfm.

- c) Contact Information for the Operator (Responsible Authority)
Provide information for person signing the NOT application in the Certification section. This person is also referred to as the Responsible Authority.

Provide a complete mailing address for receiving mail from the TCEQ. Update the address if different than previously submitted for the Notice of Intent or Notice of Change. The mailing address must be recognized by the US Postal Service. You may verify the address on the following website: <https://tools.usps.com/go/ZipLookupAction!input.action>.

The phone number should provide contact to the operator.

The fax number and e-mail address are optional and should correspond to the operator.

Section 2. Application Contact:

Provide the name, title and contact information of the person that TCEQ can contact for additional information regarding this application.

Section 3. Regulated Entity (RE) Information on Project or Site:

- a) Regulated Entity Reference Number (RN)
A number issued by TCEQ's Central Registry to sites where an activity regulated by TCEQ. This is not a permit number, registration number, or license number. The Regulated Entity Reference Number is available at the following website:
http://www2.tceq.texas.gov/wq_dpa/index.cfm.
- b) Name of the Project or Site
Provide the name of the site as known by the public in the area where the site is located.
- c) County
Identify the county or counties in which the regulated entity is located.
- d) Latitude and Longitude
Enter the latitude and longitude of the site in degrees, minutes, and seconds or decimal form. The latitude and longitude as provided on the current authorization is available at the following website: http://www2.tceq.texas.gov/wq_dpa/index.cfm.
- e) Site/Project (RE) Physical Address/Location Information
The physical address/location information, as provided on the current authorization, is available at the following website: http://www2.tceq.texas.gov/wq_dpa/index.cfm.

Section 3A. If a site has an address that includes a street number and street name, enter the complete address for the site. If the physical address is not recognized as a USPS delivery address, you may need to validate the address with your local police (911 service) or through an online map site used to locate the site. Please confirm this to be a complete and valid address. Do not use a rural route or post office box for a site location.

Section 3B. If a site does not have an address that includes a street number and street name, provide a complete written location description. For example: "The site is located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1."

Provide the city (or nearest city) and Zip Code of the facility location.

Section 4. Reason for Termination:

The Notice of Termination form is only for use to terminate the authorization (permit). The Permittee must indicate the specific reason for terminating by checking one of the options. If the reason is not listed then provide an attachment that explains the reason for termination.

Please read your general permit carefully to determine when to terminate your permit. Permits will not be reactivated after submitting a termination form. The termination is effective on the date postmarked for delivery to TCEQ.

Section 5. Certification:

The certification must bear an original signature of a person meeting the signatory requirements specified under 30 Texas Administrative Code §305.44.

IF YOU ARE A CORPORATION:

The regulation that controls who may sign an application form is 30 Texas Administrative Code §305.44(a), which is provided below. According to this code provision, any corporate representative may sign an NOI or similar form so long as the authority to sign such a document has been delegated to that person in accordance with corporate procedures. By signing the NOI or similar form, you are certifying that such authority has been delegated to you. The TCEQ may request documentation evidencing such authority.

IF YOU ARE A MUNICIPALITY OR OTHER GOVERNMENT ENTITY:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a), which is provided below. According to this code provision, only a ranking elected official or principal executive officer may sign an NOI or similar form. Persons such as the City Mayor or County Commissioner will be considered ranking elected officials. In order to identify the principal executive officer of your government entity, it may be beneficial to consult your city charter, county or city ordinances, or the Texas statutes under which your government entity was formed. An NOI or similar document that is signed by a government official who is not a ranking elected official or principal executive officer does not conform to §305.44(a) (3). The signatory requirement may not be delegated to a government representative other than those identified in the regulation. By signing the NOI or similar form, you are certifying that you are either a ranking elected official or principal executive officer as required by the administrative code. Documentation demonstrating your position as a ranking elected official or principal executive officer may be requested by the TCEQ.

If you have any questions or need additional information concerning the signatory requirements discussed above, please contact the Texas Commission on Environmental Quality's Environmental Law Division at 512-239-0600.

30 Texas Administrative Code §305.44. Signatories to Applications

(a) All applications shall be signed as follows.

(1) For a corporation, the application shall be signed by a responsible corporate officer. For purposes of this paragraph, a responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

Corporate procedures governing authority to sign permit or post-closure order applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

(2) For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this paragraph, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., regional administrator of the EPA).

SECTION 01423

REFERENCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General quality assurance related to Reference Standards.
- B. List of references.
- C. List of definitions.
- D. List of phrases.

1.02 QUALITY ASSURANCE

- A. For work specified by association, trade, or Federal Standards, follow requirements of the standard, except when more rigid requirements are specified or are required by applicable codes or by Contract Documents.
- B. Follow reference standard effective on the date stated in Document 00700 - General Conditions.
- C. Submit Document 00685- Request for Information before proceeding if specified reference standards conflict with Contract Documents, or if no standards apply.

1.03 PARTIAL LIST OF REFERENCES

AA	Aluminum Association 900 19 th St. N.W. Washington, DC 20006 Ph: 202-862-5100		Research Park Dr. P.O. Box 14052 Lexington, KY 40512-4052 Ph: 859-288-4960
AASHTO	Amer. Assoc. of State Hwy. Officials 444 North Capitol Street, N.W. #249 Washington, DC 20001 Ph: 202-624-5800	AITC	American Institute of Timber Construction 7012 S. Revere Pkwy, #140 Englewood, CO 80112 Ph: 303-792-9559
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333-9094 Ph: 248-848-3700	AISC	American Institute of Steel Construction 1 E. Wacker Dr., #3100 Chicago, IL 60601-2001 Ph: 312-670-2400
AGC	Associated General Contractors of America 333 John Carlyle St., #200 Alexandria, VA 22314 Ph: 703-548-3118	AISI	American Iron & Steel Institute 1101 17th Street, N.W., #1300 Washington, DC 20036 Ph: 202-452-7100
ASME	American Soc. of Mech. Engrs. Three Park Ave. New York, NY 10016-5902 Ph: 212-591-7733	ANSI	American Natl. Stds. Institute 25 W. 43 rd St., 4 Floor New York, NY 10036 Ph: 212-642-4900
AI	Asphalt Institute	APA	The Engineered Wood Assoc.

REFERENCES

	7011 So. 19 th , Tacoma, WA 98466 Ph: 253-565-6600	FS	Federal Standardization Documents Gen. Svcs. Admin. Specificatns. Unit (WFSIS) 7th and D Streets, S.W. #6039 Washington, DC 20407 Ph: 202-472-2205
API	American Petroleum Institute 1220 L Street, N.W. Washington, DC 20005-4070 Ph: 202-682-8000	HAS	(City of) Houston Airport System P.O. Box 60106 (16930 JFK Blvd., 77032) Houston, TX 77205-0106 Ph: 281-233-3000
AREA	Amer. Railway Engrg. Assoc. 8201 Corporate Dr., #1125 Landover, MD 20785 Ph: 301-459-3200	HOU	William P. Hobby Airport (Airport Manager) 7800 Airport Blvd. Houston, Texas 77061 Ph: 713-640-3000
ASTM	American Soc. for Testing & Materials 100 Barr Harbor Dr., PO Box C700 West Conshohocken, PA 19428-2959 Ph: 610-832-9585	IAH	George Bush Intercontinental Airport Houston (Airport Manager) 2800 N. Terminal Road Houston, TX 77032 Ph: 281-230-3100
AWPA	American Wood-Preservers' Association PO Box 388 Selma, AL 36702-0388 Ph: 334-874-9800	ICEA	Insulated Cable Engineer Association P.O. Box 1568 Carrollton, GA 30112
AWS	American Welding Society 550 N.W. LeJeune Rd. Miami, FL 33126 Ph: 800-443-9353	IEEE	Institute of Electrical and Electronics Engineers 445 Hoes Lane, or P.O. Box 1331 Piscataway, NJ 08854-1331 Ph: 732-981-0060
AWWA	Amer. Water Works Assoc. 6666 West Quincy Avenue Denver, CO 80235 Ph: 303-794-7711	MIL	Military Specifications (see "FS" for address)
BICSI	Bldg. Industry Consulting Svc. Intl. 8610 Hidden River Pkwy. Tampa, FL 33637-1000 Ph: 800-242-7405	NACE	National Association of Corrosion Engineers 440 1 st St. N.W. Washington, DC 20001 Ph: 202-393-6226
COH	City of Houston 900 Bagby Street (Box 1562) Houston, TX 77251-1562 Ph: 713-837-0311	NARTE	National Association of Radio and Telecommunications Engineers, Inc. 167 Village Street P.O. Box 678 Medway, MA 02053 Ph: 508-533-8333, 800-896-2783
CLFMI	Chain Link Fence Mfgs Inst. 10015 Old Columbia Rd., #B-215 Columbia, MD 21046 Ph: 301-596-2583	NEMA	National Electrical Manufacturers' Association 1300 North 17 th Street, Suite 1847 Rosslyn, VA 22209 Ph: 703-841-3200
CRSI	Conc. Reinforced Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173-4758 Ph: 847-517-1200	NFPA	National Fire Protection Association 1 Batterymarch Park, P.O. Box 9101 Quincy, MA 02169-7471 Ph: 617-770-3000
EJMA	Expansion Joint Manufacturers Assoc. 25 N. Broadway Tarrytown, NY 10591 Ph: 914-332-0040	OSHA	Occupational Safety Health Administration 200 Constitution Avenue, NW Washington, DC 20210 Ph: 866-487-2365
		PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083

REFERENCES

PCI	Ph: 847-966-6200 Prestressed Concrete Institute 201 North Wacker Drive Chicago, IL 60606 Ph: 312-786-0300	TAC	Pittsburgh, PA 15222-4656 Ph: 412-281-2331 Texas Admin. Code, Texas Water Development Board Box 13231, Capitol Station Austin, TX 78711-3231 Ph: 512-463-7926
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 Ph: 847-458-4647	UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062-2096 Ph: 877- 854-3577, 800-285-4476
SSPC	The Society for Protective Coatings 40 24 th Street, 6 th Floor	UNI-BELL	UNI-BELL Pipe Association 2655 Villa Creek Dr., Suite 155 Dallas, TX 75234 Ph: 972-243-3902

1.04 PARTIAL LIST OF DEFINITIONS

Airport: Area of land or water used or intended to be used for landing and takeoff of aircraft and includes buildings and facilities. Airports under control of City are certificated by FAA under FAR Part 139 and operate under specific safety requirements applicable to maintenance and construction activities.

Airport Manager: Individual delegated by Director of Department of Aviation, with absolute responsibility and authority for overall airport operation and compliance with FAR Part 139. Airport Manager shall communicate with Contractor through City Engineer except in case of emergency when City Engineer is not present. The Airport Manager may delegate responsibilities to other persons, such as airport electricians to coordinate lockouts/tag-outs.

Air Operations Area (AOA): Any area of Airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft, including paved or unpaved areas used or intended to be used for unobstructed movement of aircraft in addition to associated runway, taxiway, or apron. The AOA includes any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures.

Airport Security Officers: 1) Uniformed City of Houston Police (HPD) officers enforcing airport regulations and apprehension of unauthorized personnel in security areas; 2) Non-uniformed federal or local government personnel authorized to test for compliance with existing regulations.

Air Traffic Control Tower (ATCT): Person responsible for positive control of aircraft and vehicle traffic, including Contractor's, on and around runways, taxiways, and aprons.

Base Facility: Existing structure upon and within which the Work is constructed. "Existing construction" and "existing" mean the same as Base Facility.

1. By way of general description, Base Facility includes sidewalks and pavement; foundations; superstructure columns, beams and floors; exterior and interior walls,

REFERENCES

partitions and doors; mechanical and electrical systems; conveying systems; interior finish materials.

- a. Underground structures include sewer, water, gas, fuel and other piping, and manholes, chambers, electrical and signal conduits, ducts, tunnels, manholes and other means of access, foundations and below-ground extensions of surface structures and other existing subsurface Work located within or adjacent to the limits of the Work.
- b. Surface structures include existing buildings, tanks, masts and poles, navigational aids, walls, bridges, roads, dams, channels, open drainage, piping, wires, posts, signs, markers, curbs, walks, pavements and surfaces for wheeled vehicles (including aircraft), guard cables, fencing, lighting and similar constructs above the ground surface or visible without excavation, demolition or cutting.

DOT: Acronym for U.S. Department of Transportation.

Emergency Medical Service: Operational division of Houston Fire Department.

Emergency Vehicles: ARFF, HPD and EMS vehicles operating in emergency mode.

Federal Aviation Administration (FAA): Agency of U.S. Department of Transportation. FAA also means FAA's Administrator or Administrator's duly authorized representative.

Ground Support Equipment (GSE): Mobile and stationary vehicles and equipment for servicing aircraft.

Navigation Aids (NAVAIDS): Equipment used to locate aircraft and direct movement while airborne.

Public areas: Areas where no accessibility restrictions are imposed, generally including roadways, streets, parking lots and structures, and building interiors up to but not including baggage and passenger checkpoints at concourses.

Secured Area: Any portion of the airport where aircraft operators (and foreign air carriers that have a security program under part 1544 or 1546) enplane and deplane passengers, sort and load baggage, and any adjacent areas not separated by adequate security measures.

Security Areas, Security Identification Areas (SIDAs): 1.) AOA; 2) Secured Areas: Exterior or interior areas the access to which is controlled by authorized security personnel or by keyed or electronic locks, and which may have posted notice of restricted access.

Traffic Activity: In-the-air or on-the-ground aircraft and emergency vehicle activity that, determined by ATCT, Airport Manager or City Engineer because of safety reasons, prohibits the start, continuation or completion of construction operations.

REFERENCES

Transportation Security Administration (TSA): Agency of U.S. Department of Transportation charged with implementing and enforcing federal airport security rules and regulations. TSA also means TSA's Undersecretary or the Undersecretary's duly authorized representative(s).

TSR: an acronym for Transportation Security Regulation.

1.05 PARTIAL LIST OF PHRASES

- A. Read "includes" and "including" as having the phrase "but not necessarily limited to" immediately following the words, if not otherwise written out.
- B. "Required" means products, labor and services provided by the Contractor to properly complete the Work following the Contract Documents and the design concept expressed therein, such required work being determined and governed by field or shop conditions.

1.06 PARTIAL LIST OF ABBREVIATIONS AND ACRONYMS

- A. Following abbreviations and acronyms may appear on Drawings and in other Sections:
 - 1. CFP: City-furnished product(s).
 - 2. CSP: Contractor-salvaged product(s).
 - 3. NIC or N.I.C.: Not in contract.
 - 4. NOTAM: Notice to Airman.
 - 5. PDC: Department of Aviation Planning Design Construction Group.
 - 6. RFI: Request for Information/Clarification.
 - 7. RFP: Request for Proposal.
 - 8. WCD: Work Change Directive.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

REFERENCES

01423-5 rev. 10.10.06

SECTION 01450

CONTRACTOR'S QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General requirements for Contractor's quality control services.
- B. Contractor's responsibilities related to City's testing are specified in Section 01455 - City's Acceptance Testing.

1.02 GENERAL

- A. Maintain source and on-site quality control over suppliers, manufacturers, products, services, site conditions, quality assurance programs, and workmanship, to provide work of required quality at no additional cost to the City.
- B. Follow manufacturers' installation instructions, including each step-in sequence.
- C. Request clarification from City Engineer before proceeding should manufacturers' instructions conflict with Contract Documents.
- D. Follow 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 work by persons qualified to produce the specified level of workmanship.
- F. Observe, inspect, collect samples and test samples of the Work as it progresses and as required for compliance with Document 00700 - General Conditions Paragraph 3.2.
 - 1. At Contractor's discretion, retain a testing laboratory to supplement manufacturers' own product testing programs, except do not retain the same testing laboratory retained by City under Section 01455 - City's Acceptance Testing.
 - 2.
 - 2. Additional responsibilities of Contractor related to testing are specified in Section 01455 - City's Acceptance Testing.

1.03. CONTRACTOR'S QUALITY ASSURANCE PROGRAM (QAP)

CONTRACTOR'S QUALITY CONTROL

- A. Implement and maintain a QAP of inspection, sampling, testing, and observation and test results reporting for the Work, applicable to product source, fabrication, mixing, and through final installation, to provide proper work.

- B. Submit required submittals and requests for information (RFIs) into the HAS's web-based application, Microsoft SharePoint. Access to the SharePoint portal and required training will be coordinated through the Project Manager. Submit Contractor's Quality Assurance Program (QAP), following Section 01340 - Shop Drawings, Product Data and Samples, with following minimum information:
 - 1. Organization chart indicating Contractor's QAP personnel.
 - 2. Inspection, Sampling and Testing Matrix/ Schedule: Overlaid with requirements of Section 01325 - Construction Schedules and Section 01455 - City's Acceptance Testing.
 - 3. Sample QAP reporting forms.
 - 4. Procedures for action to correct defective work.
 - 5. Procedures to implement and manage the QAP.
 - 6. Submit one copy of Contractor's written QAP Inspection, Test, and Daily Reports to City and one copy to ITL, on a daily basis, indicating:
 - a. Project Name, Number, CIP Number.
 - b. Date/time of inspection/sampling/test, and quantity of product involved.
 - c. Product or installation batch, mill number, or production run number, and method used to assure statistically based random sampling following ASTM D3665.
 - d. Environmental conditions where applicable to results.
 - e. Name and signature of observer or tester, certifying as follows:

"The above work was inspected/sampled and tested in the manner described, and the result(s) are hereby certified by the undersigned as complete and accurate."
 - f. Product or installation inspected, by Section number, and location of inspection (such as product source, fabrication shop, or on site), and quantity of product tested.
 - g. Location in the Work, by Drawing/detail number, floor number, range/station number, or other specific identifier traceable to the Drawings.

CONTRACTOR'S QUALITY CONTROL

- h. Type of inspection or test (such as visual; non-destructive X-ray), and type of test by referenced standard test number.
 - i. Type of inspection, sample or test products used.
 - j. Performance standard required.
 - k. Factual evidence and results of inspections, measurements or tests stated as "pass" or "fail."
 - l. Factual evidence and record of observations and tests. Include nature and type of failure, and comments as applicable.
- C. Contractor's QAP Personnel for Sitework:
- 1. Quality Control Manager: Sole responsibility for management, implementation and control of the QAP; an employee of Contractor and specialist in type of applicable construction. If not an officer of firm, this person shall report to an officer.
 - a. Duties and Responsibilities: Plan, organize, staff, direct and control the QC Program; supervise QCTs (below); collate and review detail reports of QC activities for accuracy and completeness before publication, and prepare factual summary reports. The QCM may work projects other than this project, except QCM shall be present at times of sampling, testing or observation, within 2 hours of notice.
 - b. Demonstrated experience in parking garage paving construction and quality assurance compliance equivalent in scope and complexity to work of this contract, plus one of the following minimums:
 - 1) Registered civil engineer, with 1 year above experience.
 - 2) Engineer-in-Training, with 2 years above experience.
 - 3) Graduate Bachelor of Science degree in Civil Engineering, Civil Engineering Technology or Construction, with 3 years above experience.
 - 4) National Institute for Certification in Engineering Technologies (NICET), Level III, certified Construction Materials Technician, Highway Materials Technician, or Highway Construction Technician, with 4 years above experience.
 - 5) NICET-certified Civil Engineering Technician, with 5 years above experience, and approved by the City Engineer.
 - 2. Quality Control Technicians (QCT): Responsibility for processing this QC Program; report to the QCM.

CONTRACTOR'S QUALITY CONTROL

- a. Duties and Responsibilities: Inspect work, collect samples, take measurements, test work, collate test and measurement data, and prepare factual, accurate and complete reports. Use as many QCTs as required. QCTs may be Contractor's employees or personnel of a qualified ITL subcontracted to the Contractor, except do not use City's ITL to fulfill Contractor's testing requirements.
 - b. Demonstrated experience in same construction as QCM, and quality assurance compliance equivalent in scope and complexity to work of this contract, plus one of the following minimums:
 - 1) Engineer or Engineering Technician, with 1 year above experience.
 - 2) NICET Level II or higher certification as Construction Materials Technician, Highway Materials Technician, or Highway Construction Technician, , with 2 years above experience.
 3. Equivalent certifications by authorities other than NICET may be substituted following Section 01630.
- D. Contractor's QAP Personnel for Buildings:
1. Quality Control Manager: Sole responsibility for management, implementation and control of the QAP; an employee of the Contractor and specialist in type of applicable construction. If not an officer of firm, this person shall report to an officer.
 - a. Duties and Responsibilities: Plan, organize, staff, direct and control the QC Program; supervise QCT staff (below); collate and review detail reports of QC activities for accuracy and completeness before publication, and prepare factual summary reports. The QCM may work projects other than this project, except QCM shall be present at times of sampling, testing or observation, within 2 hours of notice.
 - b. Demonstrated experience in building Structural construction and quality assurance compliance equivalent in scope and complexity to work of this contract, plus one of the following minimums:
 - 1) Registered structural engineer, with 1 year above experience.
 - 2) Engineer-in-Training, with 2 years above experience.
 - 3) Graduate Bachelor of Science degree in structural engineering, with 3 years above experience.
 2. Quality Control Technicians (QCT): Responsibility for processing QAP; report to the QCM.

- a. Duties and Responsibilities: Inspect work, collect samples, take measurements, test work, collate test and measurement data, and prepare factual, accurate and complete reports. Use as many QCTs as required. QCTs may be Contractor's employees or personnel of a qualified ITL subcontracted to the Contractor, except do not use City's ITL to fulfill Contractor's testing requirements.
- b. Engineer or Engineering Technician, with minimum 1 year demonstrated experience in same construction as QCM, and quality assurance compliance equivalent in scope and complexity to work of this contract.

1.03 REFERENCES

- A. Obtain copies of referenced standards and maintain at site when required by other Sections.

1.04 MANUFACTURER'S FIELD SERVICES

- A. When specified in other Sections or when conditions are required to maintain schedule, cost or quality control, provide services of properly qualified manufacturer's or supplier's technical representative(s) to observe field conditions, conditions of substrates and installation, quality of workmanship, startup, testing, adjusting, balancing, demonstration and City-personnel training as required.
- B. Within 14 days of observation, submit a written report to City Engineer, prepared by manufacturer's representative, documenting their observations, supplementary instructions and instructions at variance with manufacturer's written instructions, and, where applicable, recommendations for corrective action. Costs and time for corrective action is Contractor's responsibility, without increase in Contract Sum or Time.

1.05 SUBCONTRACTS

- A. Coordinate work of subcontractors. Inform subcontractors of relation of their work to that of other subcontractors and Separate Contractors and direct scheduling of work to prevent conflicts or interferences.
- B. Employ subcontractors with documented proof of proper completion of two projects during the past 3 years of work similar in scope, type and quality as that required for this contract.

1.06 EXAMINATION AND PREPARATORY WORK

- A. Carefully examine substrates whether Base Facility or provided as part of the Work before commencing work applied to or accommodated by substrates. Proceed after unsatisfactory conditions are corrected, and after substrate work is properly prepared and complete.

- B. Take field dimension and establish and maintain lines, dimensions, and benchmarks as required to control proper fabrication and installation of work.
- C. Do not proceed with affected work until unsatisfactory site conditions and substrates are correct.
 - 1. Make written notification of scope and type of corrections required of separate contracts.
- D. Repair remaining substrates following Section 01731 - Cutting and Patching.

1.07 CONTRACTOR'S TESTING

- A. Follow Document 00700 - General Conditions Paragraphs 3.9.2 and this Section 01450.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSPECTIONS BY BUILDING OFFICIALS AND OTHER AGENCIES

- A. Immediately notify City Engineer of the date of inspections by governing authorities, in order for City Engineer to attend.

END OF SECTION

SECTION 01455
CITY'S ACCEPTANCE TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. City Will retain an Independent Testing Laboratory (ITL) for following services:
1. Collect product samples at source, site of fabrication, or project site as required by referenced test procedure, as specified herein or in other Sections.
 2. Test product samples at source, site of fabrication, project site or in ITL's laboratory as required by referenced test procedure, as specified herein or in other Sections.
 3. Inspect execution of work at source, site of fabrication, or project site, as applicable, as specified herein or in other Sections.
 4. Record and distribute observations of work during inspections, indicating "pass" or "fail."
 5. Record and distribute results of tests, indicating "pass" or "fail."
 6. ITL does not have authority to:
 - a. Release, revoke, alter, or enlarge requirements of Contract Documents.
 - b. Approve or accept work.
 - c. Assume duties of Contractor.
 - d. Stop the Work or a part thereof.

1.02 CONTRACTOR'S RESPONSIBILITIES

- A. Notify City Engineer, ITL and Designer minimum 24 hours prior to expected time for inspections or sample collections. Schedule ITL's, City Engineer's, and Designer's presence for timely inspections, observations, and sample collection without delay to the Work.
- B. Provide access to the Work and cooperate with ITL for inspection and sample collection.
- C. Furnish samples of manufactured products to ITL for inspection and testing.
- D. Provide incidental labor, products, services and facilities for sample collection and for transportation and handling of samples to ITL's vehicle or to ITL's on-site test facility.

CITY'S ACCEPTANCE TESTING

- E. Reimburse City by Modification (Section 01255 - Modification Procedures) for costs of retesting previously "failed" work, including time expended by City's personnel related thereto.
- F. Time delays and costs resulting from ill-timed QC work are the Contractor's responsibility, without increase in Contract Time or Price.
- G. Follow Document 00700 - General Conditions Paragraph 3.2 and Section 01450- Contractor's Quality Control.
- H. Perform work following requirements of Contract Documents.
- I. Read reports of failed tests or measurements. Implement corrective actions to prevent defective work from proceeding farther.
- J. Stop affected work when corrective action fails to bring work to required standards.
- K. Remove defective work following Section 01731 and replace with proper work.
- L. Inspect, sample and test Base Facility Section 01726, as required to determine and confirm acceptability of existing construction as substrate for new construction.
- M. If Contractor employs a testing laboratory, follow ASTM D3740 and ASTM E329, plus other test standards specified in other Sections.
- N. Contractor shall not:
 - 1. Employ for Contractor's quality assurance testing the same ITL employed by the City for this Project.
 - 2. Retain possession of ITL's samples.

1.03 SUBMITTALS BY ITL

- A. Submit 3 copies of following to City:
 - 1. Written certification of compliance with following:
 - a. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - b. ASTM E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.
 - 2. Copy of latest inspection report by Materials Reference Laboratory/ National Bureau of Standards (NBS) or inspection traceable thereto, with statement of remedies of

deficiencies.

3. Invoice for retesting previously "failed" work.
- B. Submit 5 copies of following, 3 to City, 2 to Contractor. Immediately transmit "fail" reports by facsimile directly to City and to Contractor.
1. Project Name, Number, CIP Number.
 2. Identify ITL, Contractor, Subcontractor or Supplier, Section number and name, generic and manufacturer's name of product, numerical sequence when more than one inspection, sample or test of the same product is made, date and time of each inspection, sample collection or test, and applicable Drawing detail number.
 3. Date/time of inspection/sampling/test, and quantity of product involved.
 4. Product or installation batch, mill number, or production run number, and method used to assure statistically based random sampling following ASTM D3665.
 5. Environmental conditions where applicable to results.
 6. Name and signature of observer or tester, certifying as follows:
"The above work was inspected/sampled and tested in the manner described, and the result(s) are hereby certified by the undersigned as complete and accurate."
 7. Product or installation inspected, by Section number, and location of inspection (such as product source, fabrication shop, or on site), and quantity of product tested.
 8. Location in the Work, by Drawing/detail number, floor number, range/station number, or other specific identifier traceable to the Drawings.
 9. Type of inspection or test (such as visual; non-destructive X-ray), and type of test by ASTM or other reference standard test number.
 10. Type of inspection, sample or test equipment used.
 11. Performance standard required
 12. Factual evidence and results of inspections, measurements or tests stated as "pass" or "fail."
 13. Factual evidence and record of observations and tests. Include nature and type of failure, and comments as applicable. Furnish graphic or narrative data, or both, indicating nominal requirements and actual test values. Indicate type and

numerical value of deviations from specified requirements.

14. For submittals using SI (metric) measure as the ITL's standard, include corresponding Imperial measure conversions. Follow Section 01610 - Basic Product Requirements.
- C. Print and distribute copies of records.
- D. Transmit reports within 7 days of observations, inspections or test completion, except where shorter processing time is required due to possibility of Contractor continuing installation of "failing" work.
- E. For data in the form of drawings:
1. Submit one vellum sepia or electrostatic transparency (emulsion side "up") with one diazo print to City Engineer. Submit one diazo print to Contractor.
 2. Sheet Size: 8-1/2 x 11 inches minimum; 44 x 34 inches maximum.
 3. If CADD is used, prepare documents readable, writable and printable using IBM PC-compatible hardware and software, based on AutoCAD (11 or later versions) or software translated thereto. Provide copy of AutoCAD data disks to City Engineer
 4. Prepare drawings by qualified drafters.
 5. Draw to scale, and accurately represent products.
- F. For statistical records in the form of spreadsheets or graphs:
1. Submit electrostatic prints.
 2. Sheet Size: 8-1/2 x 11 inches minimum; 11 x 17 inches maximum.
 3. Provide copy of data disks to City Engineer at completion of the Work.

PART 2 PRODUCTS

2.01 SAMPLING AND TEST EQUIPMENT

- A. Provide and maintain in proper function sampling and test equipment of type and quantity required, with calibration and accuracy traceable to NBS.

PART 3 EXECUTION

3.01 GENERAL PROCEDURES

- A. Follow requirements of individual Sections.
- B. Follow Section 01457 - Estimating Percentage of Product Within Specification Limits for determining percentage of product within specified limits.
- C. Coordinate inspections, sampling and testing with construction progress and Contractor's schedule specified in Section 01325 - Construction Schedules.
- D. At least once per shift inspect mixing, fabrication and installation of soil, cementitious and petroleum-based products for proper operation or tolerances. Confirm installers and tool operators are qualified, and tools are properly functioning.
- E. Sample at frequencies following requirements of applicable Sections or as specified herein and test each sample.
- F. Take quantity, linear, volume and bulk measurements as frequently as necessary to control mixing, fabrication and installation.
- G. Properly calibrate test equipment and measuring tools before use.
- H. Immediately report failed tests or measurements.
- I. Test work for proper function and performance as specified herein and in other Sections.
- J. Test and balance final HVAC system by AABC-certified contractor as part of the Work.

INSPECTION AND OBSERVATION

- A. Inspect work by properly experienced personnel. Observe mixing, fabrication and installation procedures. Record observations.
- B. Inspect at frequency indicated, using visual observation and measuring tools appropriate to the work. If not otherwise required in other Sections, inspect product source at the site of origin.

3.03 SAMPLING

- A. Unless otherwise indicated in Sections or otherwise required by test standard, randomly collect 3 samples and maintain possession until observation and testing is complete and results documented.
- B. Collect and handle samples following test standard.
- C. Coordinate operations with Contractor.

3.04 TESTING

- A. Test products *in situ* as approved by City Engineer or in laboratory where destructive tests are required, test to product failure. Note factual observations, test results, and measuring equipment setup, typed or legibly handwritten. For graph illustrations, use computerized database or spreadsheets.
- B. Store and cure samples following test standards or as required to maintain samples in pristine condition until tested.
- C. Test samples for conformance with requirements.
- D. Follow test standards specified herein and in other Sections.

3.05 SCHEDULE OF INSPECTIONS, SAMPLES AND TESTS

- A. Observe mixing, fabrication and installation, and inspect, collect samples and test, as indicated in applicable Sections.

END OF SECTION

SECTION 01457**ESTIMATING PERCENTAGE OF
MATERIAL WITHIN SPECIFICATION LIMITS (PWL)****PART 1 GENERAL**

When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (\bar{X}) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index(s), Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

IT IS THE INTENT OF THIS SECTION TO INFORM THE CONTRACTOR THAT, IN ORDER TO CONSISTENTLY OFFSET THE CONTRACTOR'S RISK FOR MATERIAL EVALUATED, PRODUCTION QUALITY (USING POPULATION AVERAGE AND POPULATION STANDARD DEVIATION) MUST BE MAINTAINED AT THE ACCEPTABLE QUALITY SPECIFIED OR HIGHER. IN ALL CASES, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRODUCE AT QUALITY LEVELS THAT WILL MEET THE SPECIFIED ACCEPTANCE CRITERIA WHEN SAMPLED AND TESTED AT THE FREQUENCIES SPECIFIED.

1.01 SECTION INCLUDES

- A. Statistical analysis to determine the total estimated percent of the lot within specification limits.
- B. Method for computations.
- C. Table of values for Q_L and Q_U .

ESTIMATING PERCENTAGE OF PWL

- D. Product sampling and testing is specified in Section 01455.

1.02 DEFINITIONS

- A. Percent Within Limits (PWL): Statistically based evaluation method, where the PWL is computed on a lot basis, using the average (\bar{X}) and standard deviation (S_n) of the specified number (n) of subplot tests for the lot and the specified tolerance limits (L for lower and U for upper) for the particular acceptance parameter.
 1. From these values, the respective Quality indices (Q_L for Lower Quality Index and/or Q_U for Upper Quality Index) are computed and the PWL for the specified n is determined from Table 1.

1.03 METHOD FOR COMPUTING PWL

- A. The computational sequence for computing PWL is as follows:
 1. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.
 2. Locate the random sampling position within the subplot in accordance with the requirements of the specification.
 3. Make a measurement at each location or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.
 4. Find the sample average (\bar{X}) for all subplot values within the lot by using the following formula:

$$\bar{X} = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

Where: \bar{X} = Sample average of all subplot values within a lot
 x_1, x_2 = Individual subplot values
 n = Number of sublots

5. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of subplot values in the set
 d_1, d_2, \dots = Deviations of the individual subplot values x_1, x_2, \dots from the average value \bar{X}
 that is: $d_1 = (x_1 - \bar{X}), d_2 = (x_2 - \bar{X}) \dots d_n = (x_n - \bar{X})$
 n = Number of sublots

6. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L

ESTIMATING PERCENTAGE OF PWL

by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L , using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

7. For double-sided specification limits (i.e. L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n \text{ and } Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U , using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U . Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: P_L = percent within lower specification limit
 P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

- B. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1	96.60
A-2	97.55
A-3	99.30
A-4	98.35
n = 4	

2. Calculate average density for the lot.

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$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$$

$$X = 97.95 \text{ percent density}$$

3. Calculate the standard deviation for the lot.

$$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$$

$$S_n = 1.15$$

4. Calculate the Lower Quality Index Q_L for the lot. ($L=96.3$)

$$Q_L = (X - L) / S_n$$

$$Q_L = (97.95 - 96.30) / 1.15$$

$$Q_L = 1.4348$$

5. Determine PWL by entering Table 1 with $Q_L=1.44$ and $n=4$.

$$PWL = 98$$

C. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1	5.00
A-2	3.74
A-3	2.30
A-4	3.25

2. Calculate the average air voids for the lot.

$$X = (x_1 + x_2 + x_3 + \dots + x_n) / n$$

$$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$$

$$X = 3.57 \text{ percent}$$

3. Calculate the standard deviation S_n for the lot.

$$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)]^{1/2}$$

$$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$$

$$S_n = 1.12$$

4. Calculate the Lower Quality Index Q_L for the lot. ($L=2.0$)

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$$Q_L = (X - L) / S_n$$

$$Q_L = (3.57 - 2.00) / 1.12$$

$$Q_L = 1.3992$$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and $n = 4$.

$$P_L = 97$$

6. Calculate the Upper Quality Index Q_U for the lot. ($U = 5.0$)

$$Q_U = (U - X) / S_n$$

$$Q_U = (5.00 - 3.57) / 1.12$$

$$Q_U = 1.2702$$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and $n = 4$.

$$P_U = 93$$

8. Calculate Air Voids PWL

$$PWL = (P_L + P_U) - 100$$

$$PWL = (97 + 93) - 100 = 90$$

EXAMPLE OF OUTLIER CALCULATION (Reference ASTM E 78)

Project: Example Project
Test Item: Item P-401, Lot A.

- D. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A. arranged in descending order.

A-3 99.30
A-4 98.35
A-2 97.55
A-1 96.60

2. Use $n=4$ and upper 5 percent significance level of to find the critical value for test criterion = 1.463.
3. Use average density, standard deviation, and test criterion value to evaluate density measurements.
- a. For measurements greater than the average:

If: $(\text{measurement} - \text{average}) / (\text{standard deviation})$ is less than test criterion,

ESTIMATING PERCENTAGE OF PWL

Then: the measurement is not considered an outlier for A-3 Check if $(99.30 - 97.95) / 1.15$ greater than 1.463
1.174 is less than 1.463, the value is not an outlier

b. For measurements less than the average:

If $(\text{average} - \text{measurement}) / (\text{standard deviation})$ is less than test criterion, then the measurement is not considered an outlier for A-1 Check if $(97.95 - 96.60) / 1.15$ greater than 1.463

1.0 is less than 1.463, the value is not an outlier

NOTE: In this example, a measurement would be considered an outlier if the density was:
greater than $(97.95 + 1.463 \times 1.15) = 99.63$ percent or,
less than $(97.95 - 1.463 \times 1.15) = 96.27$ percent

TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)								
Percent Within Limits (P _L and P _U)	Positive Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537

ESTIMATING PERCENTAGE OF PWL

**ESTIMATING
PERCENTAGE OF MATERIAL
WITHIN SPECIFICATION LIMITS (PWL)**

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66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892

TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)

Percent Within Limits (P _L and P _U)	Positive Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)								
Percent Within Limits (P _L and P _U)	Negative Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990

ESTIMATING PERCENTAGE OF PWL

15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
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TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)

Percent Within Limits (P _L and P _U)	Negative Values of Q (Q _L and Q _U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

END OF SECTION

SECTION 01505
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General temporary facilities:

1. Utilities and environmental systems.
2. Sanitary facilities.
3. Storage sheds, buildings and lay-down areas.
4. Fire protection.
5. Protection of the Work and property.
6. Interim cleaning.
7. Disposal of trash and debris.

B. Temporary facilities for exterior work:

1. Barricades.
2. Hazard lighting.
3. Access roads and parking.
4. Environmental controls.
5. Disposal of excavated material.
6. Control of erosion and water runoff.

C. Temporary facilities for interior work:

1. Barricades and enclosures, including those for accessways and exit ways.
2. Hazard lighting.
3. Environmental controls.

TEMPORARY FACILITIES

4. Existing electrical power, water, and HVAC are available at interior construction projects for Contractor's use at no charge by City Engineer.
- D. Provide temporary product handling facilities and construction aids, such as scaffolds, staging, ladders and stairs, protective railings, hoists, chutes and other facilities, as required for construction operations and to protect persons, property and products. Follow governing agency requirements for scope, type and location if not otherwise specified.
- E. Follow Section 01326 - Construction Sequencing for mobilization and demobilization requirements.
- F. Temporary facilities specified herein are minimum standards. Provide additional facilities as required for proper execution of the Work and to meet responsibilities for protection of persons and property.
- G. Properly install temporary facilities.
- H. Maintain in proper operating condition until use is no longer required or as otherwise approved.
- I. Modify and extend temporary facilities as required by Work progress.
- J. Restore existing facilities used temporarily, to specified or original condition following Section 01731 - Cutting and Patching.
- K. Provide weather protection and environmental controls as required to prevent damage to remaining Base Facility, the Work, and to other property.
- L. Follow regulatory agency requirements for required temporary facilities not specified herein.
- M. Where disposal of spoil and waste products, whether or not they are contaminated, is required under this or other Sections, make legal dispositions off site following governing authorities' requirements, unless on-site disposition is allowed under this or other Sections.

1.02 SUBMITTALS

- A. Follow Section 01340 - Shop Drawings, Product Data and Samples.
- B. Submit shop drawings and descriptive data showing:
 1. Enclosure and barricade construction.
 2. Enclosure and barricade layout if different from that shown on Drawings, including for each stage if applicable.

1.03 GENERAL REQUIREMENTS FOR UTILITIES AND ENVIRONMENTAL SYSTEMS

TEMPORARY FACILITIES

- A. Make arrangements with utility service companies for temporary services.
- B. Follow rules and regulations of utility service companies or authorities having jurisdiction.
- C. Maintain utility service until Substantial Completion, including fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of the Work.
- D. Follow Section 01312 - Coordination and Meetings for advance notifications and approvals of shutdowns of existing services and systems.
- E. Water: Provide water for construction, at Contractor's sole cost and expense except as otherwise required below. Coordinate location and type of temporary water service with and obtain approval from City Engineer.
 - 1. For water obtained direct from water mains or fire hydrants, obtain permit or license from proper authorities, and install temporary meter if applicable.
 - 2. For water obtained downstream from Department of Aviation meter, City will provide water without cost for construction operations. Obtain approval of tap types, locations, and pipe routing. Provide valves and pipe as required.
 - 3. For drinking water for personnel, provide potable water in proper dispensing containers, except public drinking fountains close to interior construction projects are available as long as use by Contractor does not impede airport operations or increase airport maintenance.
- F. Electrical Power: Provide power for lighting, operation of Contractor's plant or tools, or other uses by Contractor, at Contractor's sole cost and expense, except as otherwise required below. Coordinate location and type of temporary power service with and obtain approval from City Engineer.
 - 1. For power obtained direct from electric mains, obtain permit or license from proper authorities, and install temporary meter if applicable.
 - 2. For power obtained downstream from Department of Aviation meter, City will provide power, without cost for construction operations, however, this shall be solely at the discretion of the City Engineer. Tap existing electrical panels and circuits at locations and ampacities approved by City Engineer. Obtain approval of tap types, locations, and conduit/wire routing. Provide switches as required.
 - 3. Provide temporary power service or generators to power construction operations and to power existing facilities during main service shutdowns, and at locations where proper commercial power is not available.

- G. Lighting: Provide lighting in construction areas, or other areas used by Contractor, at Contractor's sole cost and expense, except as otherwise required below. Coordinate location and type of temporary light fixtures with and obtain approval from City Engineer.
 - 1. Provide explosion-resistant fixtures in areas where fuel is stored, handled or dispensed.
 - 2. Minimum Lighting Level: 5-foot candles for open areas; 10-foot candles for exitways. Provide minimum of one 300W lamp per 20 square feet of work area.
- H. Heat and Ventilation: Provide temporary heat and ventilation as required for protection or completion of the Work and to control dust, odors and other environmental contaminants. Provide safe working conditions. Maintain enclosed work areas, including interior work areas, at minimum of 50 degrees F.

1.04 SANITARY FACILITIES

- A. Provide one portable self-contained chemical toilet/urinal for each 25 workers for exterior construction projects or construction areas not close to existing public restrooms. Place at reasonably secluded locations conveniently accessible to workers. Follow regulations of State and local departments of health.
- B. Enforce use of sanitary facilities.
- C. Supply and service temporary sanitary units at least twice per week. Legally dispose of waste off-site.

1.05 STORAGE SHED, BUILDINGS AND LAY-DOWN AREAS

- A. Store products neatly and orderly onsite, arranged to allow inspection, identification and inventory, at locations approved by City Engineer.
- B. When lack of or ill-timed environmental control systems could damage products, store in bonded off-site facilities approved by manufacturer, supplier or fabricator.
- C. Provide suitable and substantial storage sheds, rooms, covers, or other facilities, for storage of material subject to contamination or damage from other construction operations. Provide environmental control to maintain products within manufacturers' required limits, when required. Storage of materials not susceptible to weather damage may be on blocks off the ground.
- D. Do not overload Base Facility structure. Provide temporary shoring or bracing as required to

1.06 FIRE PROTECTION

- A. Follow fire protection and prevention requirements specified herein and those established by Federal, State, or local governmental agencies.

TEMPORARY FACILITIES

- B. Follow applicable provisions of NFPA Standard No. 241, Safeguarding Building Construction and Demolition Operations.
- C. Provide portable fire extinguishers, rated not less than 2A or 5B following NFPA Standard No. 10, Portable Fire Extinguishers, for field office and for every 3000 square feet of floor area of facilities under construction, located within 50 feet maximum from any point in the protection area.
- D. Prohibit smoking in hazardous areas. Post suitable warning signs in areas which are continuously or intermittently hazardous.
- E. Use metal safety containers for storage and handling of flammable and combustible liquids.
- F. Do not store flammable or combustible products inside occupied buildings or near stairways or exits.
- G. Maintain clear exits from all points in the Work.

1.07 PROTECTION OF THE WORK AND PROPERTY

- A. Take precautions, provide programs, and take actions necessary to protect the Work and public and private property from damage.
- B. Prevent damage to existing public and private utilities and systems during construction. Utilities are shown on Drawings at approximate locations, but this information is not warranted as complete or accurate. Give City Engineer at least 48 hours notice before commencing work in the area, for locating the utilities during construction, and for making adjustments or relocation of the utilities when they conflict the Work.
 - 1. Utilize the Utility Coordinating Committee One Call System, telephone number, (713) 223-4567, called 48 hours in advance. The toll-free telephone number is 1-800-245-4545, Texas One Call System.
 - 2. Follow Section 01726 - Base Facility Survey, to determine existing utilities and systems.
 - 3. Follow Section 01761 - Protection of Existing Services, to make coordination efforts for each existing Service that requires protection.
- C. Provide safe barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, accessways, and hazardous areas.
- D. Obtain written consent from proper parties, before entering or occupying with workers, tools, or products on privately-owned land, except on easements required by the Contract Documents.

- E. Assume full responsibility for preservation of public and private property on or adjacent to the site. If direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of the Work by Contractor, restore by Contractor, at no cost or time increase, to a condition equivalent to or better than that existing before the damage was done.

- F. Where work is performed on or adjacent to roadways, rights-of-way, or public places, provide barricades, fences, lights, warning signs, and danger signals sufficient to prevent vehicles from being driven on or into Work under construction.
 - 1. Paint barricades to be visible from sunset to sunrise
 - 2. Install at least one flashing hazard light at each barricade section.
 - 3. Furnish watchmen in sufficient numbers to protect the Work.
 - 4. Other measures for protection of persons or property and protection of the Work.

- G. Protect existing trees, shrubs, and plants on or adjacent to the site against unnecessary cutting, breaking or skinning of branches, bark, or roots.
 - 1. Do not store products or park vehicles within drip lines.
 - 2. Install temporary fences or barricades in areas subject to damage from traffic.
 - 3. Water trees and plants to maintain their health during construction operations.
 - 4. Cover exposed roots with burlap and keep continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from physical damage and damage by erosion, flooding, run-off, or noxious materials contamination.
 - 5. Repair branches or trunks if damaged, prune branches immediately and protect the cut or damaged areas with emulsified asphalt compounded specifically for horticultural use in a manner approved by City Engineer.
 - 6. Remove and replace damaged trees and plants that die or suffer permanent injury. Replace with product of equivalent size and in good health.
 - 7. Coordinate this work with Division 2 requirements for clearing and landscaping.

- H. Protection of Existing Structures:
 - 1. Fully sustain and support in place and protect from direct or indirect injury underground and surface structures located within or adjacent to the limits of the Work.

- a. Before proceeding with sustaining and supporting work on property of others, satisfy City Engineer that the owner of the property approves the methods and procedures proposed.
2. Do not move or in any way change the property of public utilities or private service corporations without prior written consent of a responsible official of that service or public utility. Representatives of these utilities reserve the right to enter within the limits of the Work for the purpose of maintaining their properties, or of making changes or repairs to their property considered necessary by performance of the Work.
 - a. Notify the owners and/or operators of utilities and pipelines of the nature of construction operations proposed and the date or dates on which those operations will be performed. When construction operations are required in the immediate vicinity of existing structures, pipelines, or utilities, give minimum 5 working days advance notice. Probe and securely flag locations of underground utilities prior to beginning excavation.
3. Assume all risks attending presence or proximity of existing construction within or adjacent to the limits to the Work including but not limited to damage and expense for direct or indirect injury caused by the Work to existing construction. Immediately repair damage caused, following Section 01731.
- I. Protect installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed.
 1. Control traffic to prevent damage to products and surfaces.
 2. Provide coverings to protect products from damage. Cover projections, wall corners, jambs, sills, and off-site of openings in areas used for traffic and for passage of product in subsequent work.

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1.08 ACCESS ROADS AND PARKING

- A. Follow Section 01575 - Stabilized Construction Exit for construction exits.
- B. Provide temporary stable construction roads, walks, and parking areas of a load bearing capacity required during construction connecting to public thoroughfares and for use of emergency vehicles. Design and maintain temporary roads and parking areas for full use in all weather conditions.
 1. Locate temporary roads and parking areas as approved by City Engineer.
 2. Prevent interference with traffic, City and airport operations on existing roads. Indemnify and save harmless the City from expense caused by Contractor's operations over these roads.

3. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking. If not shown on the Drawings, locate as directed by City Engineer.
 4. Minimize use of construction traffic on existing on-site streets and driveways. For tracked vehicles, use street plugs. Do not load paving beyond design capacity.
 5. Do not allow heavy vehicles or construction equipment in existing parking areas.
 6. Remove temporary roads, walks and parking areas prior to final acceptance. Return to its original condition, unless otherwise required by the Contract Documents.
- C. Public, Temporary, and Construction Roads and Ramps:
1. Public Roads: Follow laws and regulations of governing authorities when using public roads. If Contractor's work requires public roads be temporarily impeded or closed, obtain approvals from governing authorities and pay for permits before starting work. Coordinate activities with City Engineer following Section 01312 - Coordination and Meetings.
 2. On-Site Roads: Prepare temporary roads, construction roads, ramps, and areas on the site to be accessible for trucking and equipment.
 3. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage. Extend and relocate as approved by City Engineer as Work progress requires, provide detours as necessary for unimpeded traffic flow. Maintain 12-foot width access road with turning space between and around combustible materials. Provide and maintain access for fire trucks to fire hydrants free of obstructions.
 - a. Do not use limestone for paving.
 4. Obtain approval of special requirements covering handling exceptionally large or heavy trucks, cranes, or other heavy equipment. Provide mats or other means, so roadways are not overloaded or otherwise damaged.
- D. Submit access road and parking locations to City Engineer for approval.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide products for temporary construction using equivalent type as required for permanent construction, except "construction grade" quality may be used (such as for wood framing, enclosures and barricades, and construction locks).

- B. Where materials for use in this Section are not specified or detailed, propose products in writing and obtain approval from City Engineer before commencing work.

2.02 TEMPORARY EXTERIOR ENCLOSURES AND BARRICADES

- A. Provide temporary fencing as required to enclose exterior storage/staging and demolition areas, during on-site operations, chain link fence at remote areas (away from Terminal buildings), and chain link fence with plywood overlay at on-site areas (adjacent to or near Terminal buildings and AOA).

1. Chain Link: Minimum 6-foot high commercial quality galvanized fabric, galvanized steel or minimum 4 x 4 treated wood posts at 8 feet on center maximum, gate frames as required, with barbed wire at top if required by Contractor. For natural earth areas, provided minimum 8-inch diameter by 3-foot deep hole for posts. Fill annular space with pea gravel or crushed stone. For paved areas, provide welded base plate on each post and attach to paving with drill-in or powder actuated fasteners of size and quantity required to resist imposed loads. Provide corner bracing and struts as required to maintain erect fencing and taut fabric. Provide gate locks of Contractor's choice. Provide one set of keys to City Engineer.

2. Plywood Overlay: Exterior grade, minimum 3/4 inch-thick, 8-feet-high. Tie plywood with wire to public side of chain link fence and gates. Paint exterior (public) face with flat latex-based paint to match "Nevamar Pepperdust" plastic laminate.

- B. Barricades in Safety Areas of Taxiways and Aprons at AOA: Preservative-treated wood construction, maximum 3 feet high sawhorse legs at both ends of one 8-inch-high top rail, with 45 degree-angled white and orange hashmarks, on 4 by 4-inch wood posts and struts bolted to 12 by 12-inch continuous timber base. Install hazard lights at maximum 6 feet centers and at each end and corners of the barricade. Sandbag wood frame to prevent overturning by jet blast or prop wash.

2.03 TEMPORARY INTERIOR ENCLOSURES AND BARRICADES

- A. Provide temporary partitions and ceilings or reuse existing partitions as required to separate work areas during on-site finishing operations, to prevent penetration of dust, odors, gases and moisture into occupied areas and to prevent damage to remaining Base Facility and to Contractor's work. Remove new and existing barricades upon completion of work or as directed by City.

- B. Rigid Barricades and Enclosures: Provide wood or metal framing and gypsum board or plywood sheet materials with closed joints; flame spread rating of 25 or less following ASTM E84.

1. Paint faces exposed to public areas to match “Nevamar Pepperdust” plastic laminate, as required by City Engineer.
 2. Sandbag or foam-tape floor track to existing terrazzo or tile flooring. Do not fasten to existing finished walls or ceiling tiles.
- C. Membrane Enclosures: Provide same framing as above. Cover with minimum 12 mil black plastic sheet, with taped joints and edges. Seal punctures as they occur.
- D. Perimeter Tape: Manufactured plastic tape, with printed “Construction Area” or equivalent message. Fasten to saw horses, “trees” or equivalent moveable posts. Repair breaks as they occur. Install around areas where quick changeability of barrier limits is required.

2.04 HAZARD LIGHTS

- A. Provide battery-powered flashing yellow lights on barricades and enclosures around perimeter of exterior areas adjacent to AOA, roadways, and parking aisles or spaces. Install on posts set in striped barrels and anchored with sand, or attach to fencing, as applicable and as ground space permits where barricades or enclosures do not occur.

2.05 TEMPORARY UTILITY AND ENVIRONMENTAL SYSTEMS WORK

- A. Furnish temporary HVAC, plumbing and electrical products as required to provide continued Base Facility operation, including systems by-pass dampers, ductwork, valves, pipe and fittings, conduit, wiring, junction boxes, and other items.
- B. Coordinate these products with products of Sections 01731 - Cutting and Patching and Divisions 2, 15 and 16.

PART 3 EXECUTION

3.01 CONTRACTOR'S FIELD OFFICE

- A. Install field office ready for occupancy, 10 days after date fixed in Notice to Proceed.

3.02 ENCLOSURE AND BARRICADE, SIGN, AND HAZARD LIGHT INSTALLATION

- A. Fill and grade site for temporary structures to provide drainage away from buildings. Follow Section 01506- Temporary Controls and 01572 - Erosion and Sedimentation Control for erosion and sedimentation control.
- B. Follow Section 01507 - Temporary Signs.
- C. Install and maintain enclosures and barricades, passageways, signs and lights at locations shown on Drawings, or as directed by City Engineer, or as required to safely divert unauthorized parties away from or around construction operations.

TEMPORARY FACILITIES

1. Maintain minimum 3-foot candles of illumination at exitways, including those remaining adjacent to permanent barricades.
2. Reinforce barricades at AOA as required to withstand jet blast loads.

3.03 TEMPORARY UTILITY AND ENVIRONMENTAL SYSTEMS

- A. Install temporary HVAC, plumbing and electrical products as required to maintain adequate environmental conditions to facilitate progress of Work, to meet specified minimum conditions for installation of materials, to protect materials and finishes from damage due to temperature or humidity beyond specified or otherwise required ranges, and to maintain proper Base Facility systems operation outside contract limits.
- B. Provide ventilation of enclosed areas for proper curing of installed products, to disperse or control humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases inside or outside of enclosures.

3.04 CONSTRUCTION EQUIPMENT

- A. See Document 00646 - Affidavit for FAA Form 7460-1 for filing of information related to height of construction equipment. When not in use, store equipment in designated location outside safety areas.

3.06 REMOVAL OF TEMPORARY FACILITIES

- A. Maintain temporary facilities until Substantial Completion inspection, or when use is no longer required, or as directed by City Engineer.
- B. Clean and repair damage caused by installation or use of temporary facilities.
- C. Restore existing facilities used during construction to specified or original condition following Section 01731 - Cutting and Patching.

3.07 DISPOSAL OF DEBRIS EXCESS PRODUCTS

- A. Legally dispose of waste and excess products off site. Do not burn or bury on site.
 1. Prepare and file with Texas Department of Health (TDH) "TDH Demolition/ Renovation Notification" related to compliance with National Emissions Standards for Hazardous Air Pollutants. Obtain form from TDH, 10500 Forum Place Drive, Suite 300, Houston, TX 77036-8599, (713) 414-6125, or (800) 572-5548.
- A. Dispose of excavated material off site. Do not make disposition within the City in an area designated as being within the 100-Year Flood Hazard Area unless a "Special Development

Permit” as defined by City Ordinance No. 81-914 and Number 85-1705 has been issued. Verify the floodplain status of proposed disposal site.

1. For floodplain information, contact the City of Houston Storm Sewer Engineering Section at (713) 837-0989.
 2. Immediately remove and properly dispose of excavated material placed in the 100-Year Flood Hazard Area without a ‘Special Development Permit’ at no cost or time increase to the contract.
- C. Do not dispose of debris in sewers. Repair sewer lines to proper function within contract limits as a result of permitted use.
- D. Remove and legally dispose of excess and other products not designated for salvage.

3.08 INTERIM CLEANING

- A. Temporarily store debris in areas concealed from public, occupants’ and AOA view. Prevent migration of debris and dust following Section 01506 - Temporary Controls.
- B. Clean-up dirt and debris in vicinity of construction entrances each day. Clean up debris, scrap materials, and other disposable items before completion of each day's work. Keep streets, driveways, and sidewalks clean of dirt, debris and scrap materials.
1. Failure to maintain clean site is the basis for City Engineer take action following Section 2.5 in Document 00700 - General Conditions.
- C. Remove debris daily unless otherwise approved by City Engineer.
- D. Prevent hazardous conditions due to product or debris storage in work areas and storage areas.
- E. Keep streets used for entering or leaving the job area free of excavated material, debris, and foreign material, including carryout dust and mud, resulting from construction operations. Follow Section 01575 - Stabilized Construction Exit for vehicle wash areas. Follow City of Houston Ordinance No. 5705, Construction or Demolishing Privileges.
- F. As frequently as necessary, sweep and damp mop floors of spaces in public spaces adjoining access points through barricades or enclosures.

END OF SECTION

SECTION 01506

AIRPORT TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dust control.
- B. Noise control.
- C. Pest and rodent control.
- D. Pollution and environmental control.
- E. Security controls, security plan and procedures. Work in AOA or the airport's secured area is not intended as part of this Contract; however, TSA may be involved in reviews of Contractor's construction plans to verify no TSA requirements or restrictions apply.
- F. Safety requirements and safety plan.
- G. Emergency procedures.

1.02 REFERENCES

- A. U.S. Department of Transportation Federal Aviation Administration Advisory Circular AC 150/5370-2C.

1.03 SUBMITTALS

- A. Make following submittals in 3-ring "D" binders, with clear spine and cover pockets and label "Airport Construction Control Plans" on white card-stock inserts. Prepare submittals as work of this and other Sections but submit following Section 01312 - Coordination and Meetings.
- B. Preliminary "Airport Construction Control Plans": Submit, under provisions of Section 01325, 3 copies in draft form of the following, with section dividers labeled as and containing:
 - 1. Construction Traffic Control Plan prepared under Section 01555 - Traffic Control and Regulation.

AIRPORT TEMPORARY CONTROLS

2. Emergency Response Plan Listing Safety Officers (Paragraph 1.09) with names, positions, office and home telephone numbers, and pager and portable telephone numbers.
 3. Safety Plan, including Trench Safety Plan prepared under Section 01561 - Trench Safety System.
 4. Security Plan.
 5. Dust Control Plan.
 6. Ground Water and Surface Water Control Plan prepared under Section 01578 - Control of Ground and Surface Water.
 7. Revise as required and submit 5 final copies, in same form as preliminary copies under Section 01312 - Coordination and Meetings.
- C. Pesticides and Poisons: Submit following Section 01340 - Shop Drawings, Product Data and Samples. Include Material Safety Data Sheets and manufacturers' recommendations for use and application. Include copy of applicator's certification from manufacturer.
- 1.04 DUST CONTROL
- A. Prevent uncontrolled dust creation and movement. Prevent airborne particulates from reaching receiving streams or storm water conveyance systems, building interiors and AOA.
 - B. Use spray-on adhesives or plastic covers on exposed soil piles.
 - C. Follow Section 01505 - Temporary Facilities for interior enclosures.
 - D. Implement dust control methods immediately whenever dust migration is observed.
- 1.05 NOISE CONTROL
- A. Provide vehicles and tools with noise suppressors and use methods and products that minimize noise to the greatest degree practicable. Follow OSHA standards and City Ordinances regarding noise. Do not create noise levels which interfere with the Work, with work by City, with airport operations, or which create a nuisance in surrounding areas.
 - B. Do not use impact-type or powder-actuated-type tools adjacent to occupied office-type areas.
- 1.06 PEST AND RODENT CONTROL
- A. Provide pest and rodent control as required to prevent infestation of construction or storage areas using legal chemicals applied by a licensed applicator.

- B. Provide methods and products with no adverse effect on the Work or adjoining properties.
- C. Use and store chemicals following manufacturers' recommendations and with local, state, and federal regulations. Avoid overuse of pesticides that produce contaminated runoff. Prevent spillage. Do not wash pesticide containers in or near flowing streams or storm water conveyance systems, or inside buildings.

1.07 POLLUTION AND ENVIRONMENTAL CONTROL

- A. Prevent contamination of soil, water or atmosphere by discharge of noxious substances from construction operations.
- B. Contain spillage and remove contaminated soils or liquids. Excavate and dispose of contaminated earth off-site and replace with suitable compacted fill and topsoil.
- C. Prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants. Prevent toxic concentrations of chemicals. Prevent harmful dispersal of pollutants into the atmosphere.
- E. Use equipment during construction following Federal, State, and local laws and regulations.
- F. Follow statutes, regulations, and ordinances governing prevention of environmental pollution and preservation of natural resources, including but not limited to the National Environmental Policy Act of 1969, PL 91-190, Executive Order 11514.
- G. Undeveloped areas on the airport site have considerable natural value. Do not cause unnecessary excavation or filling of terrain, unauthorized destruction of vegetation, air or stream pollution, nor harassment or destruction of wildlife.
- H. Follow environmental requirements. Limit disturbed areas to boundaries established by the Contract Documents. Do not pollute on-site streams, sewers, wells, or other water sources.

1.08 SECURITY CONTROLS, PLAN AND PROCEDURES

- A. Protect products and property from loss, theft, damage, and vandalism. Protect City property and other private property from injury or loss in connection with the Work.
- B. Employ watchmen as needed to provide required security and prevent unauthorized entry.
- C. Repair damage or replace property vandalized.

- D. If existing fencing or barriers are breached or removed for purposes of construction, provide an appropriate (as determined by the airport manager or designee) number of guards and/or maintain temporary security fencing equivalent to existing and approved by City Engineer.
- E. Maintain security program through construction until City's acceptance and occupancy precludes need for Contractor's security program.
- F. Provide chain link fence Terminal area staging areas, following Section 01505 - Temporary Facilities.
- G. Airport Security Requirements:
 - 1. Airport Manager and TSA monitor effectiveness of airport security by attempting to gain unauthorized entry into security areas. When TSA gains unchallenged access to security areas, City and/or the responsible individual may be fined. When unauthorized entry into security areas is made through contract limits or other areas under the Contractor's control:
 - a. Reimburse the City, without increase in contract price, the amount of imposed fines levied against the City, accomplished by Change Order following Section 01255 - Modification Procedures.
 - b. Cease work in breached areas until proper security measures are in place, without change in contract price or time.
 - 2. Immediately notify HPD of discovered presence of unbadged or unknown persons, vehicles or animals in security areas. Dial (IAH) (281) 231-3100.
 - 3. Obtain permitted AOA gate and other security area access locations from Airport Manager. Assign personnel to control passage through entry points not staffed by airport personnel.
 - 4. Badges:
 - a. *After contract award and before preparation of the Safety Plan (Paragraph 1.09D) and construction schedule (Section 01325), obtain permitted security badges.*
 - b. *Security identification badges are required for access into AOA/Secured areas. Badges are valid for one year or for the period of the contract, whichever is shorter.*
 - c. *TSA TSR Part 1542.209 applies to personnel engaged in work of this contract occurring within the AOA or secured area, and reads in part as follows:*

"...each airport operator must ensure that no individual is granted unescorted access authority unless the individual has undergone a fingerprint-based criminal history records check (CHRC) that does not disclose that he or she has a disqualifying criminal offense."

- d. Obtain from City Engineer and fill out one security badge application package (application form and all associated paperwork) per person (including subcontractors' personnel) needing unescorted access in security areas.*
- e. Contact the airport ID badging office to arrange for collection and submittal of fingerprints. Prepare and maintain a file for each applicant, including a copy of the completed application. Keep in Contractor's main office until expiration of the warranty period.*
 - (1) Short-term or temporary personnel are permitted in security areas but only under constant escort by a properly badged escort, who shall have no duty other than to escort short-term or temporary personnel.*
 - (2) Badged and escorted personnel are limited to access to and from work areas and shall remain in the work area.*
 - (3) Personnel under constant escort shall be continuously observed by and in the immediate company of badged personnel.*
 - (4) City Engineer may limit the number of badged personnel and personnel under constant escort.*
- f. Submit completed applications to City Engineer for further review.
- g. Attend required security training sessions.
- h. Pick up completed badges and pay badging fees (as of November 2019, \$55.00 per badge for a 1-year period--verify fee and duration with Airport Manager).
- 5. Do not leave fence breaks unattended. Restore fence or erect equivalent secure temporary fencing before departing the work area.
- 6. Provide proper identification on Contractor's vehicles permitted in AOA.

1.09 SAFETY REQUIREMENTS

- A. Contractor and not City, City Engineer or Designer is solely and without qualification responsible for observation and compliance with safety regulations without reliance or superintendence of or direction by City, City Engineer or Designer.
- B. Safety measures, including but not limited to safety of personnel, provision of first-aid equipment, installation, operation and removal of temporary ventilation and safety

AIRPORT TEMPORARY CONTROLS

equipment, in the Contract Documents are a subsidiary obligation of Contractor compensated through various payment items.

- C. Follow Document 00700 - General Conditions Paragraph 10.1 and this Section for safety plan and procedures.
- D. Prepare a written detailed Safety Plan for the Work describing:
 - 1. Specific methods used to maintain airport safety procedures, based on requirements of the Contract Documents, airport procedures, FAA/TSA requirements and Contractor's own safety and security program.
 - 2. Contractor's emergency procedures in event of following minimum set of circumstances: airport's-, tenants'- or Contractor's on-site property damage; accidents; fire emergency; medical emergency; Airport Manager's intervention in construction operations; detainment or arrest of unauthorized Contractor's employees and subcontractors in Security areas; discovery of hazardous materials.
 - 3. Provisions for temporary removal of security fencing (including culvert and drain-way grates). Include proposed actions to prevent entry of people or animals into security areas when security fence is breached. Do not breach fencing without approval.
 - 4. Requirements for closing safety areas.
 - 5. Submit draft Safety Plan at the Preconstruction Conference, following Section 01312 - Coordination and Meetings.
- E. City Engineer will review the safety program with FAA and ATCT for compliance with applicable regulations. If the plan fails to demonstrate compliance, modify it until approval is obtained.
- F. Contractor's Safety Officers: Refer to Section 01550 - Public Safety & Contractor Safety Staffing, Paragraph 1.05, Contractor's Safety Staffing Requirements.
- G. Submit final Safety Plan at the first Progress Meeting following Section 01312 - Coordination and Meetings.
 - 1. Include in the safety plan Contractor's response to trench safety requirements following Section 01561 - Trench Safety System.
- H. Follow applicable Federal, State and local safety codes and statutes and with proper construction practice. Establish and maintain procedures for safety of work, personnel and products involved in the Work.
- I. Follow Texas Occupational Safety Act (Art. 5182a, V.C.S.) and promulgations of 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

AIRPORT TEMPORARY CONTROLS

and health standards under the Williams-Steiger Occupational Safety and Health Act of 1970. Follow other legislation enacted for safety and health of Contractor employees. These safety and health standards apply to Contractor, Subcontractors and Suppliers and their respective employees.

- J. Immediately notify City Engineer of investigation or inspection by Federal Safety and Health inspectors of the Work or place of work on the job site, and after such investigation or inspection inform City Engineer of results. Submit 1 copy of accident reports to City Engineer within 10 days of date of inspection.
- K. Protect areas occupied by workmen by the best available devices for detection of lethal and combustible gases. Frequently test devices to assure their functional capability. Monitor liquids and gases infiltrating into work areas for visual or odor evidences of contamination. Take immediate appropriate steps to seal off entry of contaminants into to the Work.
- L. Maintain coordination with City's Police and Fire Departments during the Work.

1.10 EMERGENCY PROCEDURES

- A. If an emergency situation occurs, including involvement in or witness to aircraft or motor vehicle emergencies and emergencies involving other parties or property regardless of fault, or a violation of requirements of this Section, or a violation of FAA/TSA regulations, take one or more of the following minimum actions as appropriate to the situation.
- B. Immediately report to City Engineer accident or damage to pavement, buildings, utilities, and vehicles involving or caused by Contractor, Subcontractors, Suppliers, personnel, equipment or others.
- C. In general:
 - 1. Immediately notify HFD or HPD (public areas) as appropriate and applicable to location of emergency.
 - 2. Notify City Engineer by telephone or in person.
 - 3. Stop work in the area. Secure site as required to prevent further damage to property and persons.
 - 4. Evacuate non-essential personnel from the scene. Keep involved personnel and witnesses on-site until otherwise directed by City Engineer or security officers.
 - 5. Impound involved vehicles in "as-is condition" until otherwise directed.
 - 6. Do not resume work in the area until released by City Engineer.

- D. For discovery of actual or suspected hazardous material contamination, proceed with Paragraph B above while simultaneously initiating Contractor's own hazardous material response program.

- E. Follow City Engineer's instructions for emergencies affecting the Work but occurring outside the Contract Limits. Certain situations may require the Work or work to be temporarily stopped under provisions of Document 00700 - General Conditions.
 - 1. Maintain a log documenting cost and time impact of the stop-work order.
 - 2. Submit data to the City Engineer in form as instructed at that time.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01507
TEMPORARY SIGNS

PART 1- GENERAL

1.01 SECTION INCLUDES

- A. Temporary signs at construction access points.
- B. Maintenance.
- C. Removal.
- D. Project and Contractor identity signs are not permitted.

1.02 QUALITY ASSURANCE

- A. Design signs and supporting sign structure to remain in place and withstand 50 miles-per-hour wind velocity.
- B. Sign Manufacturer/Maker/Painter: Experienced professional sign company.
- C. Finishes, Painting: Withstand weathering, fading, and chipping for duration of construction.
- D. Appearance: Fresh, new-looking, legible and neat look during the entire period during which required.

1.03 SUBMITTALS

- A. Follow Section 01340 - Shop Drawings, Product Data and Samples.
- B. Submit shop drawings including:
 - 1. Signboards and Copy: Show to-scale size, dimensions, content, layout, font style and size, and colors.

PART 2 PRODUCTS

2.01 TEMPORARY SIGNS FOR ACCESS POINTS

- A. Posts for Exterior Signs: New 4x4 inch moisture-resistant-treated wood or 2-1/2-inch diameter by 12-foot long galvanized steel.
 - 1. Paint black.

TEMPORARY SIGNS

2. Fabricate to length required for 3-foot direct-bury plus aboveground length required for proper height of signboard mounting.
 3. Furnish number of posts as required for proper support of signboard
- B. Signboards:
1. For Exterior Signs: 3/4-inch-thick exterior grade medium density overlay (MDO) plywood, or 3/16-inch sheet aluminum. Paint background [black] [white] [] [as shown on Drawings].
 - a. Contractor's Option: Use colored vinyl film in lieu of paint for aluminum.
 2. For Interior Signs: 3/4-inch-thick fire-retardant treated medium density overlay plywood, or colored plastic laminate cladding both faces and with painted edges, or 1/8-inch sheet aluminum. Paint background black.
 - a. Contractor's Option: Use colored vinyl film in lieu of paint for aluminum.
- C. Color Coating for Signboards and Hashmarks: Flat ultraviolet inhibited acrylic polyurethane or matte vinyl, all visible surfaces.
- D. Copy and Borders: Flat color (color as scheduled) vinyl die-cut, Helvetica Medium typeface, size as shown or scheduled.
- E. Rough Hardware: [For wood, galvanized steel or brass for fasteners and other hardware] [For aluminum, cadmium-plated steel or stainless steel].
- F. Skid-mounted Signs: Allowed only when approved by the City Engineer. Approval does not release Contractor from responsibility of maintaining temporary signs on site and does not make City responsible for security of temporary signs.

2.03 SIGN FABRICATION

- A. Fabricate signboards and install copy in the shop.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install temporary signs at construction area access points, including within security areas and AOA, at following location:
 1. As scheduled below.
 2. Where shown on Drawings.

3. Where required by City Engineer.

B. Install signs fully visible, legible, level and plumb.

3.02 MAINTENANCE

A. Maintain signs and supports and markings clean. Repair deterioration and damage.

B. Relocate signs as work progresses [at each site] [at each stage] [at both] at no additional cost to the City.

3.03 REMOVAL

A. Remove temporary sign work when control is no longer needed or as directed by City Engineer.

3.04 MESSAGE SCHEDULE

A. Construction Entrance Warning Sign: 3 by 2-foot signboard, white copy and border on black background. Surface-mount on access gates through fences and on doors through barricades or enclosures; at 50 feet on center unless otherwise required by governing agencies:

NO ENTRANCE (4 inch)

CONSTRUCTION AREA (4 inch)

(45-degree hash marks, full width) (2 inch)

Hard Hat Required (2 inch)

Security Badge Required (2 inch)

B. Emergency Egress Sign: One-foot square signboard, white copy and border, with directional arrow, on black background. Surface-mount on fences, barricades or enclosures, or freestanding, spaced 50 feet on center along path of egress, unless otherwise required by governing agencies.

EXIT (4 inch)

(Arrow direction as appropriate to egress path) (6 inch)

C. No Entrance to Closed Parking Area: 8 by 4-foot signboard, white copy and border on black background, free-standing; at each ramp access to floor on which work occurs:

TEMPORARY SIGNS

NO ENTRANCE (6 inch)

CONSTRUCTION AREA (6 inch)

(45-degree hash marks, full width (4 inch)

This Parking Area Closed (4 inch)

Until (Insert Date) (4 inch)

- D. Notice of Intent to Close Parking Area: 8 by 4-foot signboard, white copy and border on black background, free-standing; at each ramp access to floor on which work occurs:

WARNING (6 inch)

THIS PARKING LEVEL (6 inch)

WILL BE CLOSED (6 inch)

(45-degree hash marks, full width) (4 inch)

Do Not Park on This Level (4 inch)

From (Insert Date) (4 inch)

Until (Insert Date) (4 inch)

END OF SECTION

SECTION 01550

PUBLIC SAFETY & CONTRACTOR'S SAFETY STAFFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Public Safety and Convenience
- B. General Requirements
- C. Street Markers and Traffic Control Signs
- D. Contractor's Safety Staffing Requirements

1.02 RELATED SECTIONS

- A. Section 00700 - General Conditions
- B. Section 01555 – Traffic Control & Regulations
- C. Section 01561 – Trench Safety System

1.03 PUBLIC SAFETY AND CONVENIENCE

- A. The Work in this Project is to be performed [edit wording for scope of work and coord. w/other const. Projects going on in the immediate area]. The Contractor shall furnish and maintain appropriate barricades and signage required to maintain a safe work environment for the HAS employees, the public and construction staff working at the project site.
- B. Contractor shall plan and execute his operations in a manner that will cause a minimum interference with other construction projects.
- C. Signs, barricades and warning devices informing public of construction features will be placed and maintained by Contractor, who shall be solely responsible for their maintenance.
- D. Contractor shall perform the necessary cleanup and finishing immediately after all or a portion of the Work is completed.
- E. All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

PUBLIC SAFETY & CONTRACTOR SAFETY STAFFING

1.04 GENERAL REQUIREMENTS

- A. The Contractor shall observe the rules and regulations of the State of Texas and agencies of the U.S. Government which prohibit the pollution of any lake, stream, river, or wetland by dumping of any refuse, rubbish, dredge material, or debris therein.
- B. The Contractor is specifically cautioned that disposal of materials into any water of the State must conform to the requirements of the Texas Natural Resource Conservation Commission (TNRCC), and any applicable permit from the US Army Corps of Engineers.
- C. Waste material must be disposed of at sites approved by the Owner's Representative and permitted by the City.

1.05 CONTRACTOR'S SAFETY STAFFING REQUIREMENTS

- A. Refer to Section 00700 – General Conditions, Article 10 – Safety Precautions

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF DOCUMENT

SECTION 01555

TRAFFIC CONTROL AND REGULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Signs, signals, lights and control devices.
- B. Flagmen.
- C. Construction parking control.
- D. Designated haul routes.
- E. Construction Traffic Control Plan.
- F. See also Section 01145 - Use of Premises.

1.02 DEFINITIONS

- A. See Section 01312 - Coordination and Meetings for definition of terms related to Aircraft Operations Area (AOA).
- B. Flagman: A person who has successfully fulfilled the “Certified Flagman” requirements set forth by the Texas Department of Transportation. Flagman certification may be achieved either through the Texas Department of Transportation, Texas Engineering Extension Services (TEEX), the City of Houston’s E.B Cape Training Center, or by a trained and certified flagman instructor, employed by the Contractor. The certified flagman must carry proof of certification while performing flagman duties. The certified flagman will be required to wear a distinctive, bright colored vest and be equipped with appropriate flagging and communication devices. He/she must be fluent in English (speaking, reading, writing), with Spanish an advantageous, but not required, primary or secondary language.
- C. Peace Officer: A licensed police officer actively employed in a full-time capacity as a peace officer, working on average, minimum 32 paid hours per week, at a rate not less than the prevailing minimum rate following the Federal Wage and Hour Act, and entitled to full benefits as a peace officer, and who receives compensation for private employment as an individual employee or independent contractor. Private employment may be either in employee-employer relationship or on an individual contractual basis. He/she must be fluent in English (speaking, reading, writing) with Spanish an advantageous, but not required, primary or secondary language.

TRAFFIC CONTROL AND REGULATION

- D. Uniformed Flagman: A peace officer trained in traffic control and familiar with George Bush Intercontinental Airport roadway traffic patterns and airport operation procedures. A uniformed flagman may not be a reserve peace officer.

1.03 SUBMITTALS

- A. For Contractor-proposed changes to Traffic Control and Regulation shown on Drawings, permitted only in order to reduce construction time and cost through re-sequencing the Work, prepare plan drawings and supplement with product literature, narrative description, and construction schedule.

1.04 MEASUREMENT AND PAYMENT

- A. Traffic Control and Regulation, excluding Flagmen: Measurement is on a lump sum basis, including submittal of Contractor-proposed changes. Payment will be made based on schedule of values and percent of work complete.
- B. Flagmen: Measurement is on a lump sum basis as required for the Work. Payment will be made based on schedule of values and percent of work complete.
- C. Follow Section 01290 - Payment Procedures.

1.05 CONSTRUCTION TRAFFIC CONTROL PLAN AND PROCEDURES

- A. Develop a written and graphic detailed Construction Traffic Control plan describing:
 1. Rerouting of public roadway and AOA roadway traffic (outside safety areas) showing route, duration, and methods for change over from one route to the other and return to normal.
 2. Product Deliveries: Location, space required and duration for temporary off-loading along public roadways or curbsides and along AOA roadways and around buildings adjacent to aprons, and route through occupied building interiors.
 3. Barricade locations and duration of installation. Submit barricade construction details following Section 01505 - Temporary Facilities.
 4. Maintain, update and obtain approval for changes.

PART 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

- A. Furnish traffic cones, drums, barricades and traffic intersection lights, including control devices in AOA, following TMUTCD.

2.02 FLAGMEN AND OTHER PERSONNEL

- A. Provide certified flagmen in number, at assigned, locations, and for durations as required to regulate even flow of vehicular and pedestrian traffic affected by construction activities.
- B. Employ other personnel, i.e. uniformed peace officers, to take the additional steps required to protect the Work and public, or when specifically requested by Airport Operations personnel through the City Engineer to assist flagmen in the regulating of airport roadway traffic. The uniformed peace officer will coordinate with City Engineer, contractor, and/or Airport Operations personnel, as appropriate, prior to beginning shift.
- C. Use of flagmen or peace officers does not reduce responsibility for damage for which the contractor would otherwise be liable.

PART 3 EXECUTION

3.01 GENERAL

- A. Install traffic control devices, including flagmen, at approaches to site and on site, at crossroads, detours, parking areas, at AOA, at construction entrances, and elsewhere as required to direct construction and affected public traffic, aircraft and GSE, or where directed by City Engineer and/or Airport operations personnel.
- B. As directed by appropriate authority, e.g., City Engineer, employ additional uniformed peace officers to supplement the flagmen when performing a total terminal area road closure, detour, or overnight activity that affects existing traffic patterns. The uniformed peace officer will coordinate with City Engineer, contractor, and/or Airport Operations personnel, as appropriate, prior to beginning shift.
- C. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
- D. Install warning lights on traffic control devices for use during hours of low visibility to delineate traffic lanes and to guide traffic. Do not use flares or flame pots.
- E. Relocate traffic controls as Work progresses, to maintain effective traffic control.

3.02 HAUL ROUTES

- A. Confine construction traffic to designated haul routes.
- B. Regulate construction traffic along haul routes. Minimize interference with public traffic.
- C. Follow Texas State Highway and Public Transportation load limits of roadways.

3.03 PUBLIC ROADS AND TERMINAL AREA OADS

- A. Abide by laws and regulations of governing authorities when using roads.
- B. Maintain road lane use as follows, unless otherwise permitted by Airport Manager or Airport Operations personnel, as coordinated through City Engineer.
 - 1. All Terminal area road lanes available from 0500 to 2200 hours; minimum two lanes in each direction at all times.
 - 2. All on-airport road lanes (outside Terminal area) available from 0500 to 0900 hours, and from 0600 to 1900 hours; minimum two lanes in each direction at all times.
- C. Maintain access at driveways. Do not block any vehicle or pedestrian traffic area without obtaining prior approval from the Houston Airport. Any unusual or otherwise unforeseen activity will require forty-eight (48) hours of notification to the City Engineer as well as Airport Operations personnel. Traffic control meetings are held weekly, on Thursdays, at 2:00 pm at a location to be identified during the pre-construction conference. Contractor shall attend these meetings to coordinate all roadway traffic impacts. Contractor must present detailed traffic control/coordination plan, including drawings, written narrative, etc., with dates, times, and durations of proposed activities. This plan must be presented a minimum of three weeks prior to intended activity.
- D. Maintain roads on airport property clean at all times. Broom or wash as required. At Terminal area roads, follow behind haul vehicles and immediately clean up roads and debris and foreign material resulting from construction operations is deposited.
- E. Follow City of Houston Ordinance 5705, Construction or Demolishing Privileges

3.04 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and airport operations.
- B. Prevent construction personnel's vehicles in revenue-producing facilities. Maintain vehicular access to and through construction parking areas.
- C. Do not park on or adjacent to roadways or curbsides.
- D. Comply with all security directives with regard to parking in the Terminal area

3.05 REMAINING EXISTING CONTROL AND REGULATION DEVICES

- A. Leave existing control and regulation devices in place and properly operating and visible during construction, unless indicated for removal or otherwise permitted.

- B. Repair damage resulting from construction operations.

3.06 REMOVAL OF EXISTING CONTROL AND REGULATION DEVICES

- A. Contact City of Houston Signal Shop Dispatcher at (713) 803-3004 before removing or deactivating existing control and regulation devices.
- B. Remove designated or permitted existing control and regulation devices following Section 01731.
- C. Unless otherwise indicated or directed, remove existing lane striping and reflective buttons in conflict with temporary control and regulation devices. Install matching temporary lane striping and reflective buttons, maintain during construction, remove after construction is complete, and install permanent matching lane striping and reflective buttons.

3.07 BRIDGING TRENCHES AND EXCAVATIONS IN ROADS

- A. Follow Section 01505 - Temporary Facilities.

3.08 REMOVAL OF TEMPORARY CONTROL AND REGULATION

- A. Remove controls and regulation when no longer required. Repair damage caused by installation.
- B. Remove post settings to a depth of 2-feet.

END OF SECTION

SECTION 01570

STORM WATER POLLUTION PREVENTION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Implementation of Storm Water Pollution Prevention Plans (SWP3) described in Section 01410 – TPDES Requirement.
- B. Installation, maintenance and removal, of storm water pollution prevention structures: diversion dikes, interceptor dikes, diversion swales, interceptor swales, down spout extenders, pipe slope drains, paved flumes and level spreaders. Structures are used during construction and prior to final development of the site.
- C. Filter Fabric Barriers:
 - 1. Type 1: Temporary filter fabric barrier for erosion and sediment control in non-channelized flow areas.
 - 2. Type 2: Temporary reinforced filter fabric barrier for erosion and sediment control in channelized flow areas.
- D. Hay Bale Fence.
- E. Drop Inlet Basket Inlet
- F. Sediment Traps
- G. Brush Berm
- H. Sand Bag Barrier
- I. Bagged Gravel Barrier
- J. Sediment Basin Inlet
- K. Protection Barrier

1.02 MEASUREMENT AND PAYMENTS

- A. UNIT PRICES

STORM WATER POLLUTION PREVENTION CONTROL

1. Payment for filter fabric barrier is on a linear foot basis measured between limits of beginning and ending of stakes.
2. Payment for reinforced filter fabric barrier is on a linear foot basis measured between limits of beginning and ending of stakes.
3. Payment for drop inlet baskets is on a unit price basis for each drop inlet basket.
4. Payment for storm inlet sediment traps is on a unit price basis for each storm inlet sediment trap.
5. Payment for storm water pollution prevention structures is on a lump sum basis for the project. Earthen structures with outlet and piping include diversion dikes, interceptor dikes, diversion swales, interceptor swales, and excavated earth-outlet sediment trap, embankment earth-outlet sediment trap, down spout extenders, pipe slope drains, paved flumes, stone outlet sediment trap, and level spreaders.
6. Payment for hay bale barrier, if included in Document 00410 - Bid Form, is on a linear foot of accepted bale barriers, if not include in cost of storm water pollution prevention structures.
7. Payment for brush berm, if included in Document 00410 - Bid Form, is on a linear foot of accepted brush berm, if not include in cost of storm water pollution prevention structures.
8. Payment for sandbag barrier, if included in Document 00410 - Bid Form, is on a linear foot basis measured between limits of beginning and ending of sandbags, if not include in cost of storm water pollution prevention structures.
9. Payment for bagged gravel barrier, if included in Document 00410 - Bid Form, is on a linear foot basis measured between limits of beginning and ending of bagged gravel barrier, if not include in cost of storm water pollution prevention controls.
10. Payment for inlet protection barriers, if included in Document 00410 -Bid Form, is on a linear foot basis measured along outside face of inlet protection barrier, if not include in cost of storm water pollution prevention structures.
11. Refer to Section 01270 - Measurement and Payment for unit price procedures.

B. Stipulated Price (Lump Sum) Contract. If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated

1.03 REFERENCE

A. STANDARD ASTM

STORM WATER POLLUTION PREVENTION CONTROL

1. A 36 – Standard Specification for Carbon Structural Steel.
 2. D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³)).
 3. D3786 – Standard Test Method for Hydraulic Bursting Strength for knitted Goods and Nonwoven Fabrics.
 4. D 4355 - Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
 5. D 4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 6. D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 7. D 4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 8. D 6382 - Standard Practice for Dynamic Mechanical Analysis and Thermogravimetry of Roofing and Waterproofing Membrane Material.
- B. Storm Water Management Handbook for Construction Activities prepared by the City of Houston, Harris County and Harris County Flood District.

1.04 SYSTEM DESCRIPTIONS

- A. Filter Fabric Barrier Type 1 and Type 2: Install to allow surface or channel runoff percolation through fabric in sheet-flow manner and to retain and accumulate sediment. Maintain Filter Fabric Barriers to remain in proper position and configuration at all times.
- B. Hay Bale Fence: Install to allow surface runoff percolation through hay in sheet- flow manner and to retain and accumulate sediment. Maintain Hay Bale Fence to remain in proper position and configuration at all times.
- C. Interceptor Dikes and Swales: Construct to direct surface or channel runoff around the project area or runoff from project area into sediment traps.
- D. Drop Inlet Baskets: Install to allow runoff percolation through the basket and to retain and accumulate sediment. Clean accumulation of sediment to prevent clogging and backups.
- E. Sediment Traps: Construct to pool surface runoff from construction area to allow sediment to settle onto the bottom of trap.

- F. Sand Bags: Are used during construction activities in unstabilized minor swales, ditches, or streambeds when the contributing drainage area is no greater than 2 acres. It is also sediment barrier for stage one Inlet.
- G. Bagged Gravel Barrier: Are used during construction activities in unstabilized minor swales, ditches, or streambeds when the contributing drainage area is no greater than 2 acres. It is also sediment barrier for stage two Inlet.
- H. Drop Inlet Insert Basket: Is a temporary barrier placed within a storm drain inlet (Lower Portion of Stage I and Upper Portion of Stage II Inlets) consisting of a filter fabric supported by a metal frame work to prevent sediment and other pollutants from entering convey system.
- I. Brush Berm: Brush Berm is constructed at the perimeter of a distribute site within the developing area.

1.05 SUBMITTALS

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

PART 2 PRODUCTS

2.01 CONCRETE

- A. Concrete: Class B in accordance with Section 03315 - Concrete for Utility Construction as shown on the Drawings.

2.02 AGGREGATE MATERIALS

- A. Use poorly graded cobbles with diameter greater than 3-inches and less than 5-inches.
- B. Provide gravel lining in accordance with Section 02320 – Utility Backfill Materials or as shown on the drawings.

- C. Provide clean cobbles and gravel consisting of crushed concrete or stone. Use clean, hard crushed concrete or stone free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic matter.
- D. Sediment Pump Pit Aggregate: Use nominal 2-inch diameter river gravel.

2.03 PIPE

- A. Polyethylene culvert pipe or PVC sewer pipe in accordance with Section 02505- High Density Polyethylene (HDPE) Solid and Profile Wall Pipe and Section 02506 Polyvinyl Chloride Pipe or as shown on the Drawings.
- B. Inlet Pipes: Galvanized steel pipe in accordance with Section 02642 Corrugated Metal Pipe or as shown on the Drawings.
- C. Standpipe for Sediment Pump Pits: Galvanized round culvert pipe or round PVC pipe, minimum of 12-inch and a maximum of 24-inch diameter, perforate at 6 to 12-inch centers around circumference.

2.04 GEOTEXTILE FILTER FABRIC

- A. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
- B. Grab Strength: 100 psi in any principal direction (ASTM D-4632), Mullen burst strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.
- C. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.
- D. Mirafi, Inc., Synthetic Industries, or equivalent

2.05 BARRIER

- A. Wire Barrier: Woven galvanized steel wire, 14 gauge by 6-inch square mesh spacing, minimum 24-inch roll or sheet width of longest practical length.
- B. Barrier Stakes: Nominal 2 by 2-inch moisture-resistant treated wood or steel posts (min. of 1.25 lbs. per linear foot and Brinell Hardness greater than 140) with safety caps on top; length as required for minimum 8-inch bury and full height of filter fabric.

2.06 SANDBAGS

- A. Provide woven material made of polypropylene, polyethylene, or polyamide material.

1. Minimum unit weight of four ounces per square yard.
2. Minimum grab strength of 100 lbs. in any principal direction (ASTM D4632).
3. Mullen burst strength exceeding 300 lbs. (ASTM D4833).
4. Ultraviolet stability exceeding 70 percent. After 500 hours of exposure (ASTM 4355).
5. Size: Length - 18 to 24-inches. Width - 12 to 18-inches. Thickness: 6 to 8-inches.
Weight: Approximately 40 to 50 pounds not to exceed 75 pounds.

2.07 BAGGED GRAVEL BARRIERS

1. Minimum unit weight of four ounces per square yard.
2. Minimum grab strength of 100 lbs. in any principal direction (ASTM D4632).
3. Mullen burst strength exceeding 300 lbs. (ASTM D4833).
4. Ultraviolet stability exceeding 70 percent. After 500 hours of exposure (ASTM 4355).
5. Size: Length - 18 to 24-inches. Width - 12 to 18-inches. Thickness: 6 to 8-inches.
Weight: Approximately 40 to 50 pounds not to exceed 75 pounds.

2.08 DROP INLET BASKETS

- A. Provide steel frame members in accordance with ASTM A36.
- B. Construct top frame of basket with two short sides of 2-inch by 2-inch and single long side of 1-inch by 1-inch, 1/8-inch angle iron. Construct basket hangers of 2-inch by 1/4-inch iron bars. Construct bottom frame of 1-inch by 1/4-inch iron bar or 1/4-inch plate with cent 3-inches removed. Use minimum 1/4-inch diameter iron rods or equivalent for sides of inlet basket.
- C. Weld minimum of 14 rods in place between top frame/basket hanger and bottom frame. Exact dimensions for top frame and insert basket will be determined based on dimensions of type of inlet being protected.

2.09 HAY BALE

- A. Hay: Standard-baled agricultural hay bound by wire, nylon, or polypropylene rope. Do not use jute or cotton binding.

- B. Hay Bale Stakes (applicable where bales are on soil): No. 3 (3/8 diameter) reinforcing bars, deformed or smooth at Contractor's option, length as required for minimum 18 inch bury and full height bales.

PART 3 EXECUTION

3.01 PREPARATION, INSTALLATION AND MAINTENANCE

- A. Provide erosion and sediment control structures at locations shown on the Drawings.
- B. Do not clear, grub or rough cut until erosion and sediment control systems are in place unless approved by Project Manager to allow installation of erosion and sediment control systems, soil testing and surveying.
- C. Maintain existing erosion and sediment control systems located within project site until acceptance of Project or until directed by Project Manager to remove and discard existing system.
- D. Regularly inspect and repair or replace damaged components of erosion and sediment control structures. Unless otherwise directed, maintain erosion and sediment control structure until project area stabilization is accepted. Redress and replace granular fill at outlets as needed to replenish depleted granular fill. Remove erosion and sediment control structures promptly when directed by Project Manager. Dispose of materials in accordance with Section 01576 - Waste Material Disposal.
- E. Remove and dispose sediment deposits at the designated spoil site for the Project. If a project spoil site is not designated on Drawings, dispose of sediment off site at approved location in accordance with Section 01576 - Waste Material Disposal.
- F. Unless otherwise shown on the Drawings, compact embankments, excavations, and trenches in accordance with Section 02315 - Roadway Excavation or Section 02317 - Excavation and Backfill for Utilities.
- G. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated right of way and easements for construction. Immediately repair damage caused by construction traffic to erosion and sediment control structures.
- H. Protect existing trees and plants in accordance with Section 01562 – Tree and Plant Protection.

3.02 SEDIMENT TRAPS

- A. Install sediment traps so that surface runoff shall percolate through system in sheet flow fashion and allow retention and accumulation of sediment.

- B. Inspect sediment traps after each rainfall, daily during periods of prolonged rainfall, and at a minimum once each week. Repair or replace damaged sections immediately.
- C. Use fill material for embankment in accordance with Section 02320 – Utility Backfill Materials.
- D. Excavation length and height shall be as specified on Drawings. Use side slopes of 2:1 or flatter.
- F. Stone outlet sediment traps:
 - 1. Maintain minimum of 6-inches between top of core material and top of stone outlet, minimum of 4-inches between bottom of core material and existing ground and minimum of 1 foot between top of stone outlet and top of embankment.
 - 2. Embed cobbles minimum of 4-inches into existing ground for stone outlet. Core shall be minimum of 1 foot in height and in width and wrapped in triple layer of geotextile filter fabric.
- F. Sediment Basin with Pipe Outlet Construction Methods: Install outlet pipe and riser as shown on the Drawings.
- G. Remove sediment deposits when design basin volume is reduced by one-third or sediment level is one foot below principal spillway crest, whichever is less.

3.03 FILTER FABRIC BARRIER CONSTRUCTION METHODS

- A. Fence Type 1: Filter Fabric: Barrier
 - 1. Install stakes 3 feet on center maximum and firmly embed minimum 8-inches in soil. If filter fabric is factory preassembled with support netting, then maximum support spacing is 8 feet. Install wood stakes at a slight angle toward the source of anticipated runoff.
 - 2. Trench in the toe of the fence lines so the downward face of the trenches is flat and perpendicular to direction of flow. V-trench configuration as shown on Drawings may also be used.
 - 3. Lay fabric along edges of trenches in longest practical continuous runs to minimize joints. Make joints only at a support post. Splice with minimum 6- inch overlap and seal securely.
 - 4. Staple filter fabric to stakes at maximum 3-inches on center. Extend fabric minimum 18-inches and maximum 36 inches above natural ground.

5. Backfill and compact trench.
- B. Barrier Type 2: Reinforced Filter Fabric Barrier
1. Layout barrier same as for Type 1.
 2. Install stakes at 6-feet on center maximum and at each joint in wire fence, firmly embedded 1-foot minimum, and inclined it as for Type 1.
 3. Tie wire fence to stakes with wire at 6-inches on center maximum. Overlap joints minimum one bay of mesh.
 4. Install trench same as for Type 1.
 5. Fasten filter fabric wire fence with tie wires at 3-inches on center maximum.
 6. Layout fabric same as for Type 1. Fasten to wire fence with wire ties at 3-inches on center maximum and, if applicable, to stakes above top of wire fence it as for Type 1.
 7. Backfill and compact trench.
 8. Attach filter fabric to wooden fence stakes spaced a maximum of 6-feet apart or steel fence stakes spaced a maximum of 8 feet apart and embedded a minimum of 12-inches. Install stakes at a slight angle toward source of anticipated runoff.
 9. Trench in toe of filter fabric barrier with spade or mechanical trencher so that downward face of trench is flat and perpendicular to direction of flow. A V-trench configuration may also be used. Lay filter fabric along edges of trench. Backfill and compact trench upon completion of Construction.
 10. Filter fabric fence shall have a minimum height of 18-inches and a maximum height of 36-inches above natural ground.
 11. Cut length of fence to minimize use of joints. When joints are necessary, splice fabric together only at support post with minimum 6-inch overlap and seal securely.
 12. When used in swales, ditches or diversions, elevation of barrier at top of filter fabric. at flow line location in channel shall be lower than bottom elevation of filter fabric at ends of barrier or top of bank, whichever is less, in order to keep storm water discharge in channel from overtopping bank.
- C. Triangular Filter Fabric Barrier Construction Methods

1. Attach filter fabric to wire fencing, 18-inches on each side. Provide a fabric cover and skirt with continuous wrapping of fabric. Skirt should form continuous extension of fabric on upstream side of fence.
2. Secure triangular fabric filter barrier in place using one of the following methods:
 - a. Toe-in skirt 6-inches with mechanically compacted material;
 - b. Weight down skirt with continuous layer of 3-inch to 5-inch graded rock; or,
 - c. Trench-in entire structure 4 inches.
3. Anchor triangular fabric filter barrier structure and skirt securely in place using 6-inch wire staples on 2-foot centers on both edges and on skirt or staked using 18-inch by 3/8-inch diameter re-bar with tee ends.
4. Lap fabric filter material by 6-inches to cover segment joints. Fasten joints with galvanized shoat rings.

3.04 DIKE AND SWALE

- A. Unless otherwise indicated, maintain minimum dike height of 18-inches, measured from cleared ground at up slope toe to top of dike. Maintain side slopes of 2:1 or flatter.
- B. Dike and Swale Stabilization: When shown on the Drawings, place gravel lining 3-inches thick and compacted into the soil or 6-inches thick if truck crossing is expected. Extend gravel lining across bottom and up both sides of swale minimum height of 8-inches vertically, above bottom. Gravel lining on dike side shall extend up the up-slope side of dike a minimum height of 8-inches, measured vertically from interface of existing or graded ground and up slope toe of dike, as shown on Drawings.
- C. Divert flow from dikes and swales to sediment basins, stabilized outlets, or sediment trapping devices of types and at locations shown on Drawings. Grade dikes and swales as shown on Drawings, or, if not specified, provide positive drainage with maximum grade of 1 percent to outlet or basin.
- D. Clear in accordance with Section 02233 – Clearing and Grubbing Compact embankments in accordance with Section 02315 – Roadway Excavation.
- E. Carry out excavation for swale construction so that erosion and water pollution is minimal. Minimum depth shall be 1-foot and bottom width shall be 4-feet, with level swale bottom. Excavation slopes shall be 2:1 or flatter. Clear, grub and strip excavation area of vegetation and root material.

3.05 DOWN SPOUT EXTENDER

- A. Down spout extender shall have slope of approximately 1 percent. Use pipe diameter of 4-inches or as shown on the Drawings. Place pipe in accordance with Section 02317 - Bedding and Backfill for Utilities.

3.06 PIPE SLOPE DRAIN

- A. Compact soil around and under drain entrance section to top of embankment in lifts appropriately sized for method of compaction utilized.
- D. Inlet pipe shall have slope of 1 percent or greater. Use pipe diameter as shown on the Drawings.
- C. Top of embankment over inlet pipe and embankments directing water to pipe shall be at least 1-foot higher at all points than top of inlet pipe.
- D. Pipe shall be secured with hold-down grommets spaced 10-feet on centers.
- E. Place riprap apron with a depth equal to pipe diameter with 2:1 side slope.

3.07 PAVED FLUME

- A. Compact soil around and under the entrance section to top of the embankment in lifts appropriately sized for method of compaction utilized.
- B. Construct subgrade to required elevations. Remove and replace soft sections and unsuitable material. Compact subgrade thoroughly and shape to a smooth, uniform surface.
- C. Construct permanent paved flumes in accordance with Drawings.
- D. Remove sediment from riprap apron when sediment has accumulated to depth of one foot.

3.08 LEVEL SPREADER

- A. Construct level spreader on undisturbed soil and not on fill. Ensure that spreader lip is level for uniform spreading of storm runoff.
- B. Maintain at required depth, grade, and cross section as specified on Drawings. Remove sediment deposits as well as projections or other irregularities which will impede normal flow.

3.09 INLET PROTECTION BARRIER

- A. Place sandbags for Stage I, Bagged gravel for Stage II and filter fabric barriers at locations shown on the SWP3. Maintain to allow minimal inlet in flow restrictions / blockage during storm event.

3.10 DROP INLET BASKET CONSTRUCTION METHODS

- A. Fit inlet insert basket into inlet without gaps around insert at locations shown on SWP3.
- B. Support for inlet insert basket shall consist of fabricated metal as shown on Drawings.
- C. Push down and form filter fabric to shape of basket. Use sheet of fabric large enough to be supported by basket frame when holding sediment and extend at least 6-inches past frame. Place inlet grates over basket/frame to serve as fabric anchor.
- D. Remove sediment deposit after each storm event and whenever accumulation exceeds 1-inch depth during weekly inspections.

3.11 HAY BALE FENCE CONSTRUCTION METHODS

- A. Place bales in row with ends tightly abutting adjacent bales. Place bales with bindings parallel to ground surface.
- B. Embed bale in soil a minimum of 4-inches.
- C. Securely anchor bales in place with Hay Bale Stakes driven through bales a minimum of 18-inches into ground. Angle first stake in each bale toward previously laid bale to force bales together.
- D. Fill gaps between bales with straw to prevent water from channeling between bales. Wedge carefully in order not to separate bales.
- E. Replace with new hay bale fence every two months or as required by Project Manager.

3.12 BRUSH BERM CONSTRUCTION METHODS

- A. Construct brush berm along contour lines by hand placing method. Do not use machine placement of brush berm.
- B. Use woody brush and branches having diameter less than 2-inches with 6- inches overlap. Avoid incorporation of annual weeds and soil into brush berm.
- C. Use minimum height of 18-inches measured from top of existing ground at upslope toe to top of berm. Top width shall be 24-inches minimum and side slopes shall be 2:1 or flatter.

- D. Embed brush berm into soil a minimum of 4-inches and anchor using wire, nylon or polypropylene rope across berm with a minimum tension of 50 pounds. Tie rope securely to 18-inch x 3/8-inch diameter rebar stakes driven into ground on 4-foot centers on both sides of berm.

3.13 STREET AND SIDEWALK CLEANING

- A. Keep areas clean of construction debris and mud carried by construction vehicles and equipment. If necessary, install stabilized construction exits at construction, staging, storage, and disposal areas, following Section 01575 - Stabilized Construction Exit.
- B. In lieu of or in addition to stabilized construction exits, shovel or sweep pavements as required to keep areas clean. Do not water hose or sweep debris and mud off street into adjacent areas, except, hose sidewalks during off-peak hours, after sweeping.

3.14 WASTE COLLECTION AREAS

- A. Prevent water runoff from passing through waste collection areas and prevent water runoff from waste collection areas migrating outside collection areas.

3.15 EQUIPMENT MAINTENANCE AND REPAIR

- A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose, so fuels, lubricants, solvents, and other potential pollutants are not washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid and solid waste. Clean and inspect maintenance areas daily.
- B. Where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.16 VEHICLE/ EQUIPMENT WASHING AREAS

- A. Install wash area (stabilized with coarse aggregate) adjacent to stabilized construction access, as required to prevent mud and dirt run-off. Release wash water into drainage swales or inlets protected by erosion and sediment controls. Build wash areas following Section 01575 - Stabilized Construction access. Install gravel or rock base beneath wash areas.
- B. Wash vehicles only at designated wash areas. Do not wash vehicles such as concrete delivery trucks or dump trucks and other construction equipment at locations where runoff flows directly into waterways or storm water conveyance systems.

- C. Locate wash areas to spread out and evaporate or infiltrate wash water directly into ground or collect runoff in temporary holding or seepage basins.

3.17 WATER RUNOFF AND EROSION CONTROL

- A. Control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties. Follow environment requirements.
- B. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas, and to direct drainage to proper runoff courses to prevent erosion, sedimentation or damage.
- C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
- D. Retain existing drainage patterns external to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as required to control conditions.
- E. Plan and execute construction and earth work to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
 - 1. Hold area of bare soil exposed at one time to a minimum.
 - 2. Provide temporary controls such as berms, dikes, and drains.
- F. Construct fill and waste areas by selective placement to eliminate surface silts or clays which will erode.
- G. Inspect earthwork periodically to detect start of erosion. Immediately apply corrective measures as required to control erosion.
- H. Dispose of sediments offsite, not in or adjacent to waterways or floodplains, nor allow sediments to flush into streams or drainage ways. Assume responsibility for offsite disposal location.
- I. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in maximum of 8- inch layers. Provide compaction density at minimum 90 percent Standard Proctor ASTM D-698-78 density. Make at least one test per 500 cubic yards of embankment.
- J. Prohibit equipment and vehicles from maneuver on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sedimentation control systems caused by construction traffic.

STORM WATER POLLUTION PREVENTION CONTROL

- K. Do not damage existing trees intended to remain.

3.18 REMOVAL OF CONTROLS

- A. Remove erosion and sediment controls when the site is finally stabilized or as directed by Project Manager.
- B. Dispose of sediments and waste products following Section 01505 - Temporary Facilities.

END OF SECTION

**SECTION 01572
EROSION AND SEDIMENTATION CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General erosion and sediment controls and other control-related practices. Provide and maintain erosion and sediment controls until the site is finally stabilized or as directed by City Engineer.
- B. Filter Fabric Fences:
 - 1. Type 1: Temporary filter fabric fences for erosion and sediment control in non-channelized flow areas.
 - 2. Type 2: Temporary reinforced filter fabric fences for erosion and sediment control in channelized flow areas.
- C. Straw Bale Fence.
- D. Temporary vehicle and equipment fueling areas, which require erosion and sediment controls, are specified in Section 01579.
- E. Dust controls are specified in Section 01506.

1.02 MEASUREMENT AND PAYMENT

- A. Control of erosion and sedimentation is incidental to the Work. Include costs for control of erosion and sedimentation in the cost of work for which it is required.

1.03 REFERENCES

- A. ASTM:
 - 1. D3786 - Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Nonwoven Fabrics.
 - 2. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

1.04 SYSTEM DESCRIPTIONS

EROSION AND SEDIMENTATION CONTROL

- A. Filter Fabric Fence Type 1 and Type 2: Install to allow surface or channel runoff percolation through fabric in sheet-flow manner and to retain and accumulate sediment. Maintain Filter Fabric Fences to remain in proper position and configuration at all times.
- B. Straw Bale Fence: Install to allow surface runoff percolation through straw in sheet-flow manner and to retain and accumulate sediment. Maintain Straw Bale Fence to remain in proper position and configuration at all times.

1.05 SUBMITTALS

- A. Follow Section 01340 - Shop Drawings, Product Data and Samples.
- B. Submit manufacturer's catalog sheets and other product data on filter fabric and wire fencing.

PART 2 PRODUCTS

2.01 EROSION CONTROL PRODUCTS AND SYSTEMS

- A. Sandbags: Polypropylene, polyethylene, or polyamide woven fabric, with minimum unit weight of 4 ounces per square yard, Muller burst strength exceeding 300 psi, and ultraviolet stability exceeding 70 percent. Fill bags with bank-run sand.
- B. Standpipe for Sediment Pump Pits: Galvanized round culvert pipe or round PVC pipe, minimum of 12-inch and a maximum of 24-inch diameter, perforate at 6 to 12 inch centers around circumference.
- C. Sediment Pump Pit Aggregate: Nominal 2-inch diameter river gravel.
- D. Portable Sediment Tank System: Standard 55-gallon steel or plastic drums, free of hazardous material contamination.
 - 1. Shop or field fabricate tanks in series with main inlet pipe, intertank pipes and discharge pipes, using quantities sufficient to collect sediments from discharge water.
- E. Straw: Standard-baled agricultural hay bound by wire, nylon, or polypropylene rope. Do not use jute or cotton binding.
- F. Straw Bale Stakes (applicable where bales are on soil): No. 3 diameter concrete reinforcing bars, deformed or smooth at Contractor's option, length as required for minimum 8 inch bury and full height bales.
- G. Filter Fabric: Mirafi, Inc., Synthetic Industries, or equivalent following Section 01630.

1. Woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
 2. Grab Strength: 100 psi in any principal direction (ASTM D-4632), Mullen burst strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.
 3. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.
- H. Wire Fencing: Woven galvanized steel wire, 14 gauge by 6-inch square mesh spacing, minimum 24-inch roll or sheet width of longest practical length.
- I. Fence Stakes: Nominal 2 by 2-inch moisture-resistant treated wood; length as required for minimum 8 inch bury and full height of filter fabric.

PART 3 EXECUTION

3.01 GENERAL

- A. Do not clear, grub or rough cut until erosion and sediment controls are in place, other than site work specifically directed by City Engineer to allow surveying and soil testing.
- B. Maintain existing erosion and sediment controls, if any, until directed by City Engineer to remove and dispose of existing controls.
- C. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage, caused by construction traffic, to erosion and sediment control systems.

3.02 INSPECTION AND REPAIR

- A. Inspect erosion and sedimentation controls daily during periods of prolonged rainfall, at end of rainfall period, and minimum once each week.
- B. Repair or replace damaged sections immediately.
- C. Remove eroded and sedimented products when silt reaches a depth one-third the height of the control or 6 inches, whichever is less.

3.03 FILTER FABRIC FENCES

- A. Layout fence lines with wood stakes.
- B. Fence Type 1:

1. Install stakes 3 feet on center maximum and firmly embed minimum 8 inches in soil. If filter fabric is factory preassembled with support netting, then maximum support spacing is 8 feet. Install wood stakes at a slight angle toward the source of anticipated runoff.
2. Trench in the toe of the fence lines so the downward face of the trenches is flat and perpendicular to direction of flow. V-trench configuration as shown on Drawings may also be used.
3. Lay fabric along edges of trenches in longest practical continuous runs to minimize joints. Make joints only at a support post. Splice with minimum 6-inch overlap and seal securely.
4. Staple filter fabric to stakes at maximum 3 inches on center. Extend fabric minimum 18 inches and maximum 36 inches above natural ground.
5. Backfill and compact trench.

C. Fence Type 2:

1. Layout fence same as for Type 1.
2. Install stakes at 6 feet on center maximum and at each joint in wire fence, firmly embedded 1-foot minimum, and inclined it as for Type 1.
3. Tie wire fence to stakes with wire at 6 inches on center maximum. Overlap joints minimum one bay of mesh.
4. Install trench same as for Type 1.
5. Fasten filter fabric wire fence with tie wires at 3 inches on center maximum.
6. Layout fabric same as for Type 1. Fasten to wire fence with wire ties at 3 inches on center maximum and, if applicable, to stakes above top of wire fence it as for Type 1.
7. Backfill and compact trench.

3.04 STRAW BALE FENCES

- A. Install bales in a row with ends tightly abutting adjacent bales. Place bales with bindings parallel to ground surface. Where bales are installed on soil:
1. Embed bales in soil 4 inches minimum.
 2. Anchor bales with 2 stakes driven into soil, with top end of stake flush with top of bales. Angle the first stake in each bale toward previously laid bale to force bales together.

3. Fill gaps between bales with straw to prevent water from escaping between bales. Wedge carefully to not separate bales.

3.05 PLACEMENT OF TOPSOILS SPECIFIED IN OTHER SECTIONS

- A. Where topsoil is work of another Section, provide erosion controls following this Section during topsoil placement operations.
 1. When placing topsoil, maintain erosion and sediment control systems, such as swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.
 2. Maintain grades previously established on areas receiving topsoil.
 3. After areas receiving topsoil are brought to grade, and immediately prior to dumping and spreading topsoil, loosen subgrade by discing or scarifying 2 inches deep minimum to permit bonding of topsoil to subsoil.
 4. Do not install sod or seed on soil treated with sterilants until sufficient time elapses to permit dissipation of chemicals.

3.06 STREET AND SIDEWALK CLEANING

- A. Keep areas clean of construction debris and mud carried by construction vehicles and equipment.
 1. If necessary, install stabilized construction exits at construction, staging, storage, and disposal areas, following Section 01575- Stabilized Construction Exit.
- B. In lieu of or in addition to stabilized construction exits, shovel or sweep pavements as required to keep areas clean. Do not waterhose or sweep debris and mud off street into adjacent areas, except, hose sidewalks during off-peak hours, after sweeping.

3.07 WASTE COLLECTION AREAS

- A. Prevent water runoff from passing through waste collection areas, and prevent water runoff from waste collection areas migrating outside collection areas.

3.08 EQUIPMENT MAINTENANCE AND REPAIR

- A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose or combine with temporary fueling area specified in Section 01579, so fuels, lubricants, solvents, and other potential pollutants are not washed directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid and solid waste. Clean and inspect maintenance areas daily.

- B. Where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.09 VEHICLE/ EQUIPMENT WASHING AREAS

- A. Install wash area (stabilized with coarse aggregate) adjacent to stabilized construction exit(s), as required to prevent mud and dirt run-off. Release wash water into drainage swales or inlets protected by erosion and sediment controls. Build wash areas following Section 01575- Stabilized Construction Exit. Install gravel or rock base beneath wash areas.
- B. Wash vehicles only at designated wash areas. Do not wash vehicles such as concrete delivery trucks or dump trucks and other construction equipment at locations where runoff flows directly into watercourses or storm water conveyance systems.
- C. Locate wash areas to spread out and evaporate or infiltrate wash water directly into ground or collect runoff in temporary holding or seepage basins.

3.10 PRODUCT STORAGE

- A. Follow Sections 01505- Temporary Facilities and 01610- Basic Product Requirements for basic storage requirements.
- B. Isolate areas where cements, solvents, paints, or other potential water pollutants are stored so they do not cause runoff pollution.
- C. Store toxic products, such as pesticides, paints, and acids following manufacturers= guidelines. Protect groundwater resources from leaching, with plastic mats, packed clay, tarpaper, or other impervious materials on areas where toxic products are opened and stored.

3.11 WATER RUNOFF AND EROSION CONTROL

- A. Control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to the Work, the site, or adjoining properties.
- B. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas, and to direct drainage to proper runoff courses to prevent erosion, sedimentation or damage.
- C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
- D. Dispose of drainage water to prevent flooding, erosion, or other damage to the site or adjoining areas. Follow environmental requirements.

- E. Retain existing drainage patterns external to the site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as required to control conditions.
- F. Plan and execute construction and earth work to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation
 - 1. Hold area of bare soil exposed at one time to a minimum.
 - 2. Provide temporary controls such as berms, dikes, and drains.
- G. Construct fill and waste areas by selective placement to eliminate surface silts or clays which will erode.
- H. Inspect earthwork periodically to detect start of erosion. Immediately apply corrective measures as required to control erosion.
- I. Dispose of sediments offsite, not in or adjacent to streams or floodplains, nor allow sediments to flush into streams or drainage ways. Assume responsibility for offsite disposal location.]
- J. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in maximum of 8-inch layers. Provide compaction density at minimum 90 percent Standard Proctor ASTM D-698-78 density. Make at least one test per 500 cubic yards of embankment.
- K. Do not maneuver vehicles on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sedimentation control systems caused by construction traffic.
- L. Do not damage existing trees intended to remain.

3.12 REMOVAL OF CONTROLS

- A. Remove erosion and sediment controls when the site is finally stabilized or as directed by City Engineer.
- B. Dispose of sediments and waste products following Section 01505 - Temporary Facilities.

END OF SECTION

EROSION AND SEDIMENTATION CONTROL

**SECTION 01575
STABILIZED CONSTRUCTION ACCESS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation and removal of erosion and sediment control for stabilized construction access used during construction and prior to final development of site, as shown in City of Houston Standard Construction details, DWG No. 01571-01.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Price Contracts. If Contract is Unit Price Contract, payment for work in this Section will be based on the following:
 - 1. Stabilized construction roads, parking areas, access and wash areas: per square yard of aggregate/recycled concrete without reinforcing placed in 8- inch layers. No separate payment will be made for street cleaning necessary to meet TPDES requirements. Include cost of work for street cleaning under related Specification section.
- B. Stipulated Price (Lump Sum) Contracts. If the Contract is a Stipulated Price Contract, include payment for work under this Section in the total Stipulated Price.

1.03 SUBMITTALS

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

1.04 REFERENCES

- A. ASTM D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- B. Storm Water Quality Management Handbook For Construction Activities prepared by the City of Houston, Harris County and Harris County Flood Control District.

PART 2 PRODUCTS

2.01 GEOTEXTILE FABRIC

- A. Provide woven or non-woven geotextile fabric made of polypropylene, polyethylene, ethylene, or polyamide material.
- B. Geotextile fabric: Minimum grab strength of 200 lbs. in any principal direction (ASTM D-4632) and equivalent opening size between 50 and 140.
- C. Geotextile and threads: Resistant to chemical attack, mildew, and rot and contain ultraviolet ray inhibitors and stabilizers to provide minimum of six months of expected usable life at temperature range of 0 to 120 degrees F.
- D. Representative Manufacturers: Mirafi, Inc. or equal.

2.02 COARSE AGGREGATES

- A. Coarse aggregate: Crushed stone, gravel, crushed blast furnace slag, or combination of these materials. Aggregate shall be composed of clean, hard, durable materials free from adherent coatings of, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.
- B. Coarse aggregates to consist of open graded rock 2" to 8" in size.

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. Provide stabilized construction roads and access at construction, staging, parking, storage, and disposal areas to keep street clean of mud carried by construction vehicles and equipment. Construct erosion and sediment controls in accordance with Drawings and Specification requirements.
- B. Do not clear grub or rough cut until erosion and sediment control systems are in place, unless approved by Project Manager to allow soil testing and surveying.
- C. Maintain existing construction site erosion and sediment control systems until acceptance of the Work or until removal of existing systems is approved by Project Manager.
- D. Regularly inspect, repair or replace components of stabilized construction access. Unless otherwise directed, maintain stabilized construction roads and access until the City accepts the Work. Remove stabilized construction roads and access promptly when directed by Project Manager. Discard removed materials off-site.

- E. Remove and dispose of sediment deposits at designated spoil site for Project. If a spoil site is not designated on Drawings, dispose of sediment off-site at a location not in or adjacent to stream or flood plain. Assume responsibility for off-site disposal.
- F. Spread compacted and stabilized sediment evenly throughout site. Do not allow sediment to flush into streams or drainage ways. Dispose of contaminated sediment in accordance with existing federal, state, and local rules and regulations.
- G. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage to erosion and sediment control systems caused by construction traffic.
- H. Conduct construction operations in conformance with erosion control requirements of Specification 01570 – Storm Water Pollution Control.

3.2 CONSTRUCTION MAINTENANCE

- A. Provide stabilized access roads, subdivision roads, parking areas, and other on-site vehicle transportation routes where shown on Drawings.
- B. Provide stabilized construction access and vehicle washing areas, when approved by Project Manager, of sizes and at locations shown on Drawings or as specified in this Section.
- C. Clean tires to remove sediment on vehicles leaving construction areas prior to entering public rights-of-way. Construct wash areas needed to remove sediment. Release wash water into drainage swales or inlets protected by erosion and sediment control measures.
- D. Details for stabilized construction access are shown on Drawings. Construct other stabilized areas to same requirements. Maintain minimum roadway widths of 14 feet for one-way traffic and 20 feet for two-way traffic and of sufficient width to allow ingress and egress. Place geotextile fabric as a permeable separator to prevent mixing of coarse aggregate with underlying soil. Limit exposure of geotextile fabric to elements between laydown and cover to a maximum 14 days to minimize potential damage.
- E. Grade roads and parking areas to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar materials to prevent sediment from entering public rights-of-way, waterways or storm water conveyance systems.
- F. Inspect and maintain stabilized areas daily. Provide periodic top dressing with additional coarse aggregates to maintain required depth. Repair and clean out damaged control systems used to trap sediment. Immediately remove spilled, dropped, washed, or tracked sediment from public rights-of-way.

- G. Maintain lengths of stabilized areas as shown on Drawings or a minimum of 50 feet. Maintain a minimum thickness of 8 inches. Maintain minimum widths at all points of ingress or egress.
- H. Stabilize other areas with the same thickness, and width of coarse aggregate required for stabilized construction access, except where shown otherwise on Drawings.
- I. Stabilized areas may be widened or lengthened to accommodate truck washing areas when authorized by Project Manager.
- J. Clean street daily before end of workday. When excess sediments have tracked onto streets, Project Manager may direct Contractor to clean street as often as necessary. Remove and legally dispose of sediments.
- K. Use other erosion and sediment control measures to prevent sediment runoff during rain periods and non-working hours and when storm discharges are expected.

END OF SECTION

SECTION 01576
WASTE MATERIAL DISPOSAL

PART 1 GENERAL

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 Floodplain Ordinance (City Ordinance Number 81-914 and Number 85- 1705), prior to disposal of excess material in areas designated as being in "100-year Standard Flood Hazard Area" within the City and areas designated as being in "500-year Standard Flood Hazard Area". Contact the City of Houston Floodplain Management Office at the Houston Permitting Center (1002 Washington Avenue, 3rd Floor), at (832) 394-8854 for floodplain 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 PRODUCTS (NOT USED)

PART 3 EXECUTION

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.

WASTE MATERIAL DISPOSAL

- 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 floodplain status of any proposed disposal site. Do not dispose of excavated materials in area designated as within 100-year and 500-year Standard Flood Hazard Areas unless "Development Permit" has been obtained. Remove excess material placed in "100-year and 500-year Standard Flood Hazard Areas" 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 01578
CONTROL OF GROUND AND SURFACE WATER**

PART 1 GENERAL

1.02 SECTION INCLUDES

- A. Dewatering, depressurizing, draining, and maintaining trenches, shaft excavations, structural excavations and foundation beds in stable condition, and controlling ground water conditions for tunnel excavations.
- B. Protecting work against surface runoff and rising floodwaters.
- C. Trapping suspended sediment in the discharge from the surface and ground water control systems.

1.02 MEASUREMENT AND PAYMENT

A. UNIT PRICES

- 1. Measurement for control of ground water, if included in Document 00410 – Bid Form, will be on either a lump sum basis or a linear foot basis for continuous installations of wellpoints, eductor wells, or deep wells.
- 2. If not included in Document 00410 – Bid Form, include the cost to control ground water in unit price for work requiring such controls.
- 3. No separate payment will be made for control of surface water. Include cost to control surface water in unit price for work requiring controls.
- 4. Follow Section 01270 – Payment Procedures for unit price procedures.

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

1.03 REFERENCES

- A. ASTM D 698 - Standard Test Methods for Laboratory Compaction of Soils Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³))

CONTROL OF GROUND AND SURFACE WATER

- B. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA)
- C. Storm Water Management Handbook for Construction Activities prepared by City of Houston, Harris County and Harris County Flood Control District.

1.04 DEFINITIONS

- A. Ground water control system: system used to dewater and depressurize water-bearing soil layers.
 - 1. Dewatering: lowering the water table and intercepting seepage that would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts; and disposing of removed water. Intent of dewatering is to increase stability of tunnel excavations and excavations and excavated slopes, prevent dislocation of material from slopes or bottoms of excavations, reduce lateral loads on sheeting and bracing, improve excavating and hauling characteristics of excavated material, prevent failure or heaving of bottom of excavations, and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.
 - 2. Depressurization: includes reduction in piezometric pressure within strata not controlled by dewatering alone, necessary to prevent failure or heaving of excavation bottom or instability of tunnel excavations.
- B. Excavation drainage: includes keeping excavations free of surface and seepage water.
- C. Surface drainage: includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines necessary to protect Work from any source of surface water.
- D. Monitoring facilities for ground water control system includes piezometers, monitoring wells and flow meters for observing and recording flow rates.

1.05 PERFORMANCE REQUIREMENTS

- A. Conduct subsurface investigations to identify groundwater conditions and top provide parameters for design, installation, and operation of groundwater control systems. Submit proposed method and spacing of readings for review prior to obtaining water level readings.
- B. Design ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Section 02260 -Trench Safety Systems, to produce following results:
 - 1. Effectively reduce hydrostatic pressure affecting:

CONTROL OF GROUND AND SURFACE WATER

- a. Excavations.
 - b. Tunnel excavation, face stability or seepage into tunnels.
2. Develop substantially dry and stable subgrade for subsequent construction operations.
3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities and other work.
4. Prevent loss of fines, seepage, boils, quick condition, or softening of foundation strata.
5. Maintain stability of sides and bottoms of excavations.
- C. Provide ground water control systems that include single-stage or multiple-stage well point systems, eductor and ejector-type systems, deep wells, or combinations of these equipment types.
- D. Provide drainage of seepage water and surface water, as well as water from other sources entering excavation. Excavation drainage may include placement of drainage materials, crushed stone and filter fabric, together with sump pumping.
- E. Provide ditches, berms, pumps and other methods necessary to divert and drain surface water from excavation and other work areas.
- F. Locate ground water control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.
- G. Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, adjacent water wells, or potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of system to protect property as required.
- H. Install an adequate number of piezometers installed at proper locations and depths necessary to provide meaningful observations of conditions affecting excavation, adjacent structures and water wells. ,
- I. Install environmental monitoring wells at proper locations and depths necessary to provide adequate observations of hydrostatic conditions and possible contaminant transport from contamination sources into work area or ground water control system.

CONTROL OF GROUND AND SURFACE WATER

1.06 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittals Procedures.
- B. Submit Ground Water and Surface Water Control Plan for review by Project Manager prior to start of excavation work. Include the following:
 - 1. Results of subsurface investigations and description of extent and characteristics of water bearing layers subject to ground water control.
 - 2. Names of equipment Suppliers and installation Subcontractors
 - 3. Description of proposed ground water control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria and operation and maintenance procedures
 - 4. Description of proposed monitoring facilities indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics
 - 5. Description of proposed filters including types, sizes, capacities and manufacturer's application recommendations
 - 6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.
 - 7. Operating requirements, including piezometric control elevations for dewatering and depressurization
 - 8. Excavation drainage methods including typical drainage layers, sump pump application and other means
 - 9. Surface water control and drainage installations
 - 10. Proposed methods and locations for disposing of removed water
- C. Submit following records upon completion of initial installation:
 - 1. Installation and development reports for well points, eductors, and deep wells
 - 2. Installation reports and baseline readings for piezometers and monitoring wells
 - 3. Baseline analytical test data of water from monitoring wells

CONTROL OF GROUND AND SURFACE WATER

4. Initial flow rates

D. Submit the following records weekly during control of ground and surface water operations:

1. Records or flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Refer to Paragraph 3.02, Requirements for Educator, Well Points, or Deep Wells.

2. Maintenance records for ground water control installations, piezometers and monitoring wells

1.07 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of agencies having jurisdiction.

B. Comply with Texas Commission on Environmental Quality regulation and Texas Water Well Drillers Association for development, drilling, and abandonment of wells used in dewatering system.

C. Obtain necessary permits from agencies with jurisdiction over use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Since review and permitting process may be lengthy, take early action to obtain required approvals.

D. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

A. Select equipment and materials necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review by Project Manager through submittals required in Paragraph 1.06, Submittals.

B. Use experience contractors, regularly engaged in ground water control system design, installation, and operation, to furnish and install and operate educators, well, points, or deep wells, when needed.

C. Maintain equipment in good repair and operating conditions.

D. Keep sufficient standby equipment and materials available to ensure continuous operation, where required.

CONTROL OF GROUND AND SURFACE WATER

- E. Portable Sediment Tank System: Maintain equipment in good repair and operating conditions.
 - 1. Shop or field fabricate tanks in series with main inlet pipe, inter-tank pipes and discharge pipes, using quantities sufficient to collect sediments from discharge water.

PART 3 EXECUTION

3.01 GROUND WATER CONTROL

- A. Perform necessary subsurface investigation to identify water bearing layers, piezometric pressures and soil parameters for design and installation of ground water control systems. Perform pump tests, if necessary, to determine draw down characteristics. Present results in the Ground Water and Surface Water Control Plan submittal.
- B. Provide labor, material, equipment, techniques and methods to lower, control and handle ground water in manner compatible with construction methods and site conditions. Monitor effectiveness of installed system and its effect on adjacent property.
- C. Install, operate, and maintain ground water control systems in accordance with the Ground Water and Surface Water Control Plan. Notify Project Manager in writing of changes made to accommodate field conditions and changes to Work Provide revised drawings and calculations with notification.
- D. Provide continuous system operation, including nights, weekends, and holidays. Arrange appropriate backup if electrical power is primary energy source for dewatering system.
- E. Monitor operations to verify systems lower groundwater piezometric levels a rate required to maintain dry excavation resulting in stable subgrade for subsequent construction operations.
- F. Depressurize zones where hydrostatic pressures in confined water bearing layers exist below excavations to eliminate risk of uplift or other instability of excavation or installed works. Define allowable piezometric elevations in the Ground Water and Surface Water Control Plan.
- G. Removal of ground water control installations.
 - 1. Remove pumping system components and piping when ground water control is no longer required.
 - 2. Remove piezometers, including piezometers installed during design phase investigations and left for Contractor's use, upon completion of testing, as required in accordance with Part 3 of applicable specification.

CONTROL OF GROUND AND SURFACE WATER

3. Remove monitoring wells when directed by Project Manager.
 4. Grout abandoned well and piezometer holes. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.
- H. During backfilling, maintain water level a minimum of 5 feet below prevailing level of backfill. Do not allow the water level to cause uplift pressures in excess of 80 percent of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement-stabilized sand until at least 48 hours after placement.
- I. Provide uniform pipe diameter for each pipe drain run constructed for dewatering. Remove pipe drains when no longer required. If pipe removal is impractical, grout connections at 50-foot intervals and fill pipe with cement-bentonite grout or cement-sand grout after removal from service.
- J. The extent of ground water control for structures with permanent perforated underground drainage systems may be reduced, for units designed to withstand hydrostatic uplift pressure. Provide a means to drain affected portions of underground systems, including standby equipment. Maintain drainage systems during construction operations.
- K. Remove systems upon completion of construction or when dewatering and control of surface or ground water is no longer required.
- L. Compact backfill to not less than 95 percent of maximum dry density in accordance with ASTM D 698.
- M. Foundation Slab: Maintain saturation line at least 3 feet below lowest elevations where concrete is to be placed. Drain foundations in areas where concrete is to be placed before placing reinforcing steel. Keep free from water for 3 days after concrete is placed.

3.02 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEPWELLS

- A. For aboveground piping in ground water control system, include a 12-inch minimum length of clear, transparent piping between each eductor well or well point and discharge header to allow visual monitoring of discharge from each installation.
- B. Install sufficient piezometers or monitoring wells to show that trench or shaft excavations in water bearing materials are pre-drained prior to excavation. Provide separate piezometers for monitoring of dewatering and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for selected method of work.
- C. Install piezometers or monitoring wells at least one week in advance of the start of associated excavation.

CONTROL OF GROUND AND SURFACE WATER

- D. Dewatering may be omitted for portions of under drains or other excavations, where auger borings and piezometers or monitoring wells show that soil is pre-drained by existing systems and that ground water control plan criteria are satisfied.
- E. Replace installations that produce noticeable amounts of sediments after development.
- F. Provide additional ground water control installations, or change method of control if, ground water control plan does not provide satisfactory results based on performance criteria defined by plan and by specifications. Submit revised plan according to Paragraph 1.06B.

3.03 SEDIMENT TRAPS

- A. Install sediment tank as shown on approved plan.
- B. Inspect daily and clean out tank when one-third of sediment tank is filled with sediment.

3.04 SEDIMENT SUMP PIT

- A. Install sediment tank as shown on approved plan.
- B. Construct standpipe by perforating 12-inch to 24-inch diameter corrugated metal or PVC pipe.
- C. Extend standpipe 12 inches to 18 inches above lip of pit.
- D. Convey discharge of water pumped from standpipe to sediment trapping device.
- E. Fill sites of sump pits compact to density of surrounding soil and stabilize surface when construction is complete.

3.05 EXCAVATION DRAINAGE

- A. Use excavation drainage methods if well-drained conditions can be achieved. Excavation drainage may consist of layers of crushed stone and filter fabric, and sump pumping, in combination with sufficient ground water control wells to maintain stable excavation and backfill conditions.

3.06 MAINTENANCE AND OBSERVATION

- A. Conduct daily maintenance and observation of piezometers or monitoring wells while ground water control installations or excavation drainage is operating at the site, or water is seeping into tunnels, and maintain systems in good operating condition.

- B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedules.
- C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make specified observations
- D. Remove and grout piezometers inside or outside of excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by Project Manager.

3.07 MONITORING AND RECORDING

- A. Monitor and record average flow rate of operation for each deep well, or for each well point or eductor header used in dewatering system. Also, monitor and record water level and ground water recovery. Record observations daily until steady conditions are achieved and twice weekly thereafter.
- B. Observe and record elevation of water level daily as long as ground water control system is in operation, and weekly thereafter until Work is completed or piezometers or wells are removed, except when Project Manager determines more frequent monitoring and recording are required. Comply with Project Manager's direction for increased monitoring and recording and take measures necessary to ensure effective dewatering for intended purpose.

3.08 SURFACE WATER CONTROL

- A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. Requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.
- B. Divert surface water and seepage water into sumps and pump it into drainage channels or storm drains, when approved by agencies having jurisdiction. Provide settling basins when required by agencies.

END OF SECTION

SECTION 01579

TEMPORARY VEHICLE AND EQUIPMENT FUELING AREA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation of erosion and sediment control for a temporary vehicle and equipment fueling area for aboveground fuel storage tank, which will be on site for more than 48 hours.

1.02 SUBMITTALS

- A. Follow Section 01340 - Shop Drawings, Product Data and Samples.
- B. Submit manufacturer's catalog sheets and other product data on dispensing equipment, pump, and aboveground fuel storage tanks, indicating the capacity and dimensions of the tank.
- C. Submit drawings to show the location of tank protection area and driveway. Indicate the nearest inlet or channelized flow area. Clearly dimension all distances and measurements.
- D. Submit a copy of Contractor's spill response and containment procedures to City Engineer. In lieu of the above, the Contractor shall submit a written statement declaring that the ?Spill Containment Procedures contained in the Airport's pollution prevention plan will be used in the event of a spill, and that a copy of the spill procedures will be located on-site.
- E. Submit a list of significant materials to be used or stored at the airport construction site. Submit statement that all significant materials and associated waste containers that are to be used or stored overnight at the airport construction site will be properly labeled.
- F. Submit a list of spill containment equipment, and quantities thereof, located at the fueling area.
- G. Submit manufacturer's catalog sheets and other product data on geotextile fabric.
- H. Submit inspection reports after the fueling site has been returned to its original condition or constructed in accordance with the Drawings.

1.03 MEASUREMENT AND PAYMENT

- A. Unless indicated in Document 00405 - Bid Tabulation Form, the Temporary Vehicle and Equipment Fueling Area is incidental to the Work. Include costs for Temporary Vehicle and Equipment Fueling Area in the cost of work for which it is required.

TEMPORARY VEHICLE AND EQUIPMENT FUELING AREA

- B. When indicated in Document 00405 - Bid Tabulation Form, measurement and payment for Temporary Vehicle and Equipment Fueling Area will be on a lump sum basis. The Temporary Vehicle and Equipment Area measured as stated, will be paid for at the unit price bid for "Temporary Vehicle and Equipment Fueling Area, Complete in Place."

1. Payment for Temporary Vehicle and Equipment Fueling area will include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, embankment and excavation, concrete foundation and curbs, protection barrier, driveway, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, redressing of aggregates and stones, and removal of erosion and sedimentation control systems at the end of construction.

1.04 QUALITY ASSURANCE

- A. Person conducting visual examination for pollutant shall be fully knowledgeable about the NPDES Construction General Permit, detecting sources of storm water contaminants, inspection of aboveground storage tank and appurtenances for leakage, and the day to day operations that may cause unexpected pollutant releases.

PART 2 PRODUCTS

2.01 ABOVEGROUND STORAGE TANK

- A. Tank Assembly: Must be listed with UL 1709 and UL 2085.
- B. Inner Steel Storage Tank: Follow UL 142, with minimum thickness of 1/8-inch all welded construction.
- C. Tank Encasement: Either concrete or steel to provide a minimum of 110 percent containment of the inner tank capacity. Provide 5-gallon overspill containment pan for tank refueling.
- D. Dispenser Pump: For submersible pump, UL listed emergency shut-off valve to be installed at each dispenser. For suction pump, UL listed vacuum-activated shut-off valve, with a shear section, is to be installed at each dispenser. Fuel may not be dispensed from a tank by gravity flow or by pressurization of the tank. Means must be provided to prevent release of fuel by siphon flow.
- E. Representative Manufacturers: Convault, Fireguard, EcoVault, SuperVault, or equal.

2.02 CONCRETE

- A. Follow Section 03310 - Structural Concrete with a minimum concrete strength of 4,000 psi at 28 days.

TEMPORARY VEHICLE AND EQUIPMENT FUELING AREA

2.03 AGGREGATES

- A. Coarse aggregate shall consist of crushed stone, gravel, crushed blast furnace slag, or a combination of these materials. Aggregate shall be composed of clean, hard, durable materials, free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.
- B. Coarse aggregate shall conform to the following gradation requirements.

Sieve Size (Square Mesh)	Percent Retained (By Weight)
2-1/2"	0
2"	0 - 20
1-1/2"	15-50
3/4"	60-80
No. 4	95-100

2.04 GEOTEXTILE FABRIC

- A. Woven or non-woven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
- B. Grab Strength: 270 psi in any principal direction (ASTM D-4632), Mullen burst strength exceeding 200 psi (ASTM D-3786), and the equivalent opening size between 50 and 140.
- C. Furnish ultraviolet inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- D. Representative Manufacturers: Mirafi, Inc., Synthetic Industries, or equal.

PART 3 EXECUTION

3.01 GENERAL

- A. Follow Section 01572 - Erosion and Sedimentation Control.
- B. Do not clear, grub, or rough cut until erosion and sedimentation control systems are in place, unless otherwise approved by City Engineer.
- C. Maintain existing erosion and sedimentation control systems located within the project site installed by others prior to start of construction under this contract until acceptance of the project or until directed by the City Engineer to remove and dispose the existing systems.
- D. Inspect and repair or replace components of all erosion and sedimentation control systems as specified for each type of system. Unless otherwise directed, maintain the erosion and sedimentation control systems until acceptance of the project. Remove erosion and

sedimentation control systems promptly when directed by the City Engineer and dispose of removed materials offsite.

- E. Remove and dispose of sediments deposits at the project spoil site. If a project spoil site is not designated on Drawings, dispose sediment at an offsite location. Contractor assumes responsibility for offsite disposal location. Sediment shall be disposed of at an offsite location not in or adjacent to a stream or floodplain. Spread, compact, and stabilize sediment placed at the project site in accordance with the directions of the City Engineer. Do not allow sediment to flush into a stream or drainage way. If sediment is contaminated, dispose of sediment in accordance with federal, state and local regulations.
- F. Do not maneuver equipment or vehicles on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damages caused by construction traffic to erosion and sedimentation control systems.
- G. Employ protective measures to avoid damage to existing trees to be retained on the project site. Conduct all construction operations under this Contract in conformance with the erosion control practices described in Section 01572 - Erosion and Sedimentation Control.
- H. Contractor to prepare spill response and containment procedures to be implemented in the event of a significant materials spill. Significant materials include but are not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under section 101(14) of CERCLA; any chemical required to be reported pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as slag, ashes and sludge that have the potential to be released with storm water discharges. In lieu of developing procedures stated above, ?Spill Containment Procedures enclosed in the airport's pollution prevention plan may be used. Spill procedures shall be kept on-site at the airport construction site.
- I. Spill containment equipment appropriate to the size of operation is to be located in close proximity to the fueling area. Such equipment includes, but not limited to, suitable waste containers for significant materials, drip pans, booms, inlet covers, or absorbent.
- J. All significant materials or waste containers used for airport construction activities and stored on-site at the airport overnight are to be properly labeled.

3.02 CONSTRUCTION METHODS

- A. Provide fuel tank protection area and driveway as shown on the Drawings, or equivalent if prior written approval has been given by City Engineer.
- B. Do not locate fueling area in or near a channelized flow area or close to a storm sewer conveyance system. Sufficient space must be provided to allow installation of other erosion and sediment controls to protect those areas.

- C. Clear and grub the fueling area to remove unsuitable materials. Place geotextile fabric as permeable separator to prevent mixing of coarse aggregate with underlying soil. Overlap fabric a minimum of 6 inches. Place coarse aggregate on top of the geotextile fabric to minimum depth of 8 inches.
- D. Grade protection area and driveway to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar methods to prevent sediment from entering public right-of-way, receiving stream or storm water conveyance system. The driveway to the fuel tank area shall have a minimum width of 15 feet for one-way traffic and 30 feet for two-way traffic.
- E. Place the aboveground storage tank on top of the cast-in-place or pre-cast foundation. The size and thickness of the foundation shall be based on the size and weight of the tank to be used, with a minimum thickness of 6 inches. The concrete foundation shall be enclosed by a 5-inch by 5-inch concrete curb and shall extend a minimum of 1 foot beyond the tank and dispenser assemblies, so that leak and drip can be contained within the concrete foundation.
- F. Slope the concrete foundation a minimum of 1 percent toward a 6-inch wide by 12-inch long by 4-inch deep sump pit. Install a minimum of 2-inch pipe inside the sump pit with a valve on the outside of the curb to allow draining of the concrete foundation.
- G. Install a portable concrete jersey barrier around the concrete foundation. Provide a minimum clearance of 2 feet from the edge of the foundation. In lieu of the jersey barrier, Contractor can install 4-inch diameter steel pipe bollards around the foundation. The bollards shall be buried a minimum of 3 feet deep, 3 feet aboveground, and 4 feet on center, encased in a 12-inch wide concrete foundation.

3.03 MAINTENANCE

- A. Inspect stabilized areas after every storm event and at least once a week. Provide periodic top dressing with additional coarse aggregate to maintain the required depth. Repair and clean out damaged control measures used to trap sediment.
- B. Inspect fuel tank foundation's bermed area after every storm event and at least once a week. Visually examine storm water contained in the tank's bermed foundation area for oil sheen or other obvious indicators of storm water pollution. Properly dispose of the storm water when significant amount of pollutant is present (as defined in Federal Register, Vol. 60, No. 189, Friday, September 29, 1995). Record visual examination of storm water discharge in a Report noting the date and time of examination, name of examiner, observations of water quality, and volume of storm water discharged from the bermed area. The Report shall be kept together with all other storm water pollution control inspection reports on the site, in a readily accessible location. The Report shall be maintained for the duration of the construction activity, and thereafter in accordance with the provisions of Section 01571 - NPDES Requirements.

3.04 TEMPORARY FUELING AREA CLOSURE

TEMPORARY VEHICLE AND EQUIPMENT FUELING AREA

A. The temporary vehicle and equipment fueling area shall be disposed of by removal of all sediment and erosion controls properly offsite. City Engineer will inspect the top soils in the fueling area and immediate vicinity for evidence of fuel leaks. If the City Engineer determines that sufficient pollutants have been released, the soil shall be removed and properly disposed offsite. Other remediation method may be required at no additional cost to the City.

SECTION 01610
BASIC PRODUCT REQUIREMENTS

PART 1 GENERAL

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.

BASIC PRODUCT REQUIREMENTS

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 by methods to prevent over-bending or overstressing.
- G. Do not drop, roll, or skid Products off delivery vehicles. Hand-carry or use Suitable materials handling equipment.

1.06 STORAGE 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 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01630
PRODUCT OPTIONS AND SUBSTITUTIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedure for requesting substitution of products in lieu of those specified. These requirements supplement Paragraph 3.10 of Documents 00700 - General Conditions and 00800- Supplementary Conditions.
- B. After submittal period expires, requests for substitutions will be considered only when a specified product becomes unavailable because of conditions beyond Contractor's control.

1.02 DEFINITIONS

- A. Process: Any proprietary method for installing products that results in an integral, functioning part of the Work. For this Section, the word "product" includes "process."

1.03 SUBMITTALS

- A. Submit 5 copies of each separate product substitution request, within time period stated in Document 00700 - General Conditions, including:
 - 1. Full submittal data for specified products, following Section 01340- Shop Drawings, Product Data and Samples.
 - 2. Full data substantiating compliance of proposed substitutions with Contract Documents and substantiating equivalency with specified products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature with precise product description, and directly applicable performance and test data and reference standards.
 - c. Samples, as applicable.
 - d. Name and address of projects on which proposed product was used in similar or equivalent conditions within the last 3 years, and date of installation.
 - e. Name, address and telephone number of owners, designer, and installing contractor.

PRODUCT OPTIONS AND SUBSTITUTIONS

- f. For process substitutions, detailed description of proposed method and drawings illustrating methods.
- B. Detailed reason(s) for substitution, and tangible benefits accruing to City.
- C. Itemized comparison of proposed substitutions with specified products and full description of deviations.
- D. Fully describe all effects of substitutions on the Work and on separate contracts and work by City. Include full cost data comparing proposed substitution with specified products and amount of change in Contract Sum. Indicate changes in construction schedule (Section 01325 - Construction Schedules).
- E. Substitutions are not permitted when:
 - 1. They are not processed following Document 00700 - General Conditions and this Section.
 - 2. Acceptance will require revision of Contract Documents or will change the design concept.
 - 3. Delay in construction will occur.
 - 4. No provisions for substitutions are stated in the Contract Documents.
- F. Burden of proof of merit of proposed substitution remains solely with Contractor.

1.02 CONTRACTOR'S OPTIONS

- A. Options, stated as "Contractor's option(s)" in Contract Documents, are intended to benefit the Work through reduced cost, decreased construction time, or better performance within designated range of criteria.
- B. Volunteer options are not permitted.
- C. Notify in writing City Engineer of options chosen.

1.03 QUALITY ASSURANCE

- A. To the maximum extent possible, provide products of the same type or function from a single manufacturer, make, or source. Where more than one choice is available, select the product which is compatible with other products already selected, specified, or which is in use by City.

1.04 DESIGNER'S ACTIONS

- A. Decision to accept or deny proposed substitute products, or selection of one product instead of another, is solely the responsibility of Designer; such decisions and selections are final.

1.05 COSTS FOR REVIEW OF SUBSTITUTIONS

- A. Pay costs related to Designer's review and examination of proposed substitutions. Assume liability for obtaining acceptance of substitutions.
- B. Reimburse City for actual evaluation costs of Designer's(s) if proposed substitute does not meet requirements of Contract Documents, or acceptance of proposed substitute requires changes to the Work.
- C. Reimburse City for associated design costs, including redesign, additional submittal reviews, investigations, Designer's fees and revision of Contract Documents required because of the requested substitution. Design costs are the full price for additional work performed, paid at the rates established by Designer's contract with City for Design and Contract Documents phase of the Project.
- D. Pay for laboratory testing required to obtain information upon which equivalency can be determined.
- E. If Designer determines that proposed substitutions are not equivalent to specified products, furnish one of the specified products without delay in time or additional cost to City.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01725
FIELD SURVEYING

PART 1 GENERAL

1.01 QUALITY CONTROL

- A. Conform to State of Texas laws for surveys requiring licensed surveyors. Employ a surveyor acceptable to Project Manager if required by the Contract.

1.02 MEASUREMENT AND PAYMENT

A. UNIT PRICES

- 1. No separate payment will be made for field surveying. Include cost in unit price for related items.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330- Submittal Procedures.
- B. Submit name, address, and telephone number of Surveyor to Project Manager before starting survey work.
- C. Submit documentation verifying accuracy of survey work on request.
- D. Submit certificate signed by Surveyor, that elevations and locations of the Work are in conformance with the Contract

1.04 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. Prepare a certified survey setting forth dimensions, locations, angles, and elevations of construction and site work upon completion of foundation walls and major site improvements.
- C. Submit record documents under provisions of Section 01785- Project Record Documents.

1.05 EXAMINATION

- A. Verify locations of survey control points prior to starting the Work.
- B. Notify Project Manager immediately if any discrepancies are discovered.
- C. Verify project address with the HAS GIS Department.

FIELD SURVEYING

1.06 SURVEY REFERENCE POINTS

- A. The City will establish survey control datum as provided in Document 00700- General Conditions and as indicated on Drawings. In m Project Manager in Advance of time horizontal and vertical control points will be established so verification deemed necessary by Project Manager may be done with minimum inconvenience to the City or Contractor.
- B. Locate and protect survey control points prior to starting site work; preserve permanent reference points during construction.
- C. Notify Project Manager a minimum of 48 hours before relocation of reference points is needed due to changes in grades or other reasons.
- D. Promptly report loss or destruction of reference points to Project Manager.
- E. Reimburse the City for cost of reestablishment of permanent reference points disturbed by construction operations.

1.07 SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices.
- B. Establish a minimum of two permanent benchmarks on site, referenced to established control points. Record horizontal and vertical location data on Project record documents.
- C. Establish elevations, lines and levels to provide quantities required for measurement and payment and for appropriate controls for the Work. Locate and lay out the following with appropriate instruments:
 - 1. Site improvements including grading, fill and topsoil placement, utilities, and footings and slabs
 - 2. Grid or axis for structures
 - 3. Building foundation, column locations, and ground floor elevations
- D. Periodically verify layouts.

PART 2 PRODUCTS (NOT USED)

PART 3 PRODUCTS (NOT USED)

END OF SECTION

FIELD SURVEYING

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SECTION 01726
BASE FACILITY SURVEY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. “Base Facility” is defined in Section 01423 - References.
- B. Survey of Base Facility and related existing conditions.
- C. Notification of discoveries.
- D. Contractor's survey of Base Facility is intended to identify and describe actual as-found conditions to supplement information contained in Base Facility documents and in the Drawings and Specifications.
- E. Necessary changes in location of the Work may be made by City Engineer to avoid unanticipated concealed conditions, following Section 01255 - Modification Procedures.
- F. If permanent relocation or reworking of existing conditions is required and not otherwise provided for in the Contract Documents, City Engineer will direct Contractor following Section 01255 - Modification Procedures.

1.02 BASE FACILITY DOCUMENTS

- A. Drawing and Specifications for the Work are based on City-furnished Base Facility documents and upon the Designer's limited visual observations of sight-exposed conditions existing in February of 2020.
 - 1. Contract Documents do not necessarily completely describe all details of Base Facility at interfaces with the Work.
 - 2. The Designer’s observations did not extend to areas or conditions above ceilings or inside partitions and chases.
- B. Obtain available Base Facility documents from the City Engineer.
 - 1. Drawing and Specifications for the Work are based on the City-furnished Base Facility documents and upon limited visual observations of sight-exposed conditions existing at the time of Notice to Proceed (NTP).

BASE FACILITY SURVEY

2. The contractor will provide HAS with a map of the project area to be used by the infrastructure and IT sections to compile a map of known underground utilities and telecommunications lines and equipment. This process does not replace any base survey methods or requirements.

1.03 SEQUENCING AND SCHEDULING

- A. Sequence and schedule survey to properly coordinate with other construction operations.
- B. Complete survey work, process one or more Document 00685 - Request for Information, obtain responses, evaluate and submit cost or schedule impact of responses, and process accepted modifications before commencing work of affected Sections.
- C. Obtain or designate and protect control samples of Base Facility work during survey and maintain until required submittals pertinent thereto are processed.

1.04 BASE FACILITY CONDITIONS

- A. Base Facility intended or required to remain takes precedence of fact and control over details and construction of interfaces, dimensions, clearances, openings, alignments, and substrate conditions between Base Facility and the Work.
- B. Base Facility is intended to remain except where shown on Drawings or specified as work of Section 01731 - Cutting and Patching or Division 2 sections covering demolition.

1.05 DIMENSIONS

- A. Control dimensions are indicated by nominal value on the Drawings within parenthesis. This designation means, in addition to other requirements, the Contractor is responsible for finding the actual dimension following this Section and using actual dimensions to govern placement of work including relationship to and coordination with related work.
 1. Follow Section 01255 - Modification Procedures to resolve discrepancies between existing conditions and Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Survey Base Facility affecting or affected by the Work by on-site examination of existing conditions.

- B. Explore ahead of trenching and excavation work to uncover obstructing underground structures sufficiently to determine location, to prevent damage and to prevent interruption of services. Restore to original condition damages to underground structure at no cost or time increase to the contract, following Section 01731 - Cutting and Patching.

- C. Note discovered discrepancies between the Base Facility and Contract Documents.
 - 1. Use one set of prints of Drawings and Specifications (made from reproducible furnished following Section 01110 - Summary of Work) for the sole purpose of documenting discoveries. Designate as "SURVEY DOCUMENTS."
 - 2. Prepare and issue Document 00685 - Request for Information for each discrepancy, following Section 01255 - Modification Procedures.
 - 3. Supplement data noted on survey documents with video or photographs following Section 01321 - Construction Photographs as required to clearly and fully describe conditions.

- D. Coordinate survey of semi-exposed and concealed conditions with work of Sections 01731-Cutting and Patching, and 024119 – Selective Structure Demolition.

END OF SECTION

SECTION 01731
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repair remaining Base Facility.
- B. Connect work to Base Facility.
- C. Remove construction required to enable required alteration or addition to Base Facility.
- D. Uncover work for inspection or reinspection of covered work by authorities having jurisdiction.
- E. Connect work not done in proper sequence.
- F. Make connections or alterations to Base Facility or to work.
- G. Provide openings, channels, chases and flues as required.
- H. Demolition is specified in Division 2.

1.02 REFERENCES

- A. National Terrazzo and Mosaic Association, Inc. (NTMA).

1.03 SUBMITTALS

- A. Submit Document 00931 - Request for Information, with supporting data, in advance of cutting or patching not shown on the Drawings or which affects:
 - 1. Contract Sum or Time.
 - 2. Visual quality of remaining sight-exposed surfaces exposed after work is complete and for which no work is required other than to gain access.
 - 3. Warrantability, value, integrity, serviceability, or life expectancy of any component of the Base Facility and the Work.

CUTTING AND PATCHING

4. Integrity or serviceability of weather-exposed, moisture-resistant, or fire-resistant components or systems.
 5. Work outside indicated contract limits.
- B. Include in each request:
1. Identification of the Project.
 2. Description of affected Work.
 3. The necessity for cutting and patching.
 4. Effect on Base Facility construction, on the Work, or on work of separate contractors and work by City.
 5. Description of proposed work:
 - a. Scope of cutting and patching.
 - b. Contractor, Subcontractor or trades executing work.
 - c. Products proposed.
 - d. Extent and type of refinishing.
 - e. Schedule of operations.
 6. Alternatives to cutting and patching, if any.
 7. Written permission of separate contractors or installers of work by City whose work will be affected, countersigned by City Engineer.
- C. Should Base Facility conditions require change of products, follow Section 01630 - Product Options and Substitutions.
- D. Submit product data and samples following Section 01340 - Shop Drawings, Product Data and Samples.
1. Submit manufacturer's technical literature for each patch material and fully describe compatibility with each substrate.
 2. Submit samples of paint colors and sheen on gypsum board with taped edges.
 3. Submit 2-foot square samples of drywall and plaster finish texture.

CUTTING AND PATCHING

4. Submit mix designs following Section 01455 - City's Acceptance Testing.
- E. Submit written notice to City Engineer designating time work will be uncovered for observation. Do not cut until authorized by City Engineer, except when documentable emergency conditions require immediate cutting.
- F. Should conditions of work or schedule indicate change of products or methods, submit Document 00931 - Request for Information stating conditions indicating change, recommendations for alternative products or methods and submittals. Follow Section 01630 - Product Options and Substitutions.

1.04 QUALITY ASSURANCE

- A. Cut and patch by persons qualified to perform work.
- B. Remove minimum construction necessary. Return surfaces to appearance of new work and match Base Facility.
 1. Cut finish surfaces such as masonry, tile, plaster or metals in a straight line at a natural line or plane of division from abutting work.
- C. Make patch work visually undetectable at 5-feet for exposed and semi-exposed interior work, and at 10-feet for exposed and semi-exposed exterior work under Base Facility lighting conditions.
- D. Presence of a damaged or defective product, finish or type of construction requires patching, extending or matching be performed as necessary to make work complete and consistent to standards of quality identical to Base Facility.
- E. Promptly notify City Engineer by Document 00931 - Request for Information of discoveries of construction, such as furnishings and articles having possible historic or private value to City.
 1. Protect discovery until disposition.
 2. Legally dispose of items not removed by City.

1.06 SCHEDULING AND SEQUENCING

- A. Provide specific time and date information to City Engineer 48 hours in advance of proposed Work involving temporary shutdown of utilities and environmental systems.
- B. Notify City Engineer at least 7 days before starting work in areas or conditions affecting data, communications, security and paging systems. Do not cut or patch such systems without approval of City Engineer.

CUTTING AND PATCHING

- C. Submit a detailed schedule of proposed connections, including shutdowns and tie-ins. Include in the submittal the proposed time and date as well as the anticipated duration of the Work. Submit the detailed schedule coordinated with the construction schedule.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Based on the Designer's knowledge of available "as-builts" of the Base Facility, and observation of sight-exposed construction, patching materials required include:
 - 1. *Paint: Follow Section 099000.*
 - 2. *Gypsum Drywall: Follow Section 092900.*
 - 3. *Lath and Plaster: Follow Section 092400.*
 - 4. *Concrete Masonry Units (CMU).*
 - 5. Concrete Repair: Refer to structural drawings.
- B. Where there is no specification for a required patch product, provide same products and types of construction as analogous Base Facility construction.
 - 1. Determine products required following Section 01726 - Base Facility Survey. Determine required workmanship by using equivalent Base Facility products as control samples.

PART 3 EXECUTION

3.01 GENERAL PERFORMANCE

- A. In addition to demolition work, cut, move or remove discovered non-hazardous-material Base Facility items as necessary to provide access or to allow alterations and new work to proceed, as approved or directed, including:
 - 1. Repair or remove dangerous and unsanitary conditions.
 - 2. Remove abandoned items and items serving no useful purpose, such as Base Facility abandoned HVAC components, piping, data cables, conduit and wiring back to panels, and ductwork.
 - a. Confirm abandonment with City Engineer prior to removal.

3. Remove unsuitable or extraneous products not designated for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
- B. Patch, repair and refinish Base Facility items intended or designated to remain, to match analogous Base Facility conditions for each product, with proper transition between new work and Base Facility.
- C. Remove and replace defective or deficient new work and work not following Contract Documents.
- D. Remove samples of Base Facility and work for Contractor's surveillance testing and for tests in Section 01455 - City's Acceptance Testing.
- E. Provide routine penetrations and applicable fire-rated or weather-resistant separations for plumbing piping, electrical conduit, HVAC ducts, and similar items required to complete the work, including incidental conditions occurring outside the indicated contract limits, which occur in walls, floors, ceilings, partitions and roofs.
- F. Repair damage to Base Facility resulting from work under this contract.
- G. Perform activities to avoid interference with facility operations and work of other contractors, following Document 00700 - General Conditions and Sections 01145 - Use of Premises, 01312 - Coordination and Meetings, 01505 - Temporary Facilities and 01506 - Temporary Controls.
- H. Restore Base Facility to a state equivalent to or better than that before cutting and patching. Restore new work to standards of these Specifications.
- I. Support, anchor, attach, match, trim and seal materials to work of other contractors. Unless otherwise specified, provide sleeves, inserts, and hangers, required for the execution of the Work.
- J. Provide shoring, bracing and support as required to maintain structural integrity and protect adjacent work from damage during cutting and patching. Before cutting beams or other structural members, anchors, lintels or other supports, request written instructions from City Engineer. Follow such instructions, as applicable.
- K. Cut and patch as recommended by manufacturers of patch products, and where possible by manufacturer of affected Base Facility products.
- L. Fit and adjust products to provide finished installation complying with specified products, functions, tolerances and finishes.

CUTTING AND PATCHING

- M. Restore Base Facility damaged as a result of the Work. Install work following Contract Documents, Base Facility documents, trade standards, or governing agencies, as applicable.
 - 1. Follow Section 01726 - Base Facility Survey to document Base Facility damage Base Facility prior to commencing work.
 - N. Refinish entire exposed and semi-exposed surfaces.
 - 1. For continuous surfaces, refinish to nearest change in plane. Remove and reinstall remaining signs, hardware and similar interferences.
 - 2. For an assembly, refinish entire unit.
 - O. Where cutting and patching fails to match Base Facility work, provide complete replacement work.
- 3.02 TEMPORARY FACILITIES AND PROTECTION
- A. Follow Section 01505 - Temporary Facilities.
- 3.03 INSPECTION AND COORDINATION
- A. Inspect Base Facility following Section 01726 - Base Facility Survey, and if required provide Contractor's testing following Section 01450 - Contractor's Quality Control, for Base Facility conditions subject to this Section.
 - B. Report by Document 00931 - Request for Information Questionable Base Facility conditions that affect the Work.
 - C. Obtain written authorizations before beginning utility or environmental systems work affecting Base Facility outside the contract limits.
 - D. Coordinate work with demolition work specified in Division 2.
- 3.04 REMAINING FLOORS, WALLS, CEILINGS AND DOORWAYS
- A. Where only partitions are removed, patch remaining floors, walls and ceilings, with substrate and finish materials to match Base Facility.
 - 1. Where removal of partitions results in adjacent spaces becoming one, rework floors and remaining walls and ceilings to provide smooth planes without breaks, steps or bulkheads.

2. Where extreme change of plane occurs, obtain direction by Document 00931 - Request for Information.

B. Trim and refinish Base Facility doors as necessary to clear plane of new floors.

3.05 DAMAGED SURFACES

A. Replace or patch any portion surfaces of the Work and Base Facility found damaged, lifted, discolored, or showing other imperfections resulting from work, with matching sound material and finish.

1. Provide proper support of substrate before patching.
2. Refinish patched portions of painted or coated surfaces scheduled for new finish, to produce uniform color and texture over entire surface.
 - a. Tape, float, sand and apply two coats of latex paint to repaired Base Facility drywall, plaster, doors and doorframes.
3. Exceptions: Fully patch remaining Base Facility surfaces exposed and semi-exposed to public view to match all visual characteristics of Base Facility.

3.06 TRANSITION FROM BASE FACILITY TO NEW CONSTRUCTION

A. Where new work abuts or finishes against Base Facility work, make smooth and workmanlike transition. Match patched work adjacent to Base Facility work for all visual characteristics.

1. Where smooth transition is not possible, terminate Base Facility surface neatly along a straight line at a natural line or plane of division, and provide edge trim appropriate to substrate and finish.
2. Exceptions: Fully patch remaining Base Facility surfaces exposed and semi-exposed to public view to match all visual characteristics of Base Facility.

3.07 SITE UTILITY AND BUILDING ENVIRONMENTAL SYSTEMS

- A. Perform work needed to complete connections and tie-ins to Base Facility. Keep Base Facility in continuous operation unless otherwise specifically permitted or approved by City Engineer.
- B. Base Facility electrical and mechanical systems and site utilities are intended to be functioning properly prior to start of the Work. Follow Section 01505 to confirm proper function.

1. Notify City Engineer by Document 00931 - Request for Information of non-operating systems prior to commencing affected work in each area.
 2. Do not proceed with work affecting improperly functioning utilities or systems until corrective work is complete.
- C. Make required cuts, plugs and terminations. Tag remaining lines with contents names and direction of flow, whether or not flow is active, using weather-resistant tags and permanent markers.
- D. Plumbing Systems and HVAC Systems:
1. Provide temporary or permanent by-passes, test plugs and stop valves in plumbing waste and supply lines, and in HVAC system piping as individual fixtures and equipment are removed. Do not bypass wastewater or sludge into waterways. Provide temporary pumping facilities to handle wastewater if necessary. Provide temporary power supply and piping to facilitate construction where necessary.
 - a. Scope, type and locations of temporary plugs and valves are at the Contractor's option, as approved, based on Base Facility conditions encountered.
 - b. Unless otherwise required, install permanent plugs and valves as follows:
 - 1) For risers tapped into remaining lateral lines cut and plug risers as close as practical to laterals.
 - 2) For laterals, cut and plug approximately one foot from surface of Base Facility demising walls intended to remain.
 - 3) For risers extending through floors in unoccupied areas, cut and plug approximately one foot above top surface of Base Facility floor.
 - 4) For risers extending through floors in occupied areas and which cannot be fully removed following Paragraph 1) above, cut and plug flush with surface of Base Facility floor.
- E. Electrical Power Systems:
1. Provide temporary or permanent bypasses and terminations of electrical systems. Do no work on Base Facility data, communications, security or paging systems following Paragraph 1.05.B above.
 - a. Scope, type and location of terminations are at the Contractor's option, as approved, determined by Base Facility conditions encountered.
 - b. Unless otherwise required, terminate electrical lines as follows:

CUTTING AND PATCHING

- 1) For circuits tapped into remaining laterals intended to remain and which occur above Base Facility ceiling planes, terminate circuits in approximately sized junction boxes as close as practical to the lateral. Attach boxes to building structure, install wire nuts on unconnected wires, and permanently label outside of box with panel/circuit number and voltage.
 - 2) For abandoned circuits, remove wire, conduit, boxes, breakers and related components back to the respective panel boxes or terminal boards, and provide a blank plate in the breaker slot, and identify plate as "SPARE CIRCUIT/ (CAPACITY) AMP" minimum.
 - c. Unless otherwise required by demolition work, and where Base Facility ceilings are indicated for removal, leave paging and security system components in place, using at least two hanger wires per device.
2. Provide permanent support for risers and laterals intended to remain.
 3. Fit ductwork, conduit and pipes water-tight, air-tight and fire-stopped, following Section 078413, at penetrations through walls, floors and ceiling, whether or not Base Facility penetrations are constructed as water-, air- or fire-tight.
 - a. If not otherwise shown on Drawings, provide properly sized fire dampers for remaining Base Facility ducts which penetrate fire-rated construction, and which do not already have fire dampers.
 4. Temporarily or permanently seal penetrations of removed laterals and risers through floors and full-height walls with firestopping, following demolition requirements, as work progresses.
 5. Provide minimum 20-gauge galvanized sheet metal plate with self-tapping screws at openings in ductwork. Seal joints as required to prevent air intake or exhaust.
 6. Remove hangers or supports where associated mechanical and electrical work is removed, if not accomplished as part of Section 024119 Selective Demolition.
 7. Remove site utility lines without disturbing underlying soil or sub-base.
- F. Insofar as possible, test work under operating conditions before final tie-ins are made to connect equipment to the Base Facility. Test remaining utilities and service in presence of City Engineer before covering up. Repair defects and deficiencies.
- 3.10 CONCRETE MASONRY UNITS (CMU)
- A. Remove Base Facility CMU to lines required to receive new work.

CUTTING AND PATCHING

3.12 GYPSUM DRYWALL SYSTEMS

- A. Follow Section 092900.
- B. Fasten new framing to Base Facility with powder-actuated or drill-in fasteners at conditions subject to shear and compression loads, with drill-in fasteners at conditions subject to tension loads, and with drywall screws firmly secured to Base Facility metal framing.

3.13 PLASTER

- A. Follow Section 092400.

3.14 PAINT

- A. Prepare and prime substrates following manufacturer's recommendations.
- B. Apply paint with equipment as required to achieve match with Base Facility. Apply at rates recommended by manufacturer.
- C. Follow Section 099000.

3.17 INTERIM CLEANING

- A. Clean occupied areas daily. Immediately remove spillage, overspray, dust and debris in occupied areas and at points of access into contract limits. Sweep and wet mop floors as required, using safety cones and tape barricades as required cleaning operations.
- B. Make surfaces ready for work of successive trades.
- C. At completion of work in each area, provide final cleaning following Section 01770 - Contract Closeout.

END OF SECTION

SECTION 01740
SITE RESTORATION

PART 1 GENERAL

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 01110 – Summary of Work and Section 01326 – Construction Sequencing.
- 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.

SITE RESTORATION

- 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(s) will follow scheduling of site restoration of prior Phase. Limit work to a maximum of two (2) Phases of the project.
- C. Construction of Project(s) 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 or easement. Commence work in additional right-of-way or easement after completion of site restoration.

PART 2 PRODUCTS

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 – Hydro-Mulch Seeding.
- C. Trees, Shrubs and Planting: Conform to requirement in Section 01562 – Tree and Plant Protection.

PART 3 EXECUTION

3.01 PREPATORY 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 (3) 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 02514 – Disinfection of Water Lines, within seven (7) 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 (3) 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 restorations.
- 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 (3) 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 hydro-mulching and tree planting.
2. No later than seven (7) 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 preconstruction 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 hydro-mulch seeding conforming to Section 02921 – Hydro-Mulch Seeding.

B. Trees, Shrubbery and Plants.

1. Remove and replant trees, shrubs, and plants in accordance with 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 footing and mow strips. Provide new wood posts, top and bottom railings 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 and seeded or sodded 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 – Hydro-Mulch Seeding, and Section 02922 – Sodding for Maintenance Requirements.

END OF SECTION

SECTION 01761

PROTECTION OF EXISTING SERVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to protect existing services and minimize impact of interruptions.

1.02 DEFINITIONS:

- A. Service is defined to include utilities (natural gas, water, or power); lighting and emergency lighting; data and telecommunications; closed-circuit video, control and monitoring circuits, and air conditioning, heating, and ventilating. Service types include:

1. Power.
2. Lighting, and emergency lighting.
3. Paging.
4. Telephone.
5. Video.
6. Data and computer networks.
7. Water.
8. Natural gas.
9. Heating, ventilating, and air conditioning

- B. Data and Telecom Service is defined to include:

1. Wiring and cable used for the transmission of data, voice, or video information.
2. Wiring for low voltage monitoring and control of various types of devices.

- C. Service interruption is defined to include any temporary or permanent inability to provide the service as contracted or as intended and includes interference with or disruption to source, distribution, or terminal items of a service system.

- D. Response time is defined to be the time elapsed between the time that a Service Interruption becomes known to the Contractor and the time that a person is at the site of the interruption

PROTECTION OF EXISTING SERVICES

or, if the site of the interruption is not immediately known, at the job site to diagnose and locate the service interruption.

1.03 PERFORMANCE REQUIREMENTS

- A. Contractor is required to protect and maintain existing services to those operating areas of the Airport.
 - 1. Where services are affected by construction activities and interruption of service is required to complete the Work, schedule service interruption to minimize impact.
 - 2. Where services cannot be interrupted, provide alternate services or circuits as required to maintain affected services. Design and implement service "cut-over" so that services are maintained without interruption.
- B. Train employees and subcontractors to ensure that accidental service interruptions are promptly recognized, and appropriate responses can be initiated.
- C. Maintain personnel, equipment, and parts at hand or on call to provide the response times indicated.
- D. Interruptions to Existing Service are classified as follows:
 - 1. Security Service Interruption:
 - a. Any service interruption of power, lighting, or data and telecom service that affects and compromises one of the following:
 - (1) FAA Security
 - (2) Airline Security
 - (3) Airport Security
 - (4) Other government entity charged with enforcing security at the Airport (Houston Police Department, FBI, Secret Service, etc.).
 - b. Security Services must be active at all times.
 - 2. Life Safety Service Interruption:
 - a. Any service interruption of power, lighting, or data and telecom service affecting or compromising one or more of the following life safety systems.
 - (1) Fire/smoke alarms.

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- (2) Emergency lighting.
- (3) Elevator operations in "Fire" mode.
- (4) Emergency intercom systems.

b. Life Safety Services must be active at all times.

3. Business Service Interruption:

a. Any service interruption of utility service (power, lighting, natural gas, data and telecom, etc.) that affects and compromises the ability of a profit-seeking entity to earn revenue, including:

- (1) Airline: Includes FIDS network, reservation/confirmation systems, paging systems.
- (2) Tenants Other Than Airlines: Point of sale systems, reservation/confirmation systems, utilities for storing, cooking, or maintaining food for sale to the public.

b. Business Services must be active at all times in the areas of the Airport served by Airlines or other tenants during hours of their operation.

4. Comfort / Convenience Service Interruption :

a. Any service interruption of power, lighting, or data and telecom services affecting or compromising the comfort or convenience of those using the Airport (passengers, visitors, employees, concessionaires, etc.) including:

- (1) Lighting.
- (2) Air Conditioning.
- (3) Heating.
- (4) Public telephones.
- (5) Elevators.

b. Minimize Comfort/Convenience Service Interruptions except in construction areas.

1.04 SUBMITTALS

- A. Schedule of service interruptions.
- B. Emergency Response Plan.

1.05 QUALITY ASSURANCE

- A. Develop emergency response plan for each class of service interruption indicated. Notify other contractors responsible for services and obtain contact information. Where possible, obtain written instructions for emergency repairs from the contractor responsible for each service. Where required, arrange for contractor personnel to be available to meet required response times.

1.06 COORDINATION AND SEQUENCING

- A. Schedule and execute construction activities to prevent service interruption or, where service interruption is required to complete the Work, minimize service interruption.

1.07 SCHEDULING

- A. Follow Section 01325.
- B. Develop a schedule of required service interruptions. Coordinate with the schedules required by Section 01325 and revise as required by the City or project conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES:

- A. Follow Section 01726.
- B. Scheduled Service Interruptions: Notify the City Engineer in writing not less than 7 days in advance of a scheduled service interruption. Use the attached form and include the following information in addition to the information required on the form:
 - 1. Type and classification of service.
 - 2. Location.
 - 3. Area(s) affected.
 - 4. Entities affected.
 - 5. Expected duration.
- C. Complete a Work Area Notification form for any/all service interruptions and/or
- D. Unscheduled Service Interruptions to Data and Telecom Service:

1. Immediately notify IAH 24-Hour Emergency Dispatch Service at (281) 230-3024 Do not attempt to repair these lines. Include the following information:
 - a. Location.
 - b. Area(s) affected.
 - c. Type and classification of service (if known).
 - d. Entities affected (if known).
 2. In addition to the notification requirements above, immediately notify the City Engineer of interruption.
- E. **Unscheduled Service Interruptions to Service Other Than Data and Telecom Service:**
1. When executing Work in an area known to have existing services, maintain on-site or on-call capability to initiate repairs to unscheduled service interruptions within the response times required.
 2. Immediately notify the City Engineer of interruption.
 - a. Location.
 - b. Area(s) affected.
 - c. Type and classification of service (if known).
 - d. Entities affected (if known).
 3. **Response Times to Interruptions to Existing Service:**
 - a. Security Service Interruption: 15 minutes.
 - b. Life Safety Service Interruption: 15 minutes.
 - c. Business Service Interruption:
 - (1) Service Interruptions to Airlines: 15 minutes.
 - (2) Service Interruptions to Tenants other than Airlines: 1 hour.
 - d. Comfort/Convenience Service Interruption: 1 hour.

END OF SECTION

PROTECTION OF EXISTING SERVICES

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**SECTION 01770
CONTRACT CLOSEOUT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal of Operation and Maintenance (O & M) manual, lien releases, record documents, badges, and keys.
- B. O & M manual format and contents.
- C. Final cleaning. Interim cleaning is specified in Section 01505.
- D. Systems demonstrations and personnel training.
- E. Notification of Substantial Completion.
- F. Contractor's punch list.
- G. Record of the Work.
- H. Forwarding of Contractor-Salvaged products (CSP), and extra products.

1.02 SUBMITTALS

- A. Two weeks before Substantial Completion inspection, submit 2 sets of Preliminary O & M manual (Paragraph 1.03), 1 copy to Designer and 1 copy direct to City Engineer.
- B. Subsequent to Preliminary O & M manual submittal and precedent to final Certificate for Payment, submit the following:
 - 1. The Contractor shall submit Preliminary O&M Manuals to the City for review and acceptance a minimum of 60 calendar days prior to starting the commissioning process.
 - 2. Release or Waiver of Liens and consents of sureties following Documents 00700-General Conditions and 00800 - Supplementary Conditions.
 - 3. BIM As-Built and BIM Record Documents
 - a. Provide the final coordinated trade construction as-built and/or fabrication models in native format, to the City at regular intervals at the end of the Construction Phase that will have incorporated all addenda, approved Change Orders, and the

PROTECTION OF EXISTING SERVICES

modifications and deliver the final record model to the City as part of the project close-out documents.

- b. The format of the delivered documents shall consist of:
 - 1) PDF files of drawings and specifications.
 - 2) HAS approved AutoCAD version of drawings.
 - 3) Native formats of the BIM model including HAS approved Revit version.
 - 4) HAS approved version of Navisworks files and Civi3D
 - 5) All information, drawings and manuals should conform with HAS approved BIM standards and BPxP.
4. File organization, File directory structure, Sheet Borders, titles, method of delivery and other specifications should be in conform to HAS CAD/GIS Data Standards and HAS BIM Standards, available in www.fly2houston.com/tip.
5. Security identification badges.
6. Construction and other master keys.

1.03 O&M MANUAL CONTENTS AND FORMAT

- A. Provide O & M Manual with full information to allow matching products under future contracts to products under this contract, and to allow City to operate, maintain and repair (for user-serviceable aspects) products, including trade names, model or type numbers, colors dimensions, and other physical characteristics.
- B. Electronic Format:
 1. Submit in searchable PDF to reflect 8.5” x 11” inch page and margins shall be formatted for double-sided print out or copy. Large format shall be pre-approved by the City.2. Sections within the O & M Manual shall also be formatted to reflect dividers if a printout copy is desired.3. Cover of the O& M Manual shall be titled “OPERATION AND MAINTENANCE MANUAL, title of project and subject matter and “Number _ of _ if multiple volumes are developed. Include the City’s Project Number and AIP/CIP Number.
- C. Contents:
 1. Table of Contents for each volume, naming each Part.

PROTECTION OF EXISTING SERVICES

2. Part 1: Directory with name, address, and telephone number of Designer, Contractor, and Subcontractors and Suppliers for each Project Manual Section.
3. Part 2: Operation and maintenance instructions, arranged by Project Manual Section number where practical, and where not, by system. Include:
 - a. For finish materials, maintenance instructions prepared by manufacturers, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
 - b. Utility, door and window hardware, HVAC, plumbing and electrical products, prepared by product manufacturer, including:
 - 1) Product design criteria, functions, normal operating characteristics, and limiting conditions.
 - 2) Assembly, installation, alignment, adjustment, checking instructions, and troubleshooting guide.
 - 3) Operating instructions for start-up, normal operation, regulation and control, normal shutdown, and emergency shutdown.
 - 4) Lubrication and detailed maintenance instructions; detailed drawings giving location of each maintainable part and lubrication point and detailed instructions on disassembly and reassembly of products.
 - 5) Spare parts list for operating products, prepared by manufacturers, including detailed drawings giving location of each maintainable part; describe predicted life of parts subject to wear, lists of spares recommended for user-service inventory, and nearest source of in-stock spares.
 - 6) Outline, cross-section, and assembly drawings; engineering data; wiring diagrams.
 - 7) Test data and performance curves.
4. Part 3: Project documents and certificates, including:
 - a. Shop drawings, product data, and where practical, samples.
 - b. Air and water balance reports.
 - c. Certificates of occupancy or use.
 - d. Product certifications and mix designs.

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- e. Material Safety Data Sheets.
- 5. Part 4: Copy (not original) of each warranty form containing language of final warranty.
- 6. Part 5: Meeting notes from systems demonstrations.
- 7. Revise content and arrangement of preliminary Manual until approval by City Engineer.

1.04 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion [of each Stage].
- B. Clean surfaces exposed to view; remove temporary labels and protective coverings, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to sanitary condition. Clean permanent filters and install new replaceable filters at equipment. Clean HVAC diffusers.
- C. Remove and legally dispose of waste and surplus products and rubbish, including from roofs, gutters, downspouts, drainage systems, pavements, lawn and landscaped areas, and elsewhere from site.
- D. Sweep streets and parking areas, rake lawn and landscaped areas.
- E. Wash roofs, opaque building walls and sidewalks.
- F. Remove temporary facilities and controls.
- G. Leave premises in spotless condition, requiring no further cleaning of construction by City.
- H. Adjust products to proper operating condition.
- I. Correct defective function of products.

1.05 SYSTEMS DEMONSTRATIONS AND PERSONNEL TRAINING

- A. Demonstrate proper operation and maintenance of each product to City's maintenance personnel precedent to Substantial Completion inspection.
 - 1. Operate HVAC, plumbing, and electrical systems 7 continuous days precedent to personnel training.
- B. Precedent to submittal of O & M Manual, train City's maintenance personnel in proper operation, adjustment, and maintenance of products and systems, using the preliminary O

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& M Manual as the basis of instruction. Continue training until City's personnel demonstrate proper knowledge and skills.

- C. Take minutes of meetings, including sign-in sheet, and record subjects covered in each session. Bind minutes in O&M Manual.

1.06 NOTIFICATION OF SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work (or a designated portion or stage thereof identified in Section 01326 - Construction Sequencing) substantially complete, submit written notice and Punchlist (Paragraph 1.04) to City Engineer.

- 1. Do not claim Substantial Completion until authorities having jurisdiction issue certificates of occupancy or use and related inspections affirming compliance.

- 2. Attach copy of each certificate to Substantial Completion form.

- B. Within a reasonable time after receipt of certificates, an inspection will be made by City Engineer and Designer to determine status of completion.

- C. Should the Work be determined by City Engineer as not substantially complete as a result of any Substantial Completion inspection, Contractor will be notified in writing.

- 1. Remedy deficiencies.

- 2. Send written notice of Substantial Completion as above.

- 3. City Engineer and Designer will reinspect the Work.

- 4. Pay costs of Designer's second and subsequent Substantial Completion inspections, by Change Order.

- D. When the Work is determined as substantially complete, the Certificate of Substantial Completion will be executed.

1.07 CONTRACTOR'S PUNCHLIST

- A. Prior to and in connection with Substantial Completion procedures, prepare a written Punchlist on a [room-by-room] [area-by-area] basis [for each stage] and as follows:

- 1. Designer will provide one reproducible copy of then-current floor plans. These drawings are the basis of Contractor's Punchlist.

- 2. Inspect the Work and mark applicable comments on the floor plans. Prepare written notes as required to supplement notes made on drawings.

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3. Continue completion of the Work including Punchlist items, marking off completed items.
 4. Forward 3 diazo prints of the annotated Drawings to City Engineer accompanied by notification that Substantial Completion Inspection is ready.
- B. Schedule Punchlist Inspection and other closeout inspections through City Engineer.
- C. Punchlist inspection will be attended by the following as a minimum:
1. Contractor, Contractor's Superintendent, and applicable Subcontractors' superintendents. Attend with Punchlist drawing.
 2. City Engineer.
 3. Designer.
 4. Others of City Engineer's choice.
- D. Substantial Completion inspection will be made during one or more mutually agreed times to inspect the Work, to review and amend Contractor's Punchlist. If the work is substantially complete, Document 00645 - Certificate of Substantial Completion will be executed.
1. Amendments to the Contractor's Punchlist will be made on the reproducible.
 2. Within 5 days of execution of Document 00645, provide 4 copies of the amended Punch List and original Document 00645 to City Engineer.
- E. Expeditiously correct work.
- F. Process each reinspection as above and in Paragraph 1.04.
- G. Punchlist items and corrections required after execution of Document 00650 - Certificate of Final Completion will be processed as warranty work following Document 00700 - General Conditions, Paragraph 3.12.
- 1.08 RECORD OF THE WORK
- A. Following requirements expand Paragraph 3.16 of Documents 00700 - General Conditions and 00800 - Supplementary Conditions.
 - B. Record information concurrently with construction progress. Do not conceal work until required information is recorded.

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- C. Keep in a secure location in the [field office (Section 01505- Temporary Facilities) at the site] [Contractor's office] and timely record the Work as actually built as the Work progresses.
1. Contractor shall maintain one full size set of Construction Documents and one set of the Project Manual(s) in the Contractor's Field office. In addition, the Contractor shall maintain one record set of submittal data, video and photographic data, and other record data as required by to support and supplement record changes made on Drawings and the Project Manual(s).
 2. Legibly note variations from Contract Documents on Drawings, Project Manual and submittal data, whichever most clearly shows the change.
 3. Clearly mark each document in red ink "RECORD OF THE WORK. Use only for recording field deviations and actual constructed conditions and arrangements."
- D. Keep documents current and make available for inspection by City Engineer.
- E. Show following minimum information, as applicable to type of work, marked in fine-point red ink:
1. Measured depths of foundation elements in relation to finish first floor datum.
 2. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Elevations of underground utilities referenced to City's benchmark utilized for project.
 4. Measured locations of internal utilities, environmental systems and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 5. Field changes of dimension and detail.
 6. Changes made by RFI (Document 00931).
 7. Changes made by Modifications.
 8. Details not on original Contract Documents.
 9. References to related shop drawings, product data, samples, RFIs and Modifications.
- F. Upon completion of the Work, collect diazo prints of marked-up Drawings, one single-sided copy of marked-up Project Manual, one set of shop drawings (including diskettes of CADD files prepared as part of the Contract, such as data required by Section 01340- Shop Drawings, Product Data and Samples), one original set of product data (Section 01340), one set of RFIs, one set of Modifications, one set of originals of video tapes and one copy of photographs (Section 01321 - Construction Photographs), and other required documents.

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1. Clearly mark each document, immediately adjacent to the “RECORD OF THE WORK” mark, in red ink thus:

“CERTIFIED AS THE CORRECT AND COMPLETE RECORD OF WORK PERFORMED.

_____ (Contractor Firm Name)
_____ (Authorized Signature)
_____ (Date)

- G. Transmit all records to City Engineer.
- H. Transmit reproducible copies of Drawings (see Section 01110 - Summary of Work) to City Engineer.
- I. Submit proper record of the Work, in addition to other requirements in the Contract Documents, precedent to City Engineer’s authorization for release of final payment.

1.09 FORWARDING CSP AND EXTRA PRODUCTS

- A. Before submitting final application for payment, forward remaining proper CSP (Section 01110 - Summary of Work), extra products, including spare parts (specified in other Sections) to location designated by City Engineer.
- B. Furnish pallets and containers as required for proper product storage.
- C. Unload products from Contractor’s vehicles. Place pallets, containers and products as directed by City Engineer.
- D. Obtain written transfer of title or receipt.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PROTECTION OF EXISTING SERVICES

**SECTION 01782
OPERATIONS AND MAINTENANCE DATA**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal requirements for equipment and facility Operations and Maintenance (O&M) Manuals

1.02 MEASUREMENT AND PAYMENT

- A. Measurement for equipment O&M Manuals is on a lump sum basis equal to five percent of the individual equipment value contained in Schedule of Unit Prices or Schedule of Values. The lump sum amount may be included in the first Progress Payment following approval of the O&M Manuals by Project Manager.

1.03 SUBMITTALS

- A. Conform to requirements of Section 01330 - Submittal Procedures. Submit a list of O&M Manuals and parts manuals for equipment to be incorporated into the Work.
- B. Submit documents with 8-1/2 x 11-inch text pages, bound in 3-ring/D binders with durable plastic covers.
- C. Print "OPERATION AND MAINTENANCE INSTRUCTIONS", Project name, and subject matter of binder on covers when multiple binders are required.
- D. Subdivide contents with permanent page dividers, logically organized according to the Table of Contents, with tab titling clearly printed under reinforced laminated plastic tabs.
- E. O&M Manual contents: Prepare a Table of Contents for each volume, with each Product or system description identified.
 - 1. Part 1 - Directory: Listing of names, addresses, and telephone numbers of Design Consultant, Contractor, Subcontractors, and major equipment Suppliers.
 - 2. Part 2 - O&M instructions arranged by system. For each category, identify names, addresses, and telephone numbers of Subcontractors and Suppliers and include the following:
 - a. Significant design criteria.
 - b. List of equipment.

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- c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
3. Part 3 -Project documents and certificates including:
- a. Shop Drawings and relevant data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties.
- F. Submit two copies of O&M Manuals and parts manuals, for review, within one month prior to placing the equipment or facility in service.
- G. Submit one copy of completed volumes in final form 10 days prior to final inspection. One copy with Project Manager comments will be returned after final inspection. Revise content of documents based on Project Manager's comments prior to final submittal.
- H. Revise and resubmit three final volumes within 10 days after final inspection.
- 1.04 EQUIPMENT O&M DATA
- A. Furnish O&M Manuals prepared by manufacturers for all equipment. Manuals must contain, as a minimum, the following:
- 1. Equipment functions, normal operating characteristics, and limiting conditions.
 - 2. Assembly, Installation, alignment, adjustment, and checking instructions.
 - 3. Operating instructions for start-up, normal operation, regulation and control, normal shutdown, and emergency shutdown.
 - 4. Detailed drawings showing the location of each maintainable part and lubrication point with detailed instructions on disassembly and reassembly of the equipment.
 - 5. Troubleshooting guide.

6. Spare parts list, predicted life of parts subject to wear, lists of spare parts recommended to be on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability.
 7. Outline, cross-section, and assembly drawings with engineering data and wiring diagrams.
 8. Test data and performance curves.
- B. Furnish parts manuals for all equipment, prepared by the equipment manufacturer, which contain, as a minimum, the following:
1. Detailed drawings giving the location of each maintainable part.
 2. Spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01785
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

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.

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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 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 24100
SELECTIVE DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

PART 3 EXECUTION

2.01 SCOPE

- A. Demolition/removal of existing information desks on main concourse level at main entry and at the connection bridge/hallway.
- B. Remove Existing large format "H", walls, information desk counter, cabinets and back walls as indicated in plans in the Baggage claim area as well as the existing information desk in central area of baggage claim.
- C. Remove other items indicated, for salvage, relocation, and recycling.
- D. Fill excavations, open pits, and holes in ground areas generated as result of removals, using fill to match surrounding areas.
- E. Refer to notes on plans for additional information

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices. Provide hard barriers with painted finish per airport standards.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 5. Do not close or obstruct roadways or sidewalks without permit.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 7. Obtain written permission from owners on work plans and procedures.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.

2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

2.03 EXISTING UTILITIES

- A. Coordinate work with utility companies and internal airport representatives; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- C. Remove existing work as indicated and as required to accomplish new work.
 1. Remove items indicated on drawings.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 3. Verify that abandoned services serve only abandoned facilities before removal.
 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch as specified for patching new work.

2.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 24100

SECTION 54000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes load bearing formed light gage steel members framing and bridging.

1.2 REFERENCES

- A. AISI (American Iron and Steel Institute) - Cold-Formed Steel Design Manual.
- B. ASTM A653, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
- C. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
- D. AWS D1.3 (American Welding Society) - Structural Welding Code - Sheet Steel.

1.3 SUBMITTALS

- A. Product Data: Submit data on standard framing members; describe materials and finish, product criteria, and section properties.
- B. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions and conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with AISI Specification for Design of Cold-Formed Steel Structural Members.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years experience.

PART 2 PRODUCTS

2.1 FRAMING MATERIALS

- A. Studs and Joist: sheet steel, formed to channel shape, punched web, with properties meeting or exceeding properties listed in Lightgage Steel Schedule on General notes sheet.
- B. Track: Formed steel; channel shaped; tight fit; with properties meeting or exceeding

properties listed in Lightgauge Steel Schedule on General notes sheet.

- C. Framing Materials: Roll from new sheet steel; cold reduction steels not being acceptable.

2.2 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: as specified on drawings.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

2.3 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized to ASTM A123.
- B. Welding: In conformance with AWS D1.1 and AWS D1.3.

2.4 FABRICATION

- A. Fabricate assemblies of sizes and profiles indicated on drawings.
- B. Fit, reinforce, and brace framing members to suit design requirements.

2.5 FINISHES

- A. Studs and Joists: Galvanize to G60.
- B. Tracks and Headers: Galvanize to G60.
- C. Bracing, Furring, and Bridging: Same finish as framing members.
- D. Plates, Gussets, and Clips: Same finish as framing members.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify [substrate surfaces] [building framing components] are ready to receive Work.
- C. Verify rough-in utilities are in proper location.

END OF SECTION 54000

SECTION 55000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Steel framing and supports for countertops.
 2. Steel tube reinforcement for low partitions.
 3. Steel framing and supports for mechanical and electrical equipment.
 4. Miscellaneous steel trim including stainless steel reveals and millwork base.
- B. Related Requirements:
1. Section 06 4100 "Architectural Wood Casework".
 2. Section 07 4213 "Metal Plate Wall Panels"

1.3 COORDINATION

- A. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing trim and base, including items with integral anchors. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Concealed Fasteners.
 2. Stainless steel trim and base.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
1. Steel framing and supports for countertops.
 2. Steel tube reinforcement for low partitions.
 3. Steel framing and supports for mechanical and electrical equipment.
 4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 5. Miscellaneous steel trim including stainless steel reveal at face of information counter and metal base at millwork.

- C. Samples for Verification: For each type and finish.
- D. Mock-up: Build mock-ups to verify selections made under samples submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation. Coordinate mock-ups with millwork mock-up.
 - 1. Refer to Sheet A-102 notes for additional information on mock-ups.
 - 2. Initial mock-up to be approved prior to fabrication of remaining trim.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
 - 1. Material: Cold-rolled steel, ASTM A1008/A1008M, [**commercial steel, Type B**] [**structural steel, Grade 33 (Grade 230)**]; [**0.0966-inch (2.5-mm)**] [**0.0677-inch (1.7-mm)**] [**0.0528-inch (1.35-mm)**] minimum thickness;

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners
 - 1. Provide concealed stainless steel fasteners for fastening stainless steel.
- B. Stainless Steel Bolts and Nuts: concealed annealed stainless steel bolts, ASTM F593 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M);

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
 - 1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
 - 2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.

2.6 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

2.7 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

END OF SECTION 55000

SECTION 60660

Plastic Fabrications

3form Translucent Resin Panel System

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the Plastic Fabrication as shown and specified in the described system(s):
 - 1. Millwork Panels-top-lit
- B. Related Sections include the following:
 - 1. Section 06 06 20 Schedules for Finish Carpentry;
 - 2. Section 06 41 00 Architectural Wood Casework

1.3 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 "Submittal Procedures".
- B. Product Data: Submit manufacturer's product data; include product description, fabrication information, and compliance with specified performance requirements.
- C. Submit product test reports from a qualified independent 3rd party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.
 - 1. Test reports required are:
 - a. Rate of Burning (ASTM D 635)
 - b. Self-Ignition Temperature (ASTM D 1929)
 - c. Density of Smoke (ASTM D 2843)
 - d. Flame spread and Smoke developed testing (ASTM E 84)
 - e. Room Corner Burn Test (NFPA 286)
 - f. Extent of Burning (UL 94)
 - g. Impact strength (ASTM D 3763)
 - h. Safety glazing impact resistance (ANSI Z97.1-2004)
 - i. UPITT Test for Combustion Product Toxicity
 - j. Dynamic environmental testing (ASTM standards D 5116 and D 6670)
- D. Shop Drawings: Include plans, elevations, sections, panel dimensions, details, and attachments to other work.
- E. Samples for Verification:

1. Submit minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.
- F. Mockups:
1. Refer to Sheet A-102 notes for additional information on mock-ups.
 2. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
 3. Build mockup of each Plastic Fabrication.
 4. Approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.
 5. Mock-up to be backlit to simulate actual conditions.
- G. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.
- 1.4 QUALITY ASSURANCE
- A. Manufacturers Qualifications
1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective packaging.
- B. Do not deliver Plastic Fabrications, system, components and accessories to Project site until areas are ready for installation.
- C. Store materials in a orientation appropriate to shape in a dry place that is not exposed to exterior elements.
- D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.
- E. Before installing Plastic Fabrications, permit them to reach room temperature.
- 1.6 PROJECT CONDITIONS
- A. Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- 1.7 WARRANTY
- A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. Warranty Period: 2 year after the date of substantial completion.
- C. The warranty shall not deprive the owner of other rights or remedies the Owner may have under other provisions of the Contract Documents and is in addition to and runs

concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Basis of Design -3form, Inc., Salt Lake City, Utah, USA / telephone 801-649-2500.

2.2 MATERIALS

- A. Chroma produced from optical grade engineered resin.
1. Engineered resin
 2. Sheet Size: Maximum 4' x 10'
 3. Thickness: Minimum 1/2"
 4. Custom Color to match Architects sample and Owner's standard.
 5. Basis of Design Product: **The design of Plastic Fabrications is based on Chroma optical grade engineered resin panels to be used as light diffusing panels lit from edge with a solid or non transparent backing as provided by 3form, Inc.** Products from other manufacturers must be approved by the Architect or Designer prior to bidding in accordance with the Instructions to Bidders and Section 10 60 00 "Product Requirements".
- B. Interlayer Materials: Compatible with polyesters and bonding process to create a monolithic sheet of material when complete.
- C. Sheet minimum performance attributes:
1. Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
 2. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.
 3. Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75%.
 4. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1".
 5. Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4" thickness as described by the 2003 *International Building Code*.
 6. Extent of Burning (UL 94). Must submit UL card.
 7. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
 8. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
 9. UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood".
 10. Dynamic environmental testing (ASTM standards D 5116 and D 6670). Panels must not have detectable VOC off-gassing agents and must be have Greenguard™ Indoor Air Quality certified.

2.3 FABRICATION

- A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles, and other characteristics are indicated on the drawings.

- B. Comply with manufacturer's written recommendations for fabrication.
- C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
 - 1. Sawing: Select equipment and blades suitable for type of cut required.
 - 2. Drilling: Drills specifically designed for use with plastic products.
 - 3. Milling: Climb cut where possible.
 - 4. Routing
 - 5. Tapping
- D. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.
 - 1. Thermoforming: Acceptable only on uncoated material.
- E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaner: Type recommended by manufacturer.
- C. Fasteners: Use concealed screws/fasteners designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures.
- D. Bonding Cements: May be achieved with solvents or adhesives, suitable for use with product and application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications.
- B. Manufacturer's shop to fabricate items to the greatest degree possible.
- C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
- D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
- E. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

3.3 CLEANING AND PROTECTION

- A. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect's satisfaction.

End of Section 60660

**SECTION 61000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-structural dimension lumber framing.
- B. Rough opening framing for doors, openings and recessed areas.
- C. Preservative treated wood materials.
- D. Concealed wood blocking, nailers, and supports.
- E. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.
- B. Section 06 2000 – Finish Carpentry
- C. Section 07 4213 – Formed Metal Wall

1.03 REFERENCE STANDARDS

- A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2017.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2017.
- F. PS 1 - Structural Plywood; 2009.
- G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- H. PS 20 - American Softwood Lumber Standard; 2015.
- I. SPIB (GR) - Grading Rules; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service

for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.03 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Fasteners to be only finishing screws, no nails are allowed.

2.04 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements. Stamp to be visible for inspection prior to covering finish application.
- B. Fire Retardant Treatment:
 - 1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Hoover Treated Wood Products, Inc: www.frtw.com.
 - 2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - 3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. All interior rough carpentry items are to be fire retardant treated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 61000

SECTION 62000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.

1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014, with Errata (2018).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2017, with Errata (2019).
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2016.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 2. Include certification program label.
- C. Samples: Submit two samples of finish plywood, 6 by 6 inch in size illustrating wood grain and specified finish.
- D. Samples: Submit two samples of wood trim 6 inch long.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Quality Certification:
 - 1. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 2. Provide designated labels on shop drawings as required by certification program.
 - 3. Provide designated labels on installed products as required by certification program.
 - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.05 MOCK-UP

- A. Refer to notes on A-102 for more specific information on mock up requirements.
- B. Mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- B. Protect from moisture damage.
- C. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

D. Interior Woodwork Items:

1. Moldings, Bases, Casings, and Miscellaneous Trim: As indicated in plans.

2.02 SHEET MATERIALS

- A. 3 / 4" thick Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application. Back prime and prepare for paint finish. Must be fire retardant in all areas.
- B. 1/2" thick Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application. Back prime and prepare for paint finish. Must be fire retardant in all areas. All plywood utilized on curved wall to be installed with a series of kerfs as required to achieve specified radius. Plywood to be placed so bends are in short grain.

2.03 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Primer: Alkyd primer sealer.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

2.04 SITE FINISHING MATERIALS

- A. Stain, Shellac, Varnish, and Finishing Materials: In compliance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2.05 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all products are fully back primed, including ends.
- B. Verify adequacy of backing and support framing.
- C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 62000

SECTION 64100
ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Subcontract apply to this Section.
2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:

1. Special fabricated cabinet units.
2. Countertops.
3. Cabinet hardware.
4. Prefinished surfaces.
5. Finishing cabinet.

C. Related Sections:

1. Division 01 Section "General Requirements."
2. Division 01 Section "Special Procedures."
3. Division 06 Section "Rough Carpentry" for grounds and support framing.
4. Division 06 Section "Plastic-Laminate-Faced Architectural Cabinets" for related trim not specified in this section.
5. Division 06 6116 "Solid Surfacing Fabrications"
6. Division 06 0660 "Plastic Fabrications"

1.2 REFERENCES

A. General:

1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

B. WI – The Woodwork Institute: Quality Standards.

C. ANSI/BHMA A156.9 - Cabinet Hardware.

D. FS MM-L-736 - Lumber, Hardwood.

E. FS MMM-A-130 - Adhesive, Contact.

F. National Electric Manufacturers Association (NEMA) LD3 - High Pressure Decorative Laminates.

G. PS 1 - Construction and Industrial Plywood.

H. G.PS 20 - American Softwood Lumber Standard.

1.3 DEFINITIONS

- A. Exposed Surfaces: Visible surfaces of units when doors, drawers, or other closures are in closed position; visible exterior and interior surfaces of units without closures; visible surfaces behind clear glass doors; bottoms of units more than four feet above floor; closure fronts and edges; and counter tops and splashes including their edges. Exterior surfaces of modular casework sides shall be considered exposed surfaces, even when they are not visible. Exterior surface of backs of overhead cabinets of modular casework shall be considered exposed, even when not visible.
- B. Semi-Exposed Surfaces: Visible interior surfaces of units when closures are in open position; surfaces and edges of shelves; interior surfaces of doors and drawers; bottoms of wall hung units four feet or less above floor; and tops of units six feet six inches or more above floor.
- C. Concealed Surfaces: Surfaces other than exposed or semi-exposed as defined above.

1.4 SUBMITTALS

- A. Submit under provisions of Divisions 01 Section "General Requirements" and "Special Procedures."
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware, Manufacturer's product number and location, and schedule of finishes.
- C. Samples: Submit two 5 by 8 inch (125 by 200 mm) size samples, illustrating cabinet finish.
- D. Samples: Submit two 5 by 8 inch (125 by 200 mm) size samples, illustrating counter top finish.
- E. Samples: Submit two samples of drawer and door pulls hinges, drawer and shelf slides, shelf standards and clips illustrating hardware finish.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with WI Laboratory quality.
- B. The work of this Section shall be WI certified.
- C. Fabricator Qualifications: The fabricator shall be equipped for and experienced in doing work, including fabricating, finishing, and installing, equal to standards specified, and be able to provide evidence of such experience to the University's satisfaction. Failure to meet any of these qualifications may be sufficient cause for rejection.
- D. Pre-installation Conference: Convene one week prior to commencing work of this section, with the University's Project Manager.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops and casework to the jobsite only after proper facilities are available for handling, storing, and protecting items; receiving areas are broom cleaned; exterior openings are closed up; wet work and mechanical and electrical rough-ins are completed.
- B. Provide temporary protective covers for items during delivery, installation, and until final acceptance of Project.

1.7 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated on Shop Drawings.

1.8 COORDINATION

- A. Coordinate the work with plumbing and electrical rough-in and finish.

PART 2 - PRODUCTS

2.1 WOOD MATERIALS

- A. Medium Density Fiberboard: Pressed wood fiber with resin binder [standard] grade, 3/4 inch (20 mm) thick, with melamine laminate on each side.
- B. Hardwood Veneer Plywood: 3/4 inch (20 mm) thick
- C. Lumber: [FS MM-L-736;] graded in accordance with WIC Custom; average moisture content of 6 percent

2.2 MANUFACTURERS - PLASTIC LAMINATE – REFER TO SECTION 06 4116

2.3 ACCESSORIES - REFER TO SECTION 06 4116

2.4 HARDWARE - REFER TO SECTION 06 4116

2.5 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- C. Grade Stamp: Arrange for grade stamp to be visible for inspection prior to final covering

2.6 FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- D. Finish work in accordance with WI.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Approve adequacy of backing and support framing.

3.2 INSTALLATION

- A. Set and secure casework in place; rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units counter tops.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.8 mm). Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorages to comply with code requirements.

3.3 ADJUSTING

- A. Adjust work under provisions of Divisions 01 Section "General Requirements".
- B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

- A. Clean work under provisions of Divisions 01 Section "General Requirements".
- B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 64100

**SECTION 64116
PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Plastic-laminate-faced architectural cabinets.
- 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

- 1. Section 06100 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
- 2. Division 06 Rough Carpentry
- 3. Division 06 Finish Carpentry
- 4. Division 06 Plastic Fabrications
- 5. Division 06 Architectural Wood Casework

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including, panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate and cabinet hardware and accessories.

- 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

- 1. Show details full size.
- 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- 3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
- 4. Apply WI Certified Compliance Program label to Shop Drawings.

- C. Samples for Initial Selection:

- 1. Plastic laminates.

- D. Mockups:

- 1. Refer to Sheet A-102 for additional information on mock-ups.
- 2. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
- 3. Approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

- E. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

- 1.4 Plastic Laminates:
1. 8 by 10 inches , for each type, color, pattern, and surface finish required.
 2. Provide one sample applied to core material with specified edge material applied to one edge.
 3. Thermally Fused Laminate (TFL) Panels: 8 by 10 inches , for each color, pattern, and surface finish.
 4. Provide edge banding on one edge.
 5. Corner Pieces:
 6. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 7. Miter joints for standing trim.
 8. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.
 9. PVC edge material.
 10. Thermoset decorative panels.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For fabricator.
 - B. Product Certificates: For each type of product:
 1. Composite wood and agrifiber products.
 2. Thermoset decorative panels.
 3. High-pressure decorative laminate.
 4. Adhesives.
 - C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- 1.6 QUALITY ASSURANCE
- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
 - B. Installer Qualifications: Fabricator of products.
 - C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- 1.8 FIELD CONDITIONS
- A. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 - B. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- 1.9 COORDINATION
- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 08712 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
 - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- B. Grade: Premium.
- C. Type of Construction: Frameless.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- E. Reveal Dimension: 1/2 inch (13 mm).
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Wilsonart International; Div. of Premark International, Inc
 - c. Abet Laminati Inc
 - d. Lamin-Art, Inc
 - e. Pionite: a Panolam Industries International, Inc.brand
- G. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Vertical Surfaces: Grade HGS.
 - 3. Edges: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
 - 4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- H. Materials for Semi-exposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade CLS.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
 - b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS
 - 2. Drawer Sides and Backs: Thermoset decorative panels with PVC edge banding.
 - 3. Drawer Bottoms: Thermoset decorative panels.
- I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
- J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from laminate manufacturer's full range in the following categories or as indicated on drawings:
 - a. Match Architect's sample.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
 - 1. Accuride International.
 - 2. Blum, Julius & Co., Inc.
 - 3. CompX International, Inc.
 - 4. Knappe & Vogt Manufacturing Company.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 100 degrees of opening.
- C. Back-Mounted Pulls: Solid Metal 4" long, 5/16 inch diameter
- D. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04102; with shelf brackets, B04112. Use FastCap SB-21X24WH, 21"x24" SpeedBrace Workstation Bracket, White in color for all counter exposed brackets as needed.
- F. Shelf Rests: BHMA A156.9, B04013; metal.
- G. Drawer Slides: BHMA A156.9.
 - 1. Pencil drawers not more than 3 inches high and not more than 24 inches wide, provide 50 lb load capacity.
 - 2. General-purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.
 - 3. File drawers more than 6 inches high or more than 24 inches wide, provide 100 lb load capacity.
 - 4. Lateral file drawers more than 6 inches high and more than 24 inches but not more than 30 inches wide, provide 150 lb load capacity.
- H. Door Locks: ANSI/BHMA A156.11, E07121.
- I. Door and Drawer Silencers: BHMA A156.16, L03011.
- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base
- K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
 - 1. Color as selected by Architect from manufactures standard color selection.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors.

Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Un-pigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

- A. Fabricate cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails [**or finishing screws**] for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semi exposed surfaces.

END OF SECTION 64116

**SECTION 66116
SOLID SURFACING FABRICATIONS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-surface material countertops
 - 2. Solid- surface vertical panels on millwork

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop and panel materials.
- B. Shop Drawings: Show materials, finishes, edge and profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples for Initial Selection: For each type of material exposed to view.
 - 1. Samples at a minimum of 4 inches x 6 inches.
- D. Mockups:
 - 1. Refer to Sheet A-102 notes for additional information on mock-ups.
 - 2. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
 - 3. Approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.5 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.
- B. Transaction Counter: 1/2 inch thick, solid surface material with water fall edge.
- C. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

2.2 MATERIALS

- A. Particleboard: Not permitted.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- C. Adhesives: Adhesives shall not contain urea formaldehyde.
- D. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design: Dupont Corian see construction documents for specific colors.
 - 2. Type: Provide Standard Type or Veneer Type made from material complying with requirements for Standard Type, as indicated unless Special Purpose Type is indicated.
 - 3. Colors and Patterns Schedule:
 - a. Full manufacturer's range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 1. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 2. Seal edges of cutouts in particleboard subtops by saturating with varnish.

END OF SECTION 66116

SECTION 74213.35
FORMED METAL WALL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Custom Slab Edge wall panel system,

B. Related Sections:

1. Section 074213.31 "Formed Metal Wall Panels" for face-fastened wall panel system.
2. Section 074213.32 "Formed Metal Wall Panels" for flat lock wall panel system.
3. Section 074213.33 "Formed Metal Wall Panels" for interlocking panel system.
4. Section 074213.34 "Formed Metal Wall Panels" for interlocking plate panel system.
5. Section 074213.36 "Formed Metal Wall Panels" for roll-formed corrugated wall panel, concealed fastener type.
6. Section 074213.37 "Formed Metal Wall Panels" for roll-formed corrugated wall panel, exposed fastener type.
7. Section 074213.41 "Metal Plate Wall Panels" for dry joint plate wall panel system.
8. Section 074213.42 "Insulated Metal Wall Panels" for insulated metal in-fill panel (spandrel).
9. Section 095423 "Linear Metal Ceilings" for linear clip-strip ceiling system used in exterior soffit applications.
10. <Insert Section>.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference:

1. Meet with Owner, Architect, metal panel Installer, metal panel Pure and FreeForm's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including Pure and FreeForm's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests

- and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
 8. Review of procedures for repair of metal panels damaged after installation.
 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
- 1.4 ACTION SUBMITTALS
- A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than **1-1/2 inches per 12 inches (1:10)**.
- C. Delegated-Design Submittal: For metal panels indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
1. Include Samples of trim and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
1. Metal Panels: **12 inches x 24 inches**. Include fasteners, closures, and other metal panel accessories.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.

- D. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by Pure and FreeForm.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Refer to Sheet A-102 notes for additional information on mock-ups.
 - 2. Build mockup of typical metal panel assembly full size with supports, attachments, and accessories utilizing samples approved under Submittals.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather

conditions permit assembly of metal panels to be performed according to Pure and FreeForm's written instructions and warranty requirements.

1.11 COORDINATION

- A. Coordinate metal panel installation with interior wall and millwork installation.

1.12 WARRANTY

- A. Special Warranty: Pure and FreeForm's standard form in which Pure and FreeForm agrees to repair or replace components of metal panel systems that fail in materials or workmanship withinspecified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
- b. Deterioration of metals and other materials beyond normal weathering.

- 2. Warranty Period: Two (2) years from date of Substantial Completion.

- A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agreesto repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

- 2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturers: Provide metal panels and accessories manufactured by Pure andFreeForm, LLC; www.purefreeform.com.

- 1. Color: Piombo # FA059 (1MM) Direct glued over fire retardant plywood.

- B. Source Limitations: Obtain all components of formed metal wall panels, including wall panel material, extrusions, and accessories from single manufacturer.

2.2 CUSTOM SLAB EDGE

- A. Provide factory-formed prefinished aluminum panels, with custom slab edge profile designed to be field assembled:
 - 1. Basis-of-Design Product: Custom slab edge Wall Panels by Pure and FreeForm.
 - 2. Aluminum Sheet: Coil-coated sheet, **ASTM B209 (ASTM B209M)**, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: **1mm thick aluminum plate**
 - b. Finish: Refer to Finishes articles below.
 - c. Color: **As selected by Architect from manufacturer's full range.**
 - 3. Panel Coverage: **[As selected by Architect from manufacturer's full range].**
 - 4. Profile Depth: **[As selected by Architect from manufacturer's full range].**
 - 5. Profile Spacing: **3 inches (76.2 mm)** o.c. spacing.
 - 6. Panel Orientation: **Vertical.**
 - 7. **Concealed Panel Clips:** Manufacturer's standard stainless steel type.
 - 8. Direct glue application per Manufacturer's guidelines.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, **G90 (Z275 hot-dip galvanized)** coating designation or ASTM A792/A792M, **Class AZ50 (Class AZM150)** aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, , corner units, clips, flashings, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- C. Panel Fasteners: No exposed fasteners.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual"

that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. FEVE Fluoropolymer: AAMA 2605. Offset gravure, direct print fluoropolymer finish system containing 100 percent fluoroethylene vinyl ether (FEVE) resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Basis-of-Design Product, FEVE Resin:
 - a. Lumiflon by Asahi Glass Company (AGC);
 - 2. Application: Panels and accessories.
 - 3. Exposed Surfaces:
 - 4. Color: [Panel manufacturer's standard color as selected by Architect] [Custom color as selected by Architect].
 - 5. Texture: Manufacturer's standard ["Exterior Clear Coat"] ["Extreme Gloss Matte"] ["HighGloss"] ["Matte"] ["Satin"] ["Ultra Matte"].
- C. Polyvinylidene fluoride/ polyvinylidene difluoride (PVDF) resin finishes are NOT accepted.
- D. Film finishes are NOT accepted.
- E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and Pure and FreeForm's written recommendations.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to Pure and FreeForm's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by Pure and FreeForm.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by Pure and FreeForm.
 - 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in

predrilled holes.

- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by Pure and FreeForm; or, if not indicated, provide types recommended by Pure and FreeForm.
- F. Flashing and Trim: Comply with performance requirements, Pure and FreeForm's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 - 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Spacemovement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (610 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

- A. Pure and FreeForm's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- B. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in Pure and FreeForm's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by Pure and FreeForm. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 74213.35

SECTION 79200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- B. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.
- C. Section 23 3100 - HVAC Ducts and Casings: Duct sealants.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.
- C. ASTM C834 - Standard Specification for Latex Sealants; 2017.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- H. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- I. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015.
- J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989 (Amended 2017).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- E. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver to manufacturer sufficient samples for testing.
 - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Manufacturer's 20-year Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
 - 1. Dow Chemical Company; 795: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 2. Sika Corporation: www.usa-sika.com/#sle.
 - 3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 4. GE Sealants & Adhesives; Silpruf SCS2000: www.gesealants.com.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
 - 1. Sika Corporation: www.usa-sika.com/#sle.
 - 2. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 - 2. Interior Joints: Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Control joints and other floor joints in concrete floors where concrete floor is exposed.
 - c. Other joints indicated below.

3. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.

- B. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
 3. Wall, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag tamper-resistant silyl-terminated polyurethane sealant.
 4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
 6. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
 7. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

- C. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

- F. Areas Where Tamper-Resistance is Required: As indicated on drawings.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 4. Color: To be selected by Architect from manufacturer's standard range.

- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 1. Color: White.

- C. Tamper-Resistant, Silyl-Terminated Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus ___ percent, minimum
 2. Hardness Range: 25 to 30, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.

- D. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus ___ percent, minimum.
 2. Color: To be selected by Architect from manufacturer's standard range.

- E. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
 1. Movement Capability: Plus and minus 35 percent, minimum.

2. Color: To be selected by Architect from manufacturer's standard range.
- F. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 1. Color: To be selected by Architect from manufacturer's standard range.
- G. Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.05 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: To be selected by Architect from manufacturer's standard range.
- B. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Color: To be selected by Architect from manufacturer's standard range.
- C. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
 1. Composition: Multi-component, 100 percent solids by weight.
 2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
 3. Color: To be selected by Architect from manufacturer's standard colors.
 4. Joint Width, Minimum: 1/8 inch.

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 1. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- G. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Perform adhesion pull tests of exterior sealant joints in accordance with ASTM C 1521.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- D. Repair destructive test location damage immediately after evaluation and recording of results.

END OF SECTION 79200

SECTION 81113
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hollow-metal steel doors.
 - 2. Hollow-metal steel frames.
- B. Related Sections include the following:
 - 1. Division 09 Section "Painting" for field painting steel doors and frames.
 - 2. Division 08 Section "Door Hardware"

1.03 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details.
 - 3. Frame details for each frame type, including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, accessories, joints, and connections.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 - 1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on ShopDrawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: **Match existing doors**. Subject to compliance with requirements, provide products by one of the following:
1. CURRIES Company; an ASSA ABLOY Group Company.
 2. Ceco Door Products; an ASSA ABLOY Group Company.
 3. Steelcraft; an Ingersoll-Rand Company.
 4. Door Pro Systems

2.02 PERFORMANCE REQUIREMENTS

- A. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.61 deg Btu/F x h x sq. ft. when tested according to ASTM C518.

2.03 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.

2.04 STANDARD STEEL DOORS

- A. General: Match existing doors. Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
 3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches .
 - b. Closed with flush or inverted 0.0747-inch- thick (14 ga.) end closures or channels of same material as facesheets.
 4. Top and Bottom Edges: Closed with flush or inverted 0.0598-inch- thick end closures or channels of same material as face sheets.
 5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Interior Doors: Face sheets fabricated from steel sheet, minimum 0.053-inch-thick (16 ga.). Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 3 and Physical Performance Level A (Maximum Duty), Model 2 (Seamless).
- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 3. Lock Face Closers, and Concealed Holders: Minimum 0.067 inch thick.
 4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.05 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
 2. Frames for Level 3 Steel Doors: 0.0598-inch-thick (16 ga.) steel sheet.
 3. Frames for Wood Doors: 0.042-inch- thick (18 ga.) steel sheet.

- C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 - 1. Hinges: Minimum 0.123-inch-thick (10 ga.) by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Pivots: Minimum 0.167-inch-thick (7 ga.) by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 3. Lock Face Closers, and Concealed Holders: Minimum 0.067-inch-thick (14 ga.).
 - 4. All Other Surface-Mounted Hardware: Minimum 0.067-inch-thick (14 ga.).
 - D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
 - E. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042-inch-thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177-inch-thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - F. Floor Anchors: Formed from same material as frames, not less than 0.042-inch-thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - G. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- 2.06 STOPS AND MOLDINGS
- A. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.
- 2.07 FABRICATION
- A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - B. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
 - 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches in height.
 - 2) Three anchors per jamb from 60 to 90 inches in height.
 - 3) Four anchors per jamb from 90 to 120 inches in height.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches in height.
 - 2) Four anchors per jamb from 60 to 90 inches in height.
 - 3) Five anchors per jamb from 90 to 96 inches in height.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
 - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 - 5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 - C. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 - 1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
 - 2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
 - D. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of doors and frames.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
- 2.08 STEEL FINISHES
- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish standard steel door and frames after assembly.
 - B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC- Paint 20.
 - C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils .
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.
- 3.03 INSTALLATION
- A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Standard Steel Frames: Install standard steel frames for doors, sidelights, borrowed lights and other openings, of size and profile indicated. Comply with SDI 105.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install door silencers in frames before grouting.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
- 3.04 ADJUSTING AND CLEANING
- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.
- C. Galvanized Surfaces: Clean abraded areas and repair with galvanizing repair paint according to

manufacturer's written instructions.

END OF SECTION 81113

**SECTION 87100
DOOR HARDWARE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood and hollow metal doors.
- B. Thresholds.
- C. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 06 - Finish Carpentry.
- B. Section 08 – Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.
- C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2017.
- D. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- E. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- F. BHMA A156.6 - American National Standard for Architectural Door Trim; 2015.
- G. BHMA A156.7 - American National Standard for Template Hinge Dimensions; 2016.
- H. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2015.
- I. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- J. BHMA A156.18 - American National Standard for Materials and Finishes; 2016.
- K. BHMA A156.21 - American National Standard for Thresholds; 2014.
- L. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2017.
- M. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- N. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- O. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- P. ITS (DIR) - Directory of Listed Products; current edition.
- Q. NFPA 70 - National Electrical Code; 2017.
- R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- S. NFPA 101 - Life Safety Code; 2017.
- T. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- U. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.
- V. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- W. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- X. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- C. Keying Requirements Meeting:
 - 1. Schedule meeting or conference call to confirm keying requirement new IT closet.
 - 2. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Installer's Architectural Hardware Consultant (AHC).
 - 3. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Provide complete description for each door listed.
 - 3. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 - 4. Include account of abbreviations and symbols used in schedule.
- D. Samples for Verification:
 - 1. Submit minimum size of 2 by 4 inch for sheet samples, and minimum length of 4 inch for other products.
 - 2. Submit one (1) sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
 - 3. Return full-size samples to Contractor.
 - 4. Submit product description with samples.
- F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- G. Keying Schedule:
 - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience and approved by manufacturer.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.
 - 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS (Match Existing Standard Hardware)

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Applicable provisions of NFPA 101.
 - 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 - 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
 - 6. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
 - 7. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
- D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
 - 1. Refer to Section 28 1000 for additional access control system requirements.

2.02 HINGES

- A. Hinges: Comply with BHMA A156.1, Grade 1.
 - 1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
 - a. Provide hinge width required to clear surrounding trim.
 - 2. Provide hinges on every swinging door.
 - 3. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 - 4. Provide ball-bearing hinges at each door with closer.
 - 5. Provide non-removable pins on exterior outswinging doors.
 - 6. Provide power transfer hinges where electrified hardware is mounted in door leaf.
 - 7. Provide following quantity of butt hinges for each door:
 - a. Doors up to 60 inches High: Two hinges.
 - b. Doors From 60 inches High up to 90 inches High: Three hinges.

2.03 FLUSH BOLTS

- A. Flush Bolts: Comply with BHMA A156.16, Grade 1.

1. Flush Bolt Throw: 3/4 inch, minimum.
2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
 - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
4. Manual Flush Bolts: Provide lever extensions for top bolt at over-sized doors.
5. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.
6. Automatic Flush Bolts: Automatically latch upon closing of door; automatic retraction of bolts when active leaf is opened; located on inactive leaf of pair of doors.

2.04 EXIT DEVICES

- A. Exit Devices: Comply with BHMA A156.3, Grade 1.
 1. Lever design to match lockset trim.
 2. Provide cylinder with cylinder dogging or locking trim.
 3. Provide exit devices properly sized for door width and height.
 4. Provide strike as recommended by manufacturer for application indicated.
 5. Provide less bottom rod (LBR) at scheduled locations to eliminate use of floor mounted strikes.
 6. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.
 7. For electrical options, provide quick connect plug-in pre-wired connectors.

2.05 CYLINDRICAL LOCKS

- A. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
 1. Bored Hole: 2-1/8 inch diameter.
 2. Latchbolt Throw: 1/2 inch, minimum.
 3. Backset: 2-3/4 inch unless otherwise indicated.
 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.
 5. Provide a lock for each door, unless otherwise indicated that lock is not required.
 6. Provide an office lockset for swinging door where hardware set is not indicated.

2.06 DOOR PULLS AND PUSH PLATES

- A. Door Pulls and Push Plates: Comply with BHMA A156.6.
 1. Pull Type: Straight, unless otherwise indicated.
 2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
 - a. Edges: Beveled, unless otherwise indicated.
 3. Material: Aluminum, unless otherwise indicated.
 4. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
 5. On solid doors, provide matching door pull and push plate on opposite faces.
 6. On glazed storefront doors, provide matching door pulls/push plates on both faces unless otherwise indicated.

2.07 COORDINATORS

- A. Coordinators: Provide on doors having closers and self-latching or automatic flush bolts to ensure that inactive door leaf closes before active door leaf.
 1. Type: Bar, unless otherwise indicated.
 2. Material: Aluminum, unless otherwise indicated.
 3. Ensure that coordination of other door hardware affected by placement of coordinators and carry bar is applied properly for completely operable installation.

2.08 CLOSERS

- A. Closers: Comply with BHMA A156.4, Grade 1.
 - 1. Type: Surface mounted to door.
 - 2. Provide door closer on each exterior door.
 - 3. Provide door closer on each fire-rated and smoke-rated door.
 - a. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
 - 4. At corridor entry doors, mount closer on room side of door.
 - 5. At outswinging exterior doors, mount closer on interior side of door.

2.09 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.
 - 1. Provide stop for every swinging door, unless otherwise indicated.
 - 2. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop, unless otherwise indicated.

2.10 PROTECTION PLATES

- A. Protection Plates: Comply with BHMA A156.6.
- B. Edges: Beveled, on four sides unless otherwise indicated.
- C. Fasteners: Countersunk screw fasteners.
- D. Provide clear anti-microbial coating that is silver ion-based.

2.11 KICK PLATES

- A. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
 - 1. Size: 12 inch high by 2 inch less door width (LDW) on push side of door.

2.12 MOP PLATES

- A. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
 - 1. Size: 6 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

2.13 FLOOR STOPS

- A. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
 - 1. Provide floor stops when wall surface is not available; be cautious not to create a tripping hazard.
 - 2. Type: Manual hold-open, with pencil floor stop.
 - 3. Material: Aluminum housing with rubber insert.

2.14 WALL STOPS

- A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
 - 1. Provide wall stops to prevent damage to wall surface upon opening door.
 - 2. Type: Bumper, concave, wall stop.
 - 3. Material: Aluminum housing with rubber insert.

2.15 THRESHOLDS

- A. Thresholds: Comply with BHMA A156.21.
 - 1. Provide threshold at each exterior door, unless otherwise indicated.
 - 2. Type: Flat surface.
 - 3. Material: Aluminum.
 - 4. Threshold Surface: Fluted horizontal grooves across full width.
 - 5. Field cut threshold to profile of frame and width of door sill for tight fit.

6. Provide non-corroding fasteners at exterior locations.

2.17 DECALS

- A. Decals: Provide to identify certain common phrases required by code and related to door operation.
 1. Phrase Required: THIS DOOR TO REMAIN UNLOCKED DURING BUSINESS HOURS.
 2. Material: Plastic, adhered.
 3. Letter Size and Placement: As required by local codes.

2.20 SILENCERS

- A. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
 1. Single Door: Provide three on strike jamb of frame.
 2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 3. Material: Rubber, gray color.

2.21 KEY CONTROL SYSTEMS

- A. Key Control Systems: Comply with guidelines of BHMA A156.28.
 1. Provide keying information in compliance with DHI (KSN) standards.
 2. Keying: Grand master keyed.
 3. Include construction keying and control keying with removable core cylinders.
 4. Provide cores and keys to owner, minimum 4 copies.
 5. Deliver keys with identifying tags to Owner by security shipment direct from hardware supplier.
 6. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
 7. Owner or Owner's agent install permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

2.23 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 2. Exceptions:
 - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 - b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
 - c. Door Closer Covers and Arms: Color as selected by Architect from manufacturer's standard colors unless otherwise indicated.
 - d. Aluminum Surface Trim and Gasket Housings: Anodized to match door panel finish, not other hardware, unless otherwise indicated.
 - e. Hardware for Aluminum Storefront Doors: Finished to match door panel finish, except at hand contact surfaces provide stainless steel with satin finish, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.

- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- D. Use templates provided by hardware item manufacturer.
- E. Do not install surface mounted items until application of finishes to substrate are fully completed.
- F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
- G. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 4000 - Quality Requirements.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION 87100

SECTION 92116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2017a.
- C. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- D. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- E. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- F. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013a.
- G. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- H. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- J. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com.
 - 2. CertainTeed Corporation; www.certainteed.com/#sle.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 4. National Gypsum Company: www.nationalgypsum.com/#sle.
 - 5. USG Corporation: www.usg.com.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Thickness:

- a. Vertical Surfaces: 5/8 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
- C. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. At location shown on drawings.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

3.06 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 3: Walls to receive textured wall finish.
 - 4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 5. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.

- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 92116

SECTION 95100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: 5 Extra units.

1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels: **Match existing**
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. USG: www.usg.com.
- B. Suspension Systems:
 - 1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels: Glass fiber with membrane-faced overlay, with the following characteristics:
 - 1. Classification: ASTM E1264 Type XII.
 - 2. Size: 24 by 24 inches.
 - 3. Thickness: 1 inch.
 - 4. Panel Edge: Square.
 - 5. Suspension System: Exposed.

2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Perimeter Moldings: Same metal and finish as grid.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- F. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 95100

SECTION 96500
RESILIENT BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.
- B. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 - Terrazzo Flooring

1.03 REFERENCE STANDARDS

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- B. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit two samples, 4 by 4 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: Quantity equivalent to 5 percent of each type and color.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 RESILIENT BASE (Match Existing)

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
 - 1. Manufacturers:
 - a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 - b. Roppe Corp: www.roppe.com/#sle.
 - 2. Height: 4 inch.
 - 3. Thickness: 0.125 inch.

4. Finish: Satin.
5. Length: Roll.
6. Color: As indicated on drawings.
7. Accessories: Premolded external corners and internal corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
- B. Clean substrate.
- C. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.

3.04 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.06 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 96500

**SECTION 96613
TERRAZZO FLOORING**

1.1 SUMMARY

- A. The scope of restoration work is limited patching and repairing. Patch where existing electrical cores in terrazzo are being removed and where modifications to the existing floor are required to re-run electrical conduits below terrazzo surface. It is our understanding that the original terrazzo is sand cushion Portland cement based terrazzo.

1.2 QUALITY ASSURANCE

- A. Installer/Restoration Company Qualifications: A contractor member of NTMA.

1.3 SUBMITTALS

- A. Contractor to field verify each location to be familiar with existing colors and patterns of terrazzo that will be impacted by the patching and repairs. Contractor to provide as many samples as necessary to match color and patterns at each area of repair.

1.4 PROJECT CONDITIONS

- A. A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive repairs during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during repair work.
- D. Close spaces to traffic for 48 hours after repairs or longer if required by manufacturer recommendations.

PART 2 - PRODUCTS

2.1 TERRAZZO FLOORING

- A. Terrazzo Floor: Contract shall adjust mix to match existing surrounding areas. Due to individual nature of the mixes and construction techniques used to place terrazzo in the floor, the mix design must be confirmed with mock -up samples in the field at the location of the construction. All mock up samples must be polished to match the existing floor finish as well.
- B. Color and Pattern: Match existing in each location.

- C. Thickness: Match existing
- D. Fire-Test-Response Characteristics:
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

- A. Prepare substrates according to manufacturer's written recommendations.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 3. Moisture Testing:
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Prepare underbed per manufacturer's recommendations.
- C. Placing Terrazzo:
 - 1. Place patch as recommended by manufacturer.
 - 2. Depending on size of patch, provide welded wire reinforcement per manufacturer's recommendation.
- D. Curing:
 - 1. After completing placement of terrazzo and composition cure until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.
- E. Finishing:
 - 1. Rough grind per manufacturer's recommended grit stones with comparable diamond plate.
 - 2. Fine grind with 80 or finer grit stones per manufacturer's recommendations.
- F. Cleaning and Sealing:
 - 1. Wash all surfaces with a neutral cleaner.
 - 2. Rinse with clean water and allow surface to dry.
 - 3. Apply sealer in accordance with manufacturer's directions.
 - 4. Upon completion, this work shall be ready for final inspection and acceptance by the owner or his agent. The general contractor shall protect the finished floor from all trades that will follow.

END OF SECTION

SECTION 96813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, adhered with manufacturer's recommended adhesive.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 15 percent of total installed of each color and pattern installed.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tile Carpeting - Basis-of-Design (match existing):
 - 1. Mohawk Group; Jean Tile-GT177: www.mohawkgroup.com/#sle.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Tile Carpeting: Tufted, manufactured in one color dye lot.
 - 1. Tile Size: 24 by 24 inch, nominal.
 - 2. Color: as indicated on construction drawings.
 - 3. Pattern: as indicated on construction drawings.

2.03 ACCESSORIES

- A. Edge Strips: Embossed aluminum, color as selected by Architect.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION 6813

SECTION 99123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Materials for backpriming woodwork.
- D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 4. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- E. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 4000 – Cold-Formed Metal Fabrications

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2016.
- D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- F. SSPC-SP 1 - Solvent Cleaning; 2015.

- G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

1.07 MOCK-UP

- A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, four feet long by five feet wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Mock-up may remain as part of the work if accepted.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Paints:
 - 1. Base Manufacturer: Benjamin Moore: www.benjaminmoore.com.
 - 2. Behr Process Corporation: www.behr.com/#sle.
 - 3. PPG Paints: www.ppgpaints.com/#sle.
- B. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. USGBC LEED Rating System; for interior wall and ceiling finish (all coats), anti-corrosive paints on interior ferrous metal, sanding sealers, other sealers, and floor coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: As indicated on drawings.
 - 1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
 - 3. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, uncoated steel, and galvanized steel.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 - 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
 - b. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 - 4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
 - 1. Medium duty applications include doors and door frames.
 - 2. Two top coats and one coat primer.
 - 3. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
 - 4. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
- C. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
 - 1. Shop primer by others.
 - 2. One top coat.
 - 3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
 - 4. Top Coat Sheen:
 - a. Eggshell: MPI gloss level 3; use this sheen at all locations.

2.04 PRIMERS

- A. As required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- G. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- H. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- I. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.
- B. Inspect and test questionable coated areas in accordance with manufacturer's recommendations.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 99123

SECTION 10000

MISCELLANEOUS SPECIALTIES

PART 2 GENERAL

2.6 SECTION INCLUDES

- A. Computer Enclosure.
- B. Undercounter CPU Holder

2.7 RELATED SECTIONS

- A. Section 06 20 00 - Finish Carpentry.

2.8 REFERENCES

- A. Underwriters Laboratories (UL).

2.9 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's printed installation instructions, showing required preparation and installation procedures.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Cleaning and maintenance instructions.
- C. Closeout Submittals: Documentation of manufacturer's warranty.

2.10 QUALITY ASSURANCE

- A. Installer: General construction knowledge.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Refer to notes on Sheet A102 for additional information on mock-up.
 - 2. Finish areas designated by Architect.
 - 3. Do not proceed with remaining work until workmanship and appearance are approved by Architect.
 - 4. Subject to approval by Architect, mock-up may be retained as part of finish work.
- C. Pre-Installation Meetings: Conduct pre-installation meetings to verify project requirements, substrate conditions, construction documents, details and manufacturer's warranty requirements.

2.11 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged rolls/pallets with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

2.12 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

2.13 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard warranty document executed by authorized company official.

PART 3 PRODUCTS

3.6 MANUFACTURERS

- A. Acceptable Manufacturer:
 - 3M
 - CSP Laptop Security CPU/Server Enclosure #CPU3.5
 - Mount-It!
 - Global Industries
 - Shure Mfg. Corp.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

3.7 Computer enclosure

- A. Basis of Design: CSP Laptop Security CPU/Server Enclosure Model #CPU3.5, black Series as manufactured and supplied by CSP Laptop Security.
 - 1. Security solution for CPU/Server enclosure.
 - 2. Material: 20 gauge steel (top and bottom units are 18 gauge steel).
 - 3. Model CPU3.5: Undercounter mounted
 - a. Color from full manufacturer provided colors as well as black.
 - b. Cable access hole size with grommet removed 3"x1 1/2"
 - c. Doors hinged on side
 - d. Include top mounting hardware

3.8 Undercounter CPU Holder

- A. Basis of Design: Workrite 920-TL Locking Track Mount CPU Holder
 - 1. Brand: ERGODIRECT.
 - 2. Material: 20 gauge steel
 - 3. Model 920-TL: Undercounter mounted
 - a. Color from full manufacturer provided colors including silver.
 - b. Include top mounting hardware

3.9 Secure Ipad Countertop Stand

- A. Basis of Design: Mount-It! MI-3771_G7 with mounting base.
 - 1. Material: 20 gauge steel
 - 2. Model MI-3771_G7: Above Counter Stand mount
 - a. Color from full manufacturer provided colors white or black.

- b. Include mounting base, hardware and key

EXECUTION

3.10 EXAMINATION AND PREPARATION

- A. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
- B. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Commencement of installation constitutes acceptance of conditions.

3.11 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and recommendations as applicable to specified application.

3.12 CLEANING AND PROTECTION

- A. Protect installed drawers from damage during application and remainder of construction period, per manufacturer's written instructions.

END OF SECTION 10000

SECTION 10140
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including information desk area, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. Signage associated with this project is integrated into the metal paneled video wall assembly and a signal room flat panel room sign at new IT closet. Contractor to coordinate with all other required trades.
 - 2. Provide shop drawings with signage schedule for review and approval. Refer elevation drawings A-401 for dimensional lettering and symbol information.
- D. Samples: Submit two samples of materials to be utilized.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Provide initial full size mock-up for use in video wall mock-up. Once approved, this mock-up can be utilized in final installation. Please see additional information on sheet A-102.
- G. Initial mock-up to be approved prior to production of remaining locations.
- H. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- I. Manufacturer's Qualification Statement.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.

1.06 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

- B. Room and Door Signs: This applies only to the new IT room adjacent to Area A at Baggage claim.
 - 1. Sign Type: Flat signs with engraved panel media to match building standard.
 - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
 - 3. Character Height: 1 inch.
 - 4. Sign Height: Match building standard typical room sign.
 - 6. Rooms: Identify with the room names and numbers indicated on drawings.

2.02 SIGN TYPES

- A. Flat Signs: Signage media without frame. (IT closet)
 - 1. Edges: Match building standard.
 - 2. Corners: Match building standard.
 - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 - 1. Character Font: Match building standard.
 - 2. Character Case: Upper case only.
 - 3. Background Color: Match building standard
 - 4. Character Color: Match building standard
- C. Integrated LED back lit acrylic faced letters and symbols
 - 1. See drawings for locations, materials, and further information for Integrated LED back lit symbols and signs on Video wall.

2.03 TACTILE SIGNAGE MEDIA

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
 - 1. Total Thickness: 1/16 inch.

2.05 ACCESSORIES

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION 10140

SECTION 26 00 01

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and this Section govern the work of this Division.

1.2 DESCRIPTION OF WORK:

- A. Work Included: This Work of this Division includes the furnishing of all supervision, labor, materials, supplies, equipment, fixtures, apparatus, appurtenances, transportation, storage, utilities, permits and licenses required for complete installation of complete, tested and operating electrical systems as shown on the drawings and specified or as reasonably inferred there from, in place and ready for service. Refer to Section 26 00 02, "Electrical Scope of Work", for additional requirements. All work performed under this Section shall be performed in a workmanlike manner in accordance with the Drawings and Specifications and industry standards and subject to the terms and conditions of the Contract. For purposes of these Specifications, "provide" and "furnish and install" shall be synonymous.
- B. Drawings: Refer to the Electrical Drawings for graphic representations, schedules, and notations of required electrical work.
- C. Specifications: Refer to this Division and related Divisions for the primary technical specifications of electrical work.
- D. Work of Other Sections: Requirements given within this Section apply to the Work of all Sections of this Division. The actual performance of the Work stays within the Section in which it occurs; but subject to the requirements of this Section to the extent applicable.
 - 1. Finish painting of electrical systems in areas exposed to the view of building occupants is specified in other Divisions. All prime and protective painting for all areas, and finished painting of electrical systems in areas not exposed to the view of building occupants shall be provided under this Division.
 - 2. Installation of electrical control power which is not specified as an integral part of equipment specified under Divisions 21, 22, 23 and 25 shall be provided under this Division.
 - 3. Access doors in finished surfaces shall be provided under this Division and installed by the Contractor installing the finished surface. Locations are shown on the Drawings and as required for proper equipment access.
 - 4. Concrete housekeeping pads, curbs, and supporting structures are specified under this Division. Dimensions and locations of pads and supports shall be the responsibility of this Division.

5. Owner and General Contractor-furnished equipment is furnished and installed under other Divisions. Proper electrical provisions, including rough-in and final equipment connections, are included in the Work of this Division.
6. Motors for all equipment shall be furnished and installed by the Division(s) providing the equipment.
7. Motor starters and controllers that are furnished as an integral part of the equipment shall be furnished and installed by the Division(s) shall be wired and connected by this Division.
8. Variable speed drives which are furnished with controlled equipment shall be provided by the Division(s) providing the equipment to this Division for installation, wiring and connections by this Division.
9. All other motor starters and associated electrical wiring and connections are included in the Work of this Division.

1.3 CODES, PERMITS AND FEES:

- A. General: Comply with the most recently revised versions of applicable laws, rules, regulations, and ordinances of federal, state, and local utilities and authorities. Where alterations to and deviations from the Contract Documents are required by said authority, report the requirements and secure approval before starting work. Obtain all applicable permits, licenses and inspections and pay all fees charged by above authorities.
- B. Code Design Basis: The following codes and ordinances were used in the design of the project and shall be complied with during construction of the project.
 1. Building Code – International Building Code, 2012 Edition.
 2. Fire Code – International Fire Code, 2012 Edition.
 3. Electrical Code – National Electric Code, 2017 Edition.
 4. Mechanical Code – Uniform Mechanical Code, 2012 Edition.
 5. Plumbing Code – Uniform Plumbing Code, 2012 Edition.
 6. Energy Code – International Energy Conservation Code, 2015 Edition.
 7. Accessibility Code- Texas Accessibility Code (TAS), 2012 and Americans with Disabilities Act of 1990.
- C. Precedence: Where Contract Document requirements are in excess of Code requirements and are permitted under the Code, the Contract Documents shall govern. None of the terms or provisions of the Drawings or specification shall be construed as waiving any of the rules, regulations or requirements of these authorities. In the event of conflict between the Contract Documents and the local enforcing authority, the latter shall rule. Any modifications resulting there from shall be made without additional cost to the Owner or Engineer. This Contractor shall report any such modifications to the Engineer and secure his approval before proceeding.

1.4 QUALITY ASSURANCE AND STANDARDS:

- A. Materials/Methods: Manufacturers, materials, and methods described in the various sections of the Specifications, and indicated on the Drawings are intended to establish a standard of quality only. It is not the intention of the Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard product will meet the requirements of the project design, Specifications and space constraints. **The Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.**
- B. Alternative Products/Materials/Methods: Products by other reliable manufacturers, other materials, and other methods may be accepted provided they have equivalent capacity, construction, and performance. **Under no circumstances shall any substitution be made without the prior written approval of the Engineer.** Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Engineer that the specified product, material or method is the only one that shall be used without prior approval. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be provided, it is the intention of the Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without prior written approval.
- C. Alternative Equipment: Where substituted or alternative equipment is used on the project, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available, including all required Code and maintenance clearances, and to coordinate all equipment requirements and provisions with the Electrical Design and all other Contractors and Subcontractors.
- D. Compatibility: Provide products which are compatible with other products of the electrical work, and with other work requiring interface with the electrical work, including electrical connections and control devices. For exposed electrical work, coordinate colors and finishes with other work. Determine in advance of purchase that equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearance as required by applicable codes and for adjustment, repair, and replacement.
- E. Standards: Refer to Divisions 0 and 1 for general administrative/procedural requirements related to compliance with applicable standards. This Work and all materials shall meet the standards set forth in the applicable portions of the following recognized standards:
1. AEIC Association of Edison Illuminating Companies.
 2. ANSI American National Standards Institute.
 3. ASHRAE American Society of Heating, Refrigerating & Air-Conditioning Engineers.
 4. ASME American Society of Mechanical Engineers.
 5. ASPE American Society of Plumbing Engineers.
 6. ASSE American Society of Sanitary Engineering.

7. ASTM American Society for Testing and Materials.
8. AWS American Welding Society.
9. CBM Certified Ballast Manufacturers.
10. CDA Copper Development Association.
11. USACE U.S. Army Corps of Engineers.
12. EIA Electronic Industry Association.
13. ETL Electrical Testing Laboratory.
14. FAA Federal Aviation Administration (US Department of Transportation).
15. FCC Federal Communications Commission.
16. FM Factory Mutual Engineering Corporation.
17. FS Federal Specification (General Services Administration).
18. ICEA Insulated Cable Engineers Association.
19. IEEE Institute of Electrical and Electronics Engineers.
20. IES Illuminating Engineering Society of North America.
21. IRI Industrial Risk Insurers.
22. LPI Lighting Protection Institute.
23. MIL Military Standardization Documents (US Dept. of Defense).
24. MSS Manufacturers Standardization Society of the Valve and Fittings Industry.
25. NEC National Electrical Code (by NFPA).
26. NECA National Electrical Contractor Association.
27. NEMA National Electrical Manufacturers Association.
28. NFPA National Fire Protection Association.
29. OSHA Occupational Safety and Health Administration (US Department of Labor).
30. UL Underwriters' Laboratories, Inc.
31. ASSP American Society of Safety Professionals.

1.5 SITE VISIT AND FAMILIARIZATION:

- A. General: Become familiar with the Drawings and Specifications, examine the premises, and understand the conditions under which the Contract shall be performed, prior to submitting a bid.
- B. Site: Be informed of the site conditions, verify locations of new and existing equipment, and determine exact requirements for connections.

- C. Coordination: Submission of a bid for this project infers that the Contractor has visited the site and has become familiar with the Drawings and site conditions and has included in his proposal, all work necessary to properly install the systems on the project.
- D. Pre-Bid Conference: Refer to Divisions 0 and 1.

1.6 DRAWINGS AND SPECIFICATIONS:

- A. General: The Drawings are schematic in nature and indicate approximate locations of the electrical systems, equipment, fixtures and devices, except where specific locations are noted and dimensioned on the Drawings. All items are shown approximately to scale. The intent is to show how these items shall be integrated into the building. Locate all items by on the job measurements and in accordance with the Contract Documents. Cooperate with other trades to ensure project completion as indicated.
- B. Location: Prior to locating electrical devices, light fixtures, and other items, obtain the Architect/Engineer's approval as to exact location. Locations shall not be determined by scaling Drawings. Mount lighting fixtures and electrical devices at the heights directed by the Architect/Engineer. Where there is a question concerning the required location for items of electrical work, the Contractor shall submit a request for information to the Architect/Engineer requesting specific directions for locating the item. Contractor shall be responsible for costs of redoing work of trades necessitated by failure to comply with this requirement.
 - 1. All electrical devices, lighting fixtures, and other devices shall be referenced to coordinated, established data points and shall be located to present symmetrical arrangements with these points and to facilitate the proper arrangements of building construction details, acoustical tile panels and other building features with respect to the mechanical and electrical outlets and devices. Electrical devices, fixtures, and outlets shall be referenced to such features as wall and ceiling furrings, balanced border widths, masonry joints, etc. Outlets in acoustical tile shall occur symmetrically in tile joints or in the centers of whole tiles and the exact location of each outlet and the arrangements to be followed shall be acceptable to the Architect/Engineer. Outlets in wall tile or masonry construction shall occur symmetrically in the centers of whole tiles, bricks, or blocks and the exact location of each outlet and the arrangement to be followed shall be acceptable to the Architect/Engineer.
 - 2. The Drawings show diagrammatically the location of the various outlets and apparatus. Exact locations of these outlets and apparatus shall be determined by reference to the Architectural Drawings and to all detail Drawings, equipment Drawings, rough-in Drawings, etc., by measurements at the building, and in cooperation with the other trades. The Owner and Architect/Engineer reserve the right to make any reasonable change in location of any outlet or apparatus before installation, without additional cost to the Owner.
- C. Specifications: The specifications are intended to supplement the Drawings and it is not in the scope of the specifications to mention any part of the work which the Drawings are competent to fully explain. Conversely, any part of the work which the specification are competent to fully explain, may not be mentioned on the Drawings.

- D. Disagreement: Disagreement between the Drawings or specifications or within the Drawings or specifications shall be estimated using the better quality or greater quantity of material or installation, and a request for information shall be made to the Engineer.

1.7 DISCREPANCIES:

- A. Clarification: Clarification shall be obtained before submitting a proposal for the Work under this Division as to discrepancies or omissions from the Contract Documents or questions as to the intent thereof.
- B. Detailed Instructions: Should it appear that the work hereby intended to be done or any of the materials relative thereto, is not sufficiently detailed or explained in the Drawings or Specifications, then the Contractor shall submit a request for information to the Engineer for such further Drawings or explanations as may be necessary before proceeding, allowing a reasonable time for the Engineer to respond. The Contractor shall conform to this additional information as a part of the Contract without additional cost to the Owner or Engineer.
- C. Interpretations: Should any doubt or question arise respecting the true meaning of Drawings or Specifications, reference shall be made to the Engineer, whose written decision shall be final and conclusive. No alleged statement by the Engineer will be accepted as an excuse for inferior work.
- D. Contractor Agreement: Consideration will not be granted for misunderstanding of the amount of work to be performed. Submission of a bid conveys full Contractor agreement of the items and conditions specified, shown, scheduled, or required by the nature of the project.

1.8 UTILITIES:

- A. General: Utility information shown on the Drawings have been shown based upon data obtained from the site survey and the agencies having jurisdiction and are accurate to the best of the knowledge of the Engineer.
- B. Coordination: The Contractor shall be responsible for field verification of the actual location of site and/or building utilities and shall make modifications necessary for connection to or construction around those utilities at no additional cost to the Owner or Engineer.

1.9 TEMPORARY FACILITIES:

- A. General: Refer to Uniform General Conditions and Divisions 0 and 1 for requirements concerning temporary electrical facilities.
- B. Provide power distribution system sufficient to accommodate construction operations requiring power, use of power tools, electrical heating, lighting, and start-up/testing of permanent electric-powered equipment prior to its permanent connection to electrical system. Provide proper overload protection. Ground fault circuit interrupters (GFCI) are to be used on all 120-volt, single-phase, 15, 20, and 30 amp receptacle outlets where portable tools and equipment are used. Ground fault circuit interrupters shall be tested weekly by the Contractor.
- C. Temporary power feeders shall originate from a distribution panel. The conductors shall be multi-conductor cord or cable per NEC for hard and extra-hard service multi-conductor cord.

- D. Branch circuits shall originate in an approved receptacle or panelboard. The conductors shall be multi-conductor cord or cable per NEC for hard and extra-hard service multi-conductor cord. Each branch circuit shall have a separate neutral and equipment grounding conductor.
- E. All receptacles shall be of the grounding type and electrically connected to the grounding conductor.
- F. Provide temporary lighting by factory-assembled lighting strings or by manually-assembled units. All lamps for general lighting shall be protected from accidental contact or breakage. Protection shall be provided by installing the lights a minimum of 7 feet from the work surface or by lamp holders with guards. Branch circuits supplying temporary lighting shall not supply any other load. Provide sufficient temporary lighting to ensure proper workmanship by combined use of day lighting, general lighting, and portable plug-in task lighting. Comply with OSHA required foot-candle levels.
- G. For temporary wiring over 600 volts, suitable fencing, barriers, or other effective means shall be provided to prevent access of anyone other than authorized and qualified personnel.
- H. Temporary power cords shall be kept off the ground or floor. The Contractor shall provide temporary supports as required to keep temporary cords off the ground or floor.

1.10 CHANGE ORDERS:

- A. General: Refer to Uniform General Conditions and Divisions 0 and 1 for requirement concerning Change Orders.

1.11 ALTERNATES:

- A. General: Refer to Divisions 0 and 1 for information concerning Alternates.

1.12 UNIT PRICES:

- A. General: Refer to Divisions 0 and 1 for information on required Unit Prices which are part of the project bid.

1.13 PRECONSTRUCTION CONFERENCE:

- A. Conference: Upon the award of this Contract and prior to commencing any work, the Contractor and his designated major subcontractors, shall confer with the Architect, Engineer and Owner concerning the Work under this Contract. The conference shall be at a mutually agreeable place and time.

1.14 SITE OBSERVATION:

- A. General: Observation at the site to verify general compliance with Contract Documents shall be made periodically by the Engineer or his representative. Written observation comments shall be submitted to the General Contractor for review and a written response.

1.15 REQUESTS FOR INFORMATION (RFI):

- A. General: All Contractor Requests for Information (RFI's) shall be submitted to the Engineer in writing, for response.

- B. Format: All RFI's shall be submitted on a form which includes the date, a sequential RFI number, the requested information and space for the Engineer's response, signature and date. RFI's shall be submitted to the Engineer in a electronic format (unprotected pdf, doc/docx or xls/xlsx format) for response.
- C. Responses: The Engineer will endeavor to provide RFI response time in the Engineer's office of five working days after receipt of the RFI by the Engineer.

1.16 SUBMITTALS:

- A. General: Submittals required for this project shall include, but not be limited to:
 - 1. Shop Drawings and Product Brochure Submittals.
 - 2. Certifications and Test Reports.
 - 3. Operating and Maintenance Manuals.
 - 4. Warranties (Guarantees).
- B. Refer to Division 1 for additional submittal requirements.
- C. Shop Drawings and Product Brochure Submittals: The Contractor shall submit one electronic (unprotected pdf format) copy or a sufficient number of complete bound hardcopy sets of Shop Drawings and complete data covering each item of equipment or material. The terms "Submittal" and "Shop Drawing" in this Specification are defined as either product literature, samples of equipment, or actual Shop Drawings. The first submittal of each item requiring a submittal must be received by the Engineer within 90 days of contract award. The Engineer shall not be responsible for any delays or costs incurred due to excessive Shop Drawing review time where the first submittal is received more than 90 days after contract award. The Architect, Owner, and Engineer will each retain one copy of all hardcopy Shop Drawing submittals for their files. The Contractor is required to include a copy of all final electrical Shop Drawing submittals in Electrical O&M manuals.
 - 1. Contractor shall prepare complete submittals that include all pertinent information about the product. A single Shop Drawing shall not contain information from more than one Specification section, but a single Specification section may be subdivided into separate submittals for items or equipment that are specified in that section. Shop Drawings shall be separately bound by complete or partial Specification section. Where a single Shop Drawing contains information from more than one Specification section, it will be marked "REVISE AND RESUBMIT" and returned. Each Shop Drawing shall include the following items enclosed in a suitable binder, Shop Drawings that do not comply with the above requirements will be marked "REVISE AND RESUBMIT" and returned to the Contractor:
 - a. A cover sheet with the names and addresses of the Project, Architect, M/E/P Engineer, General Contractor, and the Subcontractor making the submittal. The cover sheet shall also contain the Specification section number applicable to the item or items submitted, the item nomenclature and description and a submittal number. Electrical submittals shall be numbered sequentially by Specification section with a sequence suffix (e.g. 26 22 00-1, 26 23 12-2, 26 25 01-1, etc.). Resubmittals shall be numbered with the original submittal

number plus an "R" in the sequence suffix (e.g. the resubmittals of submittal 26 22 00-1 would be 26 22 00-1R1, 26 22 00-1R2, ...).

- b. An index page with a listing of all data included in the submittal.
 - c. A list of variations. This page shall list all variations, including unfurnished or additional items or features between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "No Variations". Where variations affect the work of other contractors, then the contractor shall certify on this page that these variations have been fully coordinated with the affected contractors and that all additional costs to the affected contractors associated with the variations shall be paid by the submitting contractor.
 - d. Equipment information including manufacturer's name and designation, size, performance and capacity data. All applicable listings, labels, approvals and standards shall be clearly indicated.
 - e. Dimensional data and actual sketches as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances.
 - f. Identification of each item of material or equipment matching that indicated on the Drawings.
 - g. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method. Any non-applicable information shall be crossed out.
 - h. Additional information as required in other sections of this Division.
 - i. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Contract Documents, signed and dated.
 - j. Reports or information requiring certification shall be certified by an authorized officer of the manufacturer or testing agency.
 - k. Certified Shop Drawings showing dimensions, loading details, anchor bolt locations, and inserts required for each piece of equipment set on concrete in sufficient time to cause no delay in the Work.
 - l. Equipment and material submittals shall show sufficient data including all performance data, recommended installation details, and sufficient data to indicate complete compliance with the Contract Documents, including proper sizes, clearances, capacities, materials, and finishes.
- D. Required Shop Drawing Submittals: Submit Shop Drawings, including, but not limited to the following items. Refer to individual specification sections for specific submittal requirements.
- | | |
|-------------------------------------|----------------------------|
| 1. Basic Materials and Methods | Refer to Section 26 05 01. |
| 2. Low Voltage Conductors and Cable | Refer to Section 26 05 19. |
| 3. Electrical Grounding | Refer to Section 26 05 26. |
| 4. Electrical Raceways | Refer to Section 26 05 33. |

5. Electrical Boxes Refer to Section 26 05 34.
 6. Panelboards Refer to Section 26 24 16.
 7. Wiring Devices Refer to Section 26 27 26.
 8. Coordination Drawings as required by this Section.
- E. Samples: Submit two samples, upon request, of electrical devices and materials for review by the Architect/Engineer. Samples will be returned upon written request of the Contractor.
- F. Shop Drawing Submittal Review: Shop Drawings will be reviewed for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown in review comments is subject to the requirements of the Contract Documents. The submitting Contractor is responsible for: dimensions which shall be confirmed at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.
1. The Engineer will endeavor to provide a Shop Drawing review time in the Engineer's office of two weeks per review, exclusive of transmittal time, and this review time shall be considered by the Contractor when scheduling his work on the project.
 2. The Architect's review or approval and the Engineer's review of Shop Drawings shall not relieve the Contractor of the responsibility for errors, omissions or deviations that may be contained in the submittals. If the Contractor proceeds on the basis of undetected errors, omissions or deviations in reviewed Shop Drawings, it shall be at his sole responsibility and the review does not allow deviations from the requirements of the Contract Documents. Noting some errors, omissions, and deviations but overlooking other errors, omissions, and deviations does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawing or the Engineer's review thereof, the Contract Documents shall govern the Work and are neither waived or superseded by the Shop Drawing review.
 3. It shall be the responsibility of the submitting Contractor to check all equipment and materials for conformance with the Contract Documents and "REVIEWED WITH NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" submittal at the time such equipment and materials are delivered to the job site, and to notify the Engineer of any deviations.
 4. Inadequate or incomplete Shop Drawings will not be reviewed by the Architect or the Engineer and will be returned to the Contractor marked "REVISE AND RESUBMIT" for completion and resubmittal.
 5. Shop Drawings will be marked "REVIEWED WITH NO EXCEPTIONS TAKEN", "MAKE CORRECTIONS NOTED", "MAKE CORRECTIONS NOTED AND SUBMIT WRITTEN RESPONSE", "REVISE AND RESUBMIT" or "REJECTED" when reviewed by the Engineer. The definitions of these terms for review purposes is as follows:
 - a. **REVIEWED WITH NO EXCEPTIONS TAKEN** - The Shop Drawing was reviewed and no exceptions from the general conformance with the design concept and general compliance with the information given in the Contract Documents were noted.

- b. **MAKE CORRECTIONS NOTED** - The Shop Drawing was reviewed and found to have minor deviations from the requirements of the Contract Documents, as noted. A Shop Drawing resubmittal is not required, however, the furnished material/systems shall comply with the corrections noted in the submittal review.
 - c. **MAKE CORRECTIONS NOTED AND SUBMIT WRITTEN RESPONSE** - The Shop Drawing was reviewed and found to have either minor deviations from the requirements of the Contract Documents or information missing from the submittal, as noted. A complete Shop Drawing resubmittal is not required, however, a written response to all review comments shall be submitted in the format used for a resubmittal.
 - d. **REVISE AND RESUBMIT** - The Shop Drawing was reviewed and major deviations from general conformance with the design concept and general compliance with the information given in the Contract Documents were observed, as noted. The Shop Drawing shall be revised to eliminate the deviations noted and resubmitted.
 - e. **REJECTED** - The Shop Drawing was reviewed and is not in general conformance with the design concept or in compliance with the information given in the Contract Documents, as noted. A revised Shop Drawing submittal for the specified equipment or materials shall be resubmitted.
6. Division 1 and General Conditions requirements concerning Shop Drawing submittal review are not applicable to this Division.
 7. Materials and equipment which are purchased or installed without a "REVIEWED WITH NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" Shop Drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Architect/Engineer for any reason, shall be at the expense of the Contractor.
 8. Shop Drawings shall be complete and checked prior to submission to the Engineer for review. **Where more than three reviews are required for a given Shop Drawing to reach "REVIEWED WITH NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" status, the Subcontractor will be invoiced for extra services at a cost of \$100.00 per hour for review of the fourth and subsequent reviews.** If the Subcontractor fails to pay any legitimate extra services invoice in full within 30 days, then that invoice will be forwarded to the Architect/Owner requesting him to withhold payment of the amount invoiced from the next General Contractors request for payment as allowed for under the General Conditions of the Contract for Construction (AIA Document A-201). Incomplete submittals will be returned to the Contractor unchecked.
- G. Certifications and Test Reports: The Engineer may, at their option, witness any or all on and off-site acceptance and operational testing. Submit a detailed listing of certification and testing for each system indicating estimated dates for completion of system installation. This listing of certification and testing shall be submitted at least 30 days before any testing is conducted.
1. Test procedures and test result reporting forms shall be submitted for review no later than the date of the certification and testing listing submittal.

2. Notify the Engineer in writing two weeks prior to all scheduled testing to allow time for Engineer to schedule witnessing of testing, where elected by the Engineer.
 3. Submit four copies of all certifications and test reports to the Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
 4. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section 26 01 25 "Electrical Testing".
- H. Operating and Maintenance Manuals: Submit two copies of Operating and Maintenance Manuals to the Engineer for approval prior to the beginning of operator training. Provide four approved Operating and Maintenance Manuals for use in operator training. Manuals shall be bound in rigid cover, 3-ring binders with spine and cover labels and shall provide operating and maintenance information for every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference. Bulletins containing information about equipment which is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of applicable equipment supplied by Division 26, 27 and 28 shall be clearly and legibly set forth in memoranda which shall, likewise, be bound with bulletins. As a minimum, the following information shall be provided as applicable:
1. Complete description of each system, item of equipment, and apparatus provided under this Division, including ratings, capacities, performances, data and curves, characteristics identifying name and number, locations, and wiring diagrams, including sources for all parts.
 2. Fully detailed parts lists, including all numbered parts and recommended spare parts, of each item of equipment and apparatus provided under this Division.
 3. Manufacturer's printed instructions describing operation, service, maintenance, and repair of each item of equipment and apparatus.
 4. Typed record of tests made of materials, equipment, and systems included under this Division. Such records shall state the dates the tests were conducted, name(s) of person(s) making and witnessing the tests, and citing any unusual conditions relevant to the tests.
 5. Identifying names, name tags designations and locations for all equipment.
 6. Fuse and motor heater information including location and use.
 7. Equipment and motor nameplate data.
 8. Copies of all approved Shop Drawing submittals.
 9. Fabrication drawings.
 10. Equipment and device bulletins and cutsheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable.
 11. Maintenance instructions clearly highlighted to show all required periodic maintenance and lubrication.

- 12. Wiring diagrams.
 - 13. Operating instructions clearly highlighted to show proper operating procedures for all equipment.
 - 14. Exploded parts views and parts lists for all equipment and devices.
 - 15. Color coding charts for all painted equipment and conduit.
 - 16. Location and listing of all spare parts and special keys and tools furnished to the Owner.
- I. Tools: Provide and deliver to the Owner's authorized representative any special tools required for maintenance of systems, equipment, and apparatus installed under this Division prior to requesting final acceptance of the installation.

1.17 PROJECT RECORD DOCUMENTS:

- A. Site Prints: Maintain a set of clearly marked prints of the Contract Drawings at the job site which shall be used for recording the work details, final size, location, interrelation, and similar items of all work under this Division. This set of Drawings shall be corrected daily as the Work progresses and shall clearly indicate all changes to suit field conditions, changes made by "Field Order" or "Change Order", accurate dimensions of all buried or concealed work, precise locations of all concealed work, locations of all concealed boxes, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall be to at least two permanent structure points.
- B. Upon completion of the work, the Contractor shall clearly and legibly transfer all marks from the site prints to a set of reproducible Record "As-Built" Drawings using red pen or pencil. The reproducible Record "As-Built" Drawings shall have the Engineers Name and Seal removed or blacked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE: _____

(NAME OF GENERAL CONTRACTOR)

BY: _____ (SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: _____ (SIGNATURE)

- C. Approval: Prior to final acceptance of the Work of this Division, the Contractor shall submit three prints of properly certified Record Drawings to the Engineer for review and shall make changes, corrections or additions as the Engineer may require to the Record Drawings.

1.18 COORDINATION OF ELECTRICAL WORK:

- A. General: Refer to Division 1 for general coordination requirements applicable to the entire work. It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including

utilities and mechanical work and that such establishment is the exclusive responsibility of the Contractor. The Drawings show diagrammatically the sizes and locations of the various conduit and raceway systems and equipment items and the sizes of the major interconnecting distribution, without showing exact details as to elevations, offsets, control lines, and installation details.

1. Arrange electrical work in a neat, well organized and workmanlike manner with services running parallel with primary lines of the building construction and with a minimum of 7' overhead clearance where possible.
2. The Contractor shall carefully lay out his work at the site to conform to the architectural and structural conditions, to avoid obstructions and to provide proper grading of lines. Exact locations of outlets, apparatus and connections thereto shall be determined by reference to detail Drawings, equipment Drawings, roughing-in Drawings, etc., by measurements at the building and in cooperation with other Contractors and in all cases shall be subject to the approval of the Engineer. Relocations necessitated by the conditions at the site or directed by the Engineer shall be made without any additional cost to the Owner or Engineer.
3. All conduit and boxes except those in the various equipment rooms, in unfinished spaces or where specifically designated herein or on the Drawings shall be run concealed in furrings, plenums and chases. Wherever conditions exist which would cause any of these items to be exposed in finished spaces, the Contractor whose work is involved shall immediately call the situation to the attention of the Engineer and shall stop work in those areas until the Owner's Representative or General Contractor directs the resumption of the work. Submit for approval a Shop Drawing for any change in equipment placement, etc.
4. Equipment has been chosen to fit within the available space with all required Code and maintenance clearances and shall be installed as shown. Every effort has been made to also accommodate equipment of other approved manufacturers, however since equipment and access space requirements vary, the final responsibility for installation access and proper fit of substituted equipment rests with the Contractor.
5. System interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, the following order of precedence shall, in general, be observed:
 - a. Building lines.
 - b. Structural members.
 - c. Soil and drain piping.
 - d. Steam and condensate piping.
 - e. Sprinkler piping.
 - f. Vent piping.
 - g. Supply ductwork.
 - h. Exhaust ductwork.
 - i. Chilled water and heating hot water piping.

- j. Domestic water piping.
- k. Electrical conduit.
- 6. Locate electrical equipment properly to provide easy access. Arrange entire electrical work with adequate code access for operation and maintenance.
- 7. Advise other trades of openings required in their work for the subsequent move in of large units of electrical work (equipment).
- 8. Coordinate all items which will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical connections, space requirements, sequence of construction, building requirements and special conditions.
- 9. When submitting Shop Drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

B. Coordination Drawings:

- 1. Coordinate the work of all Subcontractors for this Division with the Contractors and Subcontractors responsible for this and other Divisions. Provide, in writing (with copies to the Engineer, Architect and Owner) all information necessary for coordination to permit the work of the project, including all Divisions, to be installed satisfactorily and with the least possible interference or delay.
- 2. This Divisions Contractors, in coordination with Contractors responsible for other Divisions, shall prepare a complete set of construction "Coordination Drawings" which shall be completed and submitted to the Engineer, Architect and Owner within one (1) months after notice to proceed is given to the General Contractor. If the General Contractor or any Subcontractor allows any work to be installed before coordinating with the work of other Subcontractors, the necessary changes for field coordination shall be made without extra cost to the Owner, Architect or Engineer.
- 3. "Coordination Drawings" shall be drawn at a scale of not less than 1/4" = 1'0" and shall be originals or CAD plots, Drawings shall show actual equipment being provided and shall maintain all design drawing space allocations, designated dimensions, ceiling heights, chase dimensions, room sizes and required service clearances for the actual equipment being provided. Deviations from ceiling heights, chase dimensions, room sizes and similar requirements to the Construction Documents shall not be made without specific prior written authorization from the Architect.
- 4. "Coordination Drawings" for interior construction shall show the coordinated locations for equipment, ductwork, piping, conduit, busway, devices, etc. and shall show all ductwork, all busway and all pipe and conduit larger than 4" using double lines. Elevations shall be shown for all construction and horizontal dimensions from major construction to accessible column or building lines shall be shown. Where required for coordination, offsets shall be shown and sections shall be cut and drawn.

5. "Coordination Drawings" shall indicate loads and anchor/support points for all piping 8" and larger, for all racked piping, for all racked conduit 3" and larger, for all busway and for all suspended equipment. These drawings shall be submitted to the Structural Engineer for review and approval. Any special hangers, embeds, supports, reinforcing, etc. required by the Structural Engineer shall be provided at no additional cost to the Owner.
6. "Coordination Drawings" for all work routed underground or embedded in concrete shall show specific dimensions to accessible column or building lines and the burial depth of all underground utilities. Where existing utilities are located in the area where new utilities are being installed, dimensions and burial depth for existing utilities shall be shown on "Coordination Drawings".
7. Prior to submittal, each "Coordination Drawing" shall be completed and signed off by the General Contractor and all applicable Subcontractors prior to the submission to the Architect, Engineer and Owner and prior to installation of Division 21, 22, 23, 25, 26, 27 and 28 work in the area covered by the specific coordination drawing.
8. The requirement for "Coordination Drawings" shall not be construed as releasing the General Contractor or Subcontractors from their responsibility to coordinate the installation of the work or as authorization for the General Contractor or Subcontractors to make unauthorized changes to the Construction Documents or the project design concepts.

1.19 MATERIALS AND WORKMANSHIP:

- A. General: Materials and equipment shall be new, of best grade and quality, and standard products of reputable manufacturers regularly engaged in the production of such materials and equipment.
- B. Workmanship: Work shall be executed and materials installed in accordance with the best practice of the trades in a thorough, substantial, workmanlike manner by competent workmen, presenting a neat appearance when completed.
- C. Manufacturer's Recommendations: With exceptions as specified or indicated on the Drawings or in the Specifications, apply, install, connect, erect, use, clean, and condition manufactured articles, materials, and equipment per manufacturer's current printed recommendations. Copies of such printed recommendations shall be kept at the job site and made available as required.

1.20 SPACE REQUIREMENTS:

- A. General: Determine in advance of purchase that the equipment and materials proposed for installation will fit into the confines indicated, leaving adequate code clearances for adjustments, repair, or replacement.
- B. Clearance: Allow adequate space for clearance in accordance with requirements of the Code and local inspection department.
- C. Scheduled Equipment: The design shown on the Drawings is based on the equipment scheduled.
- D. Responsibility: Since space requirements and equipment arrangement vary for each manufacturer, the responsibility for initial access and proper fit rests with the Contractor.

- E. Review: Final arrangements of equipment to be installed shall be subject to the Architect's review.

1.21 SAFETY REGULATIONS:

- A. All electrical work shall be performed in compliance with all applicable and governing safety regulations. All safety lights, guards, signs, and other safety materials and provisions required for the performance of the electrical work shall be provided by and operated by the Electrical contractor.

1.22 DELIVERY, STORAGE AND HANDLING OF MATERIALS:

- A. General: Protect all materials and equipment to be installed under this Division from physical and weather damage.
- B. Scope: Work under this Division shall include, but not limited to:
 1. Shipping from point of manufacture to job site.
 2. Unloading, moving, and storage on site with proper protection as required to properly protect equipment from rust, drip, humidity, dust, or physical damage.
 3. Hoisting and scaffolding of materials and equipment included in this Division.
 4. Ensuring safety of employees, materials, and equipment using such hoisting equipment and scaffolding.
- C. Coordination: All large pieces of apparatus which are to be installed in the building and which are too large to permit access through doorways, stairways or shafts shall be brought to the job by the Contractor and shall be placed in the spaces before enclosing partitions and structure are completed. All apparatus shall be cribbed up from the floor by Contractor and shall be covered with tarpaulins or other protective covering where required for protection.

1.23 NOISE AND VIBRATION:

- A. General: Warrant the electrical systems, and their component parts to operate without objectionable noise or vibration. Noise from systems or equipment which results in noise within occupied spaces above the recommended NC curves (refer to ASHRAE Standard) shall be considered objectionable. Vibration shall not be apparent to the senses in occupied areas of the building. Objectionable noise, vibration, or transmission thereof to the building shall be corrected.

1.24 CLEANING, ADJUSTING AND START-UP:

- A. Start-up Services: Where specified for any individual item of electrical equipment, provide a factory-authorized representative for testing, start-up of equipment, and instruction of Owner's operating personnel. Certify that these services have been performed by including a properly executed invoice for these services or a letter from the manufacturer.
- B. Testing: Refer to Section 26 01 25, "Electrical Testing" for requirements.
- C. Clean-up: Each Contractor shall clean away from the job site all debris, surplus material, and similar items, resulting from his work or operations, leaving the job and equipment in a clean condition. Each

Contractor shall thoroughly clean all pieces of equipment, conduit, boxes, fixtures, and similar items, leaving the installation in a first class condition.

- D. Operation Prior to Completion: When any piece of electrical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so, providing that he properly supervises the operation, and has the Engineer's written permission to do so. The warranty period shall, however, not commence until such time as the equipment is operated for the beneficial use of the Owner, or date of substantial completion, whichever occurs first. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, properly adjust, and complete all deficiency list items before final acceptance by the Owner. The date of final acceptance and the start of the warranty may not be the same date.

1.25 FINAL REVIEW:

- A. General: Upon completion of the Work, perform a final test of the entire system.
1. The system shall be operating properly.
 2. After the final test, any changes or corrections noted as necessary for the Work to comply with these Specifications or the Drawings, shall be accomplished without delay in order to secure final acceptance of the Work.
 3. The date for the final test shall be sufficiently in advance of the Contract completion date to permit execution, before expiration of the Contract, of any adjustments or alterations which the final acceptance tests indicate as necessary for the proper functioning of all equipment. Any such modifications shall be completed within the time allotted for completion of the Contract. Retests shall be conducted as directed and shall be of such time duration as necessary to ensure proper functioning of adjusted and altered items. Retests shall not relieve the Contractor of completion date responsibility.
 4. Certificates, including certificates of occupancy from local authorities and documents required herein, shall be completely in order and presented to the Engineer at least one week prior to the review.
- B. Qualified Person: Individuals knowledgeable of the systems and persons approved by the Engineer, shall be present at this final inspection to demonstrate the system and prove the performance of the equipment.

1.26 OWNER INSTRUCTION:

- A. General: This Contractor and appropriate factory-trained representatives shall instruct the Owner's representative in the proper operation and maintenance of all systems and equipment and shall explain all warranties.
- B. Outline: Prior to instruction of Owner Personnel, prepare a typed outline, listing the subjects that will be included in this instruction, and submit the outline for review by the Engineer.
- C. Certification: At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the approved outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

- D. Other Requirements: Refer to other Division 26, 27 and 28 Sections for additional Operator Training requirements.

1.27 CONTRACTOR WARRANTIES AND GUARANTEES:

- A. General: Contractor shall guarantee all material and equipment installed by him against defects in workmanship and material for a period of 12 months after final acceptance of the work by the Owner and he shall repair or replace any materials or equipment developing such defects within that time, promptly on due notice given him by the Owner and at Contractor's sole cost and expense.
- B. Equipment: All equipment bearing a manufacturer's guarantee, such as electrical equipment, devices, components, and similar items, shall be construed to have an extended guarantee to the Owner by the manufacturer. Any such equipment that proves defective in materials or workmanship within the guarantee period is to be replaced by the Contractor in accordance with the manufacturer's guarantee.
- C. Start-up: The Electrical Contractor shall provide instructions and equipment starting service on new equipment for one complete year after date of final acceptance of the work by the Owner, at Contractor's sole cost and expense.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION 26 00 01

E&C Engineers & Consultants Inc.
TX Firm Registration No. F-003068

SECTION 26 0501

ELECTRICAL BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide basic materials and methods for electrical construction as shown, scheduled, indicated, and specified.
- B. Types: The types of basic materials and methods required for the project include, but are not limited to:
 - 1. Manner of running conduits.
 - 2. Hangers and supports.
 - 3. Attachment.
 - 4. Sleeves.
 - 5. Openings, cutting, and patching.
 - 6. Excavation, trenching, and backfilling.
 - 7. Access doors.
 - 8. Firestopping for conduit, busway, wire, and cable.
 - 9. Fire-rated partitions.
 - 10. Flame spread properties of materials.
 - 11. Penetration flashing and seals.
 - 12. Escutcheon plates.
 - 13. Cleaning and painting of electrical work.
 - 14. Prohibited markings.
 - 15. Tamper resistant fasteners.
 - 16. Equipment housekeeping pads and anchor bolts.
 - 17. Concrete.

18. Wiring device and equipment mounting heights.

19. Demolition and work within existing buildings.

1.3 SUBMITTALS:

A. Shop Drawing submittals shall include, but not be limited to, the following:

1. The Contractor shall submit to the Engineer for review, a list of proposed manufacturers and product data on hangers, supports, and methods of attachment to the structure.
2. Excavation and trenching plan, designed and sealed by a registered professional engineer. Refer to Division 1 for additional submittal requirements.
3. Cut sheets on access doors and fire stopping materials products.
4. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver components in factory-fabricated water resistant packaging.
- B. Handle components carefully to avoid damage to components, enclosures, and finish.
- C. Store components in a clean, dry space and protect from weather.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General: Refer to PART 3 - EXECUTION of this Section and other Division 26 sections for basic electrical products and materials.

PART 3 - EXECUTION

3.1 MANNER OF RUNNING CONDUITS:

- A. All conduits shall be concealed in pipe chases, walls, furred spaces, topping, or above the ceilings of the building unless otherwise indicated.
- B. Conduit may be run exposed in mechanical rooms, duct and piping chases, but only where necessary. All exposed conduit shall be run in the neatest, most inconspicuous manner, and parallel or perpendicular to the building lines.
- C. All conduit and surface raceways shall be adequately and properly supported from the building structure by means recommended by the manufacturer, or by the use of hanger rods or clamps as herein specified.
- D. Where limited space is available above the ceilings and below concrete beams or other deep projections, conduit shall be sleeved through the projection where it crosses rather than hung below

them and in a manner to provide maximum above-floor clearance.

- E. No sleeves shall be installed through any concrete beam or other deep projection without written approval of the Architect/Engineer.
- F. Run conduit to avoid proximity to heat producing equipment, piping and flues, keeping a minimum of 8" clear.
- G. Whenever possible, install horizontal conduit runs above water piping.
- H. Install all conduit to allow for adequate maintenance and access clearances to all equipment and so as to not inhibit removal of ceiling tiles.
- I. The Contractor shall study all construction documents and carefully lay out all work in advance of fabrication and erection in order to meet the requirements of limited spaces. Where conflicts occur, the Contractor shall meet with all involved trades and the Construction Inspector and resolve the conflict prior to erection of any work in the area involved.
- J. Conduit and raceway connections, rough-in and stub-up locations for equipment shall be coordinated by the Contractor to provide locations indicated on approved manufacturers equipment shop drawings. Connection, rough-in and stub-up locations shown on the Drawings are diagrammatic for general reference only.

3.2 HANGERS AND SUPPORTS:

- A. All supports required for the proper installation of equipment, cable tray, wireway, and conduit shall be provided as hereinafter specified unless otherwise indicated on the Drawings.
- B. All conduits throughout the building shall be supported as specified in Section 26 05 33, "Electrical Raceways", unless specifically noted differently on the Drawings or in the Specifications, but in every case shall be adequate to support the raceway being suspended. The supports shall be from the structure to line of grade, with proper provision for expansion, contraction, vibration elimination, and anchorage.
- C. Vertical conduits shall be supported from floor lines with riser clamps sized to fit the conduit and to adequately support their weight, with allowance for expansion and contraction. At the bases of conduit, where required for proper support, provide anchor base fittings or other approved supports.
- D. Perforated strap shall **not** be used as a hanger material. Conduit **shall not** be supported from ductwork, piping, or equipment.
- E. All electrical conduits and surface raceways exposed to view shall be run parallel to the adjacent building construction. All hangers shall be fastened to the building structure in a manner as hereinafter specified under "Attachment".
- F. Single conduits running horizontally shall be supported by Caddy, Minerallac, or approved equal adjustable conduit hangers from adequately sized rods (minimum 1/8") from the building structure. Refer to Section 26 05 33 for additional requirements.
- G. Multiple conduits running horizontally shall be supported by trapeze channels suspended on rods or bolted to vertical building members. Channels shall be as manufactured by Unistrut, Superstrut,

Powerstrut, Kindorf, Elcen, T&B or approved equal. Conduits shall be secured to the channel with galvanized or stainless steel clamps. Refer to Section 26 05 33 for additional requirements.

- H. Vertical conduits, both concealed and exposed, shall be supported by clamping to vertical surfaces or by means of clamps resting on adjacent beams, or floor slabs, or both as required by the installation. Refer to Section 26 05 33 for additional requirements.
- I. Conduits and raceways run against building surfaces shall be supported by means recommended by the manufacturer, or by means of single or two hole rigid conduit clamps. Two-hole clamps shall be provided where size of conduit and installation conditions warrant. Refer to Section 26 05 33 for additional requirements.
- J. All auxiliary steel required for conduit, cable tray, and wireway supports, etc. shall be provided by this Division unless specifically indicated to be provided by others. All indoor support steel and fasteners shall be galvanized and all outdoor support steel and fasteners shall be hot-dip galvanized.
- K. Contractor shall review all Drawings, including Structural Drawings, for details regarding supports.
- L. All supports shall be of type and arrangement to prevent excessive deflection, to avoid excessive bending stresses between supports, and to eliminate transmission of vibration.

3.3 ATTACHMENT:

- A. The load and spacing on each hanger and/or insert shall not exceed the safe allowable load for any component of the support system, including the concrete which holds the inserts. Reinforcement at inserts shall be provided as required to develop the strength required.
- B. All conduits not embedded in concrete or masonry shall be securely and independently supported so that no strain will be transmitted to outlet box and pull box supports, etc. Supports shall be rigid enough to prevent distortion of conduits during wire pulling.
- C. Inserts shall be of a type which will not interfere with reinforcing, as indicated on the Structural Drawings, and which will not displace excessive amounts of structural concrete. All methods of attachment to the structure and the use of afterset inserts shall be approved in writing by the Structural Engineer.
- D. All conduit supports shall be designed and installed to avoid interference with other piping, hangers, ducts, conduit, supports, building structures, equipment, etc. All conduit, cable tray, and wireway shall be installed with due regard to expansion and contraction and the type of hanger method of support, location of support, etc. shall be governed in part by this Specification.
- E. Hangers shall be attached to structure as follows:
 - 1. Poured-in-place Concrete:
 - a. Where conduits, equipment, etc., are supported under poured-in-place concrete construction, each hanger rod shall be fitted with a nut at its upper end, which shall be set into a UL-listed universal concrete insert placed in the form work before concrete is poured.
 - b. Where inserts are placed in the bottom faces of concrete joists which are too narrow to provide adequate strength of concrete to hold the insert properly, or where a larger insert

would require displacement of a bottom joist steel, the hanger rod shall be suspended from

the center of a horizontal angle iron, channel iron, I-beam, etc., spanning across to adjacent joists. The angle iron shall be bolted to nonadjustable concrete inserts of the "spot" type, of physical size small enough to avoid the bottom joist steel.

2. Steel Bar Joists:

- a. Where light loads are supported under bar joists, hanger rods may be run with a washer and two nuts.
- b. Where larger loads are supported beneath bar joists, hanger rods shall be secured to angle irons of adequate size; each angle shall span across two or more joists as required to distribute the weight properly and shall be welded to the joists or otherwise permanently fixed thereto.

3. Steel Beams: Where loads are supported under steel beams, approved type beam clamps shall be used.

4. Wood Framing: Where loads are supported from wood framing, hanger rods shall be attached to framing with side beam brackets or angle clips.

5. Miscellaneous Steel: All miscellaneous steel members, angles, rods, supports, and similar items specified or required for this project shall be galvanized for indoor use or hot dipped galvanized for exterior use and where exposed to ambient conditions. All required miscellaneous steel shall be provided by this Division.

F. Fastening of conduits, etc., in the building shall be as follows: To wood members - by wood screws; to masonry by threaded metal inserts, metal expansion screws, or toggle bolts, whichever is appropriate for the particular type of masonry; to steel - machine screws or welding (when specifically permitted or directed), or bolts, and to concrete by suitable inserts anchored to reinforcing steel, and poured in place unless other means are indicated on the plans. Power-actuated fasteners (shooting) will not be acceptable for attaching conduit clamps, boxes and hanger wire unless approved by the Architect/Engineer in writing.

3.4 SLEEVES:

- A. Provide sleeves for timely placing in construction for all conduit passing through concrete and masonry walls, partitions, beams, floors and roofs while same is under construction.
- B. In general, a conduit sleeve shall be one size larger than the size conduit which it serves, except where larger sizes are required for manufactured water stop fittings.
- C. No sleeves shall be installed through any concrete beam or other deep projection without written approval of the Architect/Engineer.
- D. Sleeves set in concrete floor construction shall be minimum 18 gauge, galvanized steel, and shall extend 2" above the finished floor. Where sleeve will be used to support a conduit riser clamp, sleeve gauge shall be increased accordingly.

- E. Sleeves for concrete or masonry walls shall be Schedule 40, galvanized steel, and shall be set flush with the finished wall.
- F. Sleeves for conduits passing through walls below grade shall be wall sleeves with corresponding segmented annular seals for the conduit size required as specified in Paragraph 3.11.
- G. Where sleeves are not properly set during construction and must be installed by cutting and patching, obtain direction from the Architect/Engineer prior to proceeding.
- H. Sleeves are not required where new openings are core-drilled into existing construction, unless noted otherwise on the Drawings.

3.5 OPENINGS, CUTTING AND PATCHING:

- A. General: The Contractor shall be responsible for coordinating openings in the building construction for installation of electrical systems. Comply with the requirements of Division 1 for the cutting and patching of other work to accommodate the installation of electrical work. Except as individually authorized by the Architect/Engineer, cutting and patching of electrical work to accommodate the installation of other work is not permitted.
- B. Cut and Patch: Cut and patch walls, floors, etc., resulting from work in existing construction or by failure to provide proper openings or recesses in new construction.
- C. Methods of Cutting: Openings cut through concrete and masonry shall be made with masonry saws and/or core drills and at such locations acceptable to the Architect/Engineer. Impact-type equipment shall not be used except where specifically acceptable to the Architect/Engineer. Openings in precast concrete slabs for conduits, outlet boxes, etc., shall be core drilled to exact size.
- D. Approval: If holes or sleeves are not properly installed and cutting and patching becomes necessary, it shall be done at no change in Contract amount. Undertake no cutting or patching without first securing written approval from the Architect/Engineer. Patching shall create a surface which is structurally and aesthetically equal to the surface surrounding the area patched and shall be performed by the trade whose work is involved, at no change in the Contract amount.
- E. Protection: Openings through exterior walls or roofs shall be provided with suitable covers while they are left open to protect the property or materials involved. Any openings through walls below grade shall be properly protected to prevent entrance of water or other damaging elements.
- F. Restoration: All openings shall be restored to "as-new" condition under the appropriate Specification Section for the materials involved, and shall match remaining surrounding materials and/or finishes. Restoration work shall be performed by the trades who originally installed the work being restored and shall be performed at no cost to the Owner or Architect/Engineer.
- G. Masonry: Where openings are cut through masonry walls, provide and install lintels or other structural supports to protect the remaining masonry. Adequate supports shall be provided during the cutting operation to prevent any damage to the masonry occasioned by the operation. All structural members, supports, etc., shall be of the proper size and shape, and shall be installed in a manner acceptable to the Architect/Engineer.

H. Plaster: All electrical work in areas containing plaster shall be completed prior to the application of the finish plaster coat. Cutting of finish plaster coat will not be permitted.

I. Special Note: No cutting, boring, or excavating which will weaken the structure shall be undertaken.

3.6 EXCAVATING, TRENCHING AND BACKFILLING:

A. General: The work hereunder includes whatever excavating and backfilling is necessary to install the electrical work. Coordinate the electrical work with other work in the same area, including excavating and backfilling, dewatering, floor protection provisions, other temporary facilities, other underground services (existing and new), landscape development, paving, structural foundations, and floor slabs on grade. Coordinate with weather conditions and provide temporary facilities needed for protection and proper performance of excavating and backfilling.

B. Standards: Except as otherwise indicated, comply with the applicable provisions of Division 2 for electrical work excavating and backfilling. Refer instances of uncertain applicability to the Architect/ Engineer for resolution before proceeding with the Work.

C. The bottoms of trenches shall be excavated to required depths, slope and grade. The bottom of the trench shall be accurately excavated to provide firm, uniform bearing for the bottom of the raceways and ductbanks. Where mud or unstable soil is encountered in bottom of trench, it shall be removed to firm bearing and the trench shall be backfilled with bedding sand to proper grade and tamped to provide uniform firm support.

D. The bottom of trenches shall be accurately graded to provide proper fall and uniform bearing and support for each section of the conduit on undisturbed soil or 2" of sand fill at every point along its entire length. In general, grading for electrical ductbanks and conduits shall be from building to manhole, and from a high point between manholes to each manhole.

E. Exercise care not to excavate below required depth, leaving a flat bed of undisturbed earth, firm and secure, before laying cable, and ductbanks. In the event rock is encountered, excavate 6" below required depth and backfill to required depth with bedding sand, and compact to minimum 95% compaction.

F. All grading in the vicinity of excavation shall be controlled to prevent surface ground water from flowing into the excavations. Any water accumulated in the excavations shall be removed by pumping or other acceptable method. During excavation, material suitable for backfilling shall be stacked in an orderly manner a sufficient distance back from edges of trenches to avoid overloading and prevent slides or cave-ins. Material unsuitable for backfilling shall be wasted and removed from the site and properly disposed of.

G. The Contractor shall be fully responsible for the safety of persons, materials and equipment in or near trenches or other excavations and provide all required sloping, shoring, railings and other protective provisions. The Contractor shall provide a trench shoring plan and design which is sealed by a registered professional engineer. Refer to Divisions 1 and 2 for additional requirements.

H. If any unknown and/or uncharted utilities are encountered during excavation, promptly notify Architect/ Engineer and wait for his instructions before proceeding.

- I. If such unknown utilities are encountered and work is continued without contacting the Architect/Engineer for instructions, and damage is caused to said utilities, the Contractor shall repair at his own expense, such damage to the satisfaction of the owner or utility company concerned.
- J. Trenches shall not be backfilled until all required tests have been made by the Contractor and approved by the Architect/Engineer and any local authorities having jurisdiction.
- K. Backfill shall be compacted or cement stabilized sand up to 6" above the top of conduit or ductbank. Backfill up to grade shall be in maximum 6" lifts with minimum 95% compaction of lifts. Refer to Division 2 or elsewhere in Contract Documents for additional trenching and backfill requirements.
- L. Opening and Reclosing Pavement, Landscape Areas and Lawns: Where excavation requires the opening of existing walks, street, drives, other existing pavement or lawns, such surfaces shall be cut as required to install new conduit and to make new connections to existing conduits. The sizes of the cut shall be held to a minimum, consistent with the work to be accomplished. After the installation of the new work is completed and the excavation has been backfilled and flooded, the area shall be patched or replaced, using materials to match those cut out or removed. Patches shall thoroughly bond with the original surfaces, shall be level with them, and shall meet all the requirements established by the authorities having jurisdiction over such areas. All removed work shall be replaced by craftsman who regularly install the types of work being replaced.
- M. Excavation in Vicinity of Trees: All trees including low hanging limbs within the immediate area of construction shall be adequately protected to a height of at least 5' to prevent damage from the construction operations and/or equipment. All excavation within the outermost limb radius of all trees shall be accomplished with extreme care. All roots located within this outermost limb radius shall be brought to the attention of the Architect before they are cut or damaged in any way. The Architect will give immediate instructions for the disposition of same. All stumps and roots encountered in the excavation, which are not within the outermost limb radius of existing trees, shall be cut back to a distance of not less than 18" from the outside of any concrete structure or pipeline. No chips, parts of stumps, or loose rock shall be left in the excavation. Where stumps and roots have been cut out of the excavation, clean compacted dry bank sand shall be backfilled and tamped.

3.7 ACCESS DOORS:

- A. General: This Contractor shall provide wall or ceiling access doors for installation in finished surfaces for unrestricted access to all concealed items of electrical equipment.
- B. Types: Doors shall be factory-finished as noted below and turned over to the General Contractor for installation. Refer to finish painting requirements specified herein below. Doors shall be as manufactured by Inryco/Milcor or an approved equal in the following styles:
 1. Drywall Construction Inryco/Milcor Style DW with gray prime finish.
 2. Finished Acoustical Ceiling Tile Inryco/Milcor Style AT with door designed for tile insert.
 3. Finished Plaster Ceiling or Walls Inryco/Milcor Style AP with door designed for finish plastering.

- 4. Masonry Walls Inryco/Milcor Style M with gray prime finish.
- 5. Fire Rated Construction Inryco/Milcor Fire Rated Access Door with gray prime finish.
- 6. Fire Rated Ceiling or Ceiling Assembly Inryco/Milcor Style ATR with door designed for tile insert.

- C. Selection: Access doors shall be furnished with a continuous piano hinge with screwdriver-operated flush locks and shall be a minimum of 12" x 12". Larger sizes shall be furnished where required for proper access. Access doors shall not be installed until location and style has been approved by the Architect.
- D. Approval: Access door shall not be installed until location and style have been approved by the Architect.

3.8 FIRESTOPPING FOR CONDUIT, BUSWAY, WIRE AND CABLE:

- A. General: Provide a UL Systems Classified, intumescent material capable of expanding up to three to five times when exposed to temperatures beginning at 250°F for sealing all holes or voids created to extend electrical system conduit, raceways, busway, wire, cable and other components through fire-rated floors and walls to prevent the spread of smoke, fire, toxic gas and water.
- B. Fire barrier products shall be used to create through-penetration firestop systems as required. All firestop systems shall be listed in the Underwriter's Laboratories Building Materials Directory, Through Penetration Firestop Systems (XHEZ).
- C. The products manufactured by 3M/Electrical Products Division or an approved equal are acceptable subject to Shop Drawing submittal approval.
- D. Install firestop materials according to the following UL Systems Classifications and manufacturer's recommendations:

<u>OPENING TYPE</u>	<u>UL SYSTEM CLASSIFICATION NUMBER</u>
Metal Conduit/Metal Pipe Through Round Openings	CAJ1001, CAJ7001, CAJ1007, WL1001, WL1002, WL1003, WL5001, WL5002.
Busway Through Rectangular Openings	CAJ6001
Insulated Power Cables/Telephone Cables Through Openings.	CAJ3001, CAJ1001, CAJ7001, WL3001.
Blank Openings/Joints/Expansion Trenches	CAJ0004, CAJ0001.
Cable Tray (Single or Double)	CAJ4003.
Metal Pipe/Conduit/Cables Through Large Openings	CAJ1006, CAJ3005, CAJ8001.
Plastic Pipe/Plastic Conduit Through Openings	CAJ2001, CAJ2002, CAJ2003, CAJ2004, CAJ2005, FA2001,

WL2002, WL2003, WL2004,
WL2005.

All Other Firestop Systems

Per manufacturer's recommendations.

- E. Provide fire rated insulation blankets around conduits where shown on Drawings. Blankets shall be one inch (1"), 8 pound density thermo ceramic material, Thermo Ceramics Kas-Wool Fire Master Series thermal blankets or and approved equal. Blankets shall be wrapped to provide continuous coverage and be secured with stainless steel bands in accordance with the manufacturer's UL-listed installation instructions.

3.9 FIRE-RATED PARTITIONS:

- A. Coordinate locations of raceways in fire-rated partitions so not to effect the fire rating of the partition. Notify the Architect/Engineer in writing where additional construction is required to maintain the partition fire rating.
- B. Outlet boxes installed in fire-rated partitions (2 hour or less) shall not exceed 16 square inches, with a maximum of 100 square inches of wall opening per 100 square feet of wall area.
- C. The outlet boxes shall be located whereby no two outlet boxes are installed closer than 24" on center, and securely attached to the partition studs, with at least one partition stud separating the outlet boxes.

3.10 FLAMESPREAD PROPERTIES OF MATERIALS:

- A. Materials and adhesives incorporated in this project shall conform to NFPA Standard 255 (1984), "Method of Test of Surface Burning Characteristics of Building Materials". The classification shall not exceed a flame spread rating of 25 for all materials, adhesives, finishes, etc., specified for each system, and shall not exceed a smoke-developed rating of 50.

3.11 PENETRATION FLASHING AND SEALS:

- A. Conduit sleeves, pitch pockets, and flashings compatible with the roofing and waterproofing installation shall be provided for all roof and wall penetrations and roof-mounted equipment and supports. Coordinate flashing details with the Architectural details and the roofing/waterproofing contractors.
- B. Conduits passing through walls where exposed to weather or below grade shall pass through waterstop sleeves (new construction) or core-drilled openings (existing construction). The space between the conduit and sleeve/opening shall be sealed using segmented annular seals to prevent the entry of water or foreign materials. Segmented annular seals shall be Thunderline Incorporated, Type LS Series, Style C insulating type link seals for temperatures up to 250°F, or an approved equal. Waterstop sleeves shall be Thunderline Corporation Century-Line or equal noncorroding thermoplastic sleeves with a molded in water stop lip.

3.12 ESCUTCHEON PLATES:

- A. Except as otherwise noted, provide chrome-plated brass floor and ceiling escutcheon plates around all pipes, conduits, etc., passing exposed through walls, floors, or ceilings, in any finished spaces except under floor and attic spaces. Plates shall be sized to fit snugly against the outside of the conduit.

Plates will not be required for conduit where pipe sleeves extend above finished floor. All equipment rooms are classified as finished spaces.

3.13 PROHIBITED MARKINGS:

- A. Prohibited Markings: Markings which are intended to identify the manufacturer, vendor, or other source from which the material has been obtained are prohibited for installation within public, tenant, or common areas within the project. Also prohibited are materials or devices which bear evidence that markings or insignias have been removed. Certification, testing (example, Underwriters' Laboratories, Inc.), and approval labels are exceptions to this requirement.

3.14 EQUIPMENT HOUSEKEEPING PADS AND ANCHOR BOLTS:

- A. Concrete pads for equipment (Housekeeping Pads) will be furnished under this Division. Pads shall be provided in locations where floor mounted equipment is to be installed.
- B. Pads shall be nominal 3-1/2" high and shall extend a minimum of 3" beyond all equipment and supports while generally conforming to the shape of the equipment. Provide pad heights to match existing pads where located in the same room.
- C. Pads shall be minimum 2500 psi (28 day) concrete reinforced with No. 6 - 6" x 6" welded wire mesh. Pad tops and sides shall be hard troweled smooth with a 3/4" bull nose on all external corners. Refer to Division 3 for additional requirements.
- D. Furnish galvanized anchor bolts with layout templates for installation in equipment pads. Bolts shall be of the size and quantity recommended by the manufacturer and where vibration isolators are used, they shall be anchor bolted to the equipment pad.

3.15 CONCRETE:

- A. All concrete used in light pole bases and ductbank encasement shall be 5 sack mix with 1/2" maximum aggregate and 3000 psi compressive strength when tested after 28 days in accordance with ASTM C39/C39M-18, "Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens". Refer to other Divisions for additional requirements.
- B. Add Solomon Colors Iron Oxide Pigment in color 290 Red or and approved equal dye per cubic yard of wet mix ductbank encasement concrete to form a uniform red color throughout the concrete. The amount of pigment required shall be as recommended by the manufacturer.
- C. Use forms except where the earth is firm enough to support the concrete. Above grade portions of pole bases shall be formed using Sonatube or an approved equal forming system.
- D. Keep concrete wet at least 48 hours after forms are removed to ensure proper curing.
- E. Ductbanks and light pole bases shall be reinforced where noted on the Drawings. Refer to Division 3 for reinforcing steel.
- F. Ductbank concrete shall be carefully spaded during the pouring to eliminate all voids under and between the ducts and to prevent honeycombing of the exterior surfaces. Power driven tampers or agitators shall not be used unless specifically designed for the application.

- G. Generally, each run of the ductbank shall be poured in one continuous operation. Where more than one pour is necessary, each pour shall terminate in an angular plane, and reinforcing rod dowels shall be added as necessary to ensure a sound joint. Partial pours shall not terminate in horizontal or vertical planes.
- H. The concrete encasement covering the ductbank may be poured directly against the sides of the trenches if the cut is clean enough, and free of loose material. All loose dirt and extraneous material shall be removed from the trenches before and during the pouring of the concrete to ensure sound envelopes. The trench bed shall be smooth and properly graded for the placement of the bottom row of spacers.

3.16 WIRING DEVICE AND EQUIPMENT MOUNTING HEIGHTS:

- A. Refer to architectural drawings to determine whether outlets occur in wainscot or cabinet spaces and coordinate mounting heights as required by architectural form. For example, mounting heights of outlets occurring in a tile or brick wall should be adjusted so that the outlet will occur entirely within a single course. However, all outlets in a given space shall be mounted at the same height.
- B. In general, unless noted otherwise on Architectural or Electrical Drawings, mounting heights to device center line shall be as follows:

- | | |
|-------------------------------|--|
| 1. Wall Switches | 45" above finished floor. |
| 2. Receptacles | 18" above finished floor. |
| 3. Receptacles | 6" above countertops without splash backs and
4" above splash backs for countertops with
splash backs, mounted with their long axis
horizontal. |
| 4. Clock Outlets | 7'-6" above finished floor. |
| 5. Panelboards | 72" from finish floor to top of panelboard. |
| 6. Stairway Lighting Fixtures | Wall mounted 7'-6" above finished floor or mid-
landing. |
| 7. Fire Alarm Pull Stations | Coordinate with architectural graphics
package for actual mounting heights. |
| 8. Fire Alarm Wall-Mounted | 6'8" above finish floor or 6" below ceiling,
Audio/Visual Signals whichever is lower. |

- C. All receptacles shall be mounted with their long axis vertical, unless noted otherwise.

3.17 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS:

- A. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in service maintenance of all electrical services for the new and existing facilities.

The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

- B. The Contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.
- C. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, conduit, outlet boxes, wiring, light fixtures, equipment, and similar items, to provide this access and shall reinstall same upon completion of work in the areas affected.
- D. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed and reinstalled, this Contractor shall remove and reinstall, in locations approved by the Architect, all devices required for the operation of the various systems installed in the existing construction.
- E. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.
- F. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Survey the project with the Owners representative before demolition begins and determine all materials which the Owner specifically chooses to have salvaged. Pre-establish with the Owner locations where salvaged materials are to be stored. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- G. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
- H. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.
- I. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner

acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

- J. During the construction and remodeling, portions of the project shall remain in service. Construction equipment, materials, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building.
- K. Certain work during the demolition and alteration phases of construction may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner's Representative at least 72 hours in advance.
- L. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch, or replace as required any damaged which might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction. Cooperate with the Owner and other trades in scheduling and performance of the work.
- M. Include in the contract price all rerouting of existing conduits, wiring, outlet boxes, fixtures, etc., and the reconnecting of existing fixtures as necessitated by field conditions to allow the installation of the new systems. Furnish all temporary conduit, wiring boxes, etc., as required to maintain lighting and power service for the existing areas with a minimum of interruption.
- N. All existing lighting fixtures, switches, outlets, speakers, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.
- O. Electrical equipment, outlets, speakers, circuits to mechanical and building systems equipment, etc., which are to remain but which are served by conduit and/or circuiting that is disturbed by the remodeling work, shall be reconnected in such a manner as to leave it in proper operating condition.
- P. Existing branch circuit wiring which is to be removed, shall be pulled from the raceways and the empty conduit shall be removed to a point of permanent concealment.
- Q. Existing lighting fixtures shown to be removed and indicated to be reused, shall be cleaned, repaired, relamped and provided with such new accessories as may be needed for the proper installation in their new locations.
- R. New circuiting indicated to be connected to existing panels shall be connected to "spares" and/or "released" breakers as applicable, or new breakers provided where space is available. Contractor shall verify the existing panel load and feeder capacity prior to adding any additional loads.
- S. Within the remodeled or alteration areas where existing ceilings are being removed and new ceilings are installed, all existing lighting fixtures, other ceiling mounted devices and their appurtenances shall be removed and reinstalled into the new ceiling, unless otherwise shown or specified.
- T. Within the remodeled or alteration areas where existing walls are being removed, all existing lighting fixtures, switches, receptacles, other materials and equipment and their appurtenances shall be removed, where required by the remodel work either shown or specified.

- U. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.
- V. No portion of the fire alarm system shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner's Representative.
- W. Refer to Architectural "Demolition" and "Alteration" plans for actual location of walls, ceilings, etc. being removed and/or remodeled.

END OF SECTION 26 05 01

E&C Engineers & Consultants Inc.
TX Firm Registration No. F-003068

SECTION 26 05 19**LOW VOLTAGE CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS:**

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide low voltage electrical conductor, cable, wire, and connector work as shown, scheduled, indicated, and as specified.
- B. Types: The types of low voltage electrical conductor, cables, wire, and connectors required for the project include, but are not limited to, the following:
 - 1. 600 volt building wire and cable.
 - 2. 600 volt building wire and cable connectors.
 - 3. 300 volt control/signal wire and cable.
 - 4. 300 volt control/signal wire and cable connectors.
- C. Application: The applications for cable, wire, and connectors required on the project are as follows:
 - 1. Power distribution circuitry.
 - 2. Lighting branch circuitry.
 - 3. Appliance, receptacle and equipment branch circuitry.
 - 4. Motor branch circuitry.
 - 5. Control wiring.

1.3 STANDARDS:

- A. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
 - 1. ANSI/ICEA S-95-658/NEMA WC70 – Nonshielded 0-2kV Cables
 - 2. ASTM B3-13(2018) - Standard for Specification for Soft or Annealed Copper Wire.
- B. Where application of applicable codes, Trade Association standards, or publications appears to be in conflict with the requirements of this Section, an interpretation shall be obtained from the Architect/Engineer.

1.4 QUALITY ASSURANCE:

A. Manufacturers: Provide products complying with these specifications and produced by one of the following:

1. 600 Volt Building Wire and Cable:
 - a. Alcon. (aluminum)
 - b. Cerro Wire and Cable Company.
 - c. Colonial Wire and Cable.
 - d. Encore Wire Corporation.
 - e. General Cable Corporation.
 - f. Okonite Company.
 - g. Republic Wire Inc.
 - h. Southwire Company.
2. 300 Volt Wire and Cable:
 - a. Alpha Wire.
 - b. Belden.
 - c. West Penn Wire.
3. Connectors:
 - a. TE Connectivity/AMP Connectors
 - b. Buchanan.
 - c. Burndy Corporation.
 - d. OZ-Gedney - Emerson.
 - e. General Electric Company.
 - f. Ideal Industries, Inc.
 - g. Mac Products, Inc.
 - h. Minnesota Mining and Manufacturing Company (3M).
 - i. Penn-Union.
 - j. Orbit Industries, Inc.
 - k. Thomas & Betts Company.

B. UL Label: All cable, wire, and connectors shall be UL-labeled.

1.5 SUBMITTALS:

- A. Shop Drawing submittals shall include, but not be limited to, the following:
1. The Contractor shall submit to the Engineer for review, a list of the proposed manufacturers of wire and cable, cable lugs, cable connectors and termination fittings listed herein. The Contractor may install wire and cable, cable lugs, cable connectors and termination fittings furnished by any manufacturer listed on the approved submittal.
 2. Cut sheets on all 300 and 600 volt conductors with manufacturers name, ratings and capacities, insulation characteristics, and available colors, clearly listed.
 3. Cut sheets indicating all cable lugs, termination fittings and cable connectors.
 4. Cut sheets indicating types of conductor identification bands.
 5. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Provide factory-wrapped waterproof flexible barrier material for covering wire and cable wood reels, where applicable; and weather resistant fiberboard containers for factory-packaging of cable, wire and connectors, to protect against physical damage in transit. Damaged cable, wire, or connectors shall be removed from project site.
- B. Store cable, wire, and connectors in their factory-furnished coverings, and in a clean, dry indoor space which provides protection against the weather.

PART 2 - PRODUCTS

2.1 600 VOLT BUILDING CABLE, WIRE AND CONNECTORS:

- A. General: Except as otherwise indicated, provide cable, wire, and connectors of manufacturer's standard materials, as indicated by his published product information, designed and constructed as instructed by the manufacturer, and as required for the installation.
- B. Wire and Cable: Provide factory-fabricated wire and cable of the size, rating, material, and type as indicated for each service. Where not indicated, provide proper selection as required to comply with installation requirements and with NEC standards. The minimum size wire to be used for power or lighting circuits shall be No. 12 copper (No. 14 for light fixture pigtails) with insulation as noted below. Minimum size for control wiring shall be No. 14 copper.
- C. Conductors: Provide soft or annealed copper wires meeting, before stranding, the requirements of ASTM B3, "Standard Specification for Soft or Annealed Copper Wire for Electrical Purposes", latest edition.
 1. Conductors for power wiring sized No. 10 AWG and smaller shall be stranded or solid at the Contractors option, except that solid conductors shall be provided where conductors are terminated under terminal screws and stranded conductors shall be provided for connections to vibrating or movable equipment. Stranded conductors may be terminated on back wired wiring devices where wiring is mechanically secured via a side screw. Conductors for control wiring sized No. 10 AWG and smaller shall be stranded, except that solid conductors or stranded conductors with UL Listed crimp on connectors shall be provided where conductors are

terminated under terminal screws.

2. Conductors sized No. 8 AWG and larger shall be stranded. Stranding shall be Class B meeting the requirements of ASTM B8, "Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, or Soft".

D. Insulation: Insulation shall meet or exceed the requirements of UL 83, "Standard for Thermoplastic Insulated Wires".

1. Insulation for conductors sized No. 10 AWG and smaller shall be UL Type "THHN/THWN" (rated at 90°C in dry locations and 75°C in wet locations).
2. Insulation for conductors sized No. 8 AWG and larger shall be UL Type "THHN/THWN" (rated at 90°C in dry locations and 75°C in wet locations).
3. All wiring inside lighting fixtures shall be temperature rated per the NEC.
4. Branch circuit wiring within 3" of fluorescent ballasts shall be temperature rated for 90°C.

E. Connectors for Building Wire and Cable: Provide factory-fabricated, metal connectors of the size, rating, material, type, and class required for each use.

2.2 300 VOLT CONTROL/SIGNAL CABLE, WIRE AND CONNECTORS:

A. General: Except as otherwise indicated, provide cable, wire, and connectors of manufacturer's standard materials, as indicated by his published product information, designed and constructed as instructed by the manufacturer, and as required for the installation.

B. Wire and Cable: Provide factory-fabricated wire and cable of the size, rating, material, and type as indicated for each use.

C. Conductors: Provide soft or annealed copper wires as individual conductors, twisted together or shielded, where required, and meeting, before stranding, the requirements of ASTM B3, "Standard Specification for Soft or Annealed Copper Wire for Electrical Purposes", latest edition.

D. Conductor Gauge: Provide conductor gauge as required for the application with a minimum of 24 AWG. Conductors shall be stranded or solid as required by the application or manufacturer.

E. Insulation: Insulation shall meet or exceed the requirements of UL 83, "Thermoplastic-Insulated Wires and Cable", and the requirements of NEC Article 725 for Class 2 wiring.

1. Insulation shall be rated for a maximum working voltage of 300 volts; PVC jacket; UL-listed.
2. Insulation of cables used in environmental air spaces shall be nonmetallic jacket UL-listed for use in air plenums.

F. Connectors: Provide factory-fabricated, metal connectors of the size, rating, material, type, and class required for the application.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install electrical cable, wire and connectors as shown, in accordance with the manufacturer's

written instructions, the applicable requirements of NEC, the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended functions.

B. Coordination:

1. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.
2. Installer shall examine the areas and conditions under which cable, wire and connectors are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Inspect wire and cable for physical damage. Do not proceed with the work until unsatisfactory conditions have been corrected.

C. 600 Volt Building Wire and Cable:

1. Mains and feeders are to be run their entire length in continuous pieces without joints or splices.
2. Conductors may be run in multiple on sizes No. 1/0 AWG through 600 kcmil inclusive, provided all multiple conductors are the same size, length, and type of insulation, and are so arranged and terminated as to ensure equal division of the total current between all conductors involved.
3. Before any wire is pulled into any conduit, the conduit shall be thoroughly swabbed in such a manner as to remove all foreign material and to permit the wire itself to be pulled into a clean, dry conduit. All conductors shall be pulled into the conduit at the same time.
4. Cables shall be selected on the basis of their purpose and UL-listing. Generally, use Types "THWN" and "THHN" in building interiors and other dry locations. Outdoors and underground in raceways, use Type "THWN". Conductors subject to abrasion, such as in lighting poles, shall be Type "THWN" or "THHN".
5. Feeder conductors shall be sized such that the voltage drop from the source to the load served shall not exceed 2% at maximum load and 80% power factor, at 120/208 volts and 1% at maximum load and 80% power factor at 277/480 volts.
6. Where pulling lubricant is required, use only non-wax based cable lubricants equal to American Polywater as a lubricant. Wire pulling lubricant shall not be used when installing branch circuit conductors from panelboards with "isolation" transformers.
7. Pull all conductors together when more than one conductor is being installed in a raceway. Where more than six power conductors are installed in a single conduit, a conductor derating factor per NEC Table 310-15(B)(2)(a) shall be applied to conductor ampacity.
8. The use of shared branch circuit neutrals is not permitted. Separate neutral conductors shall be pulled for all branch circuits served by single pole and where required for 2 and 3 pole circuit breakers.
9. No conductor smaller than No. 12 AWG shall be used for power or lighting purposes (except light fixture tails). Switch legs shall be No. 12 AWG. Control circuit wiring may be No. 14 AWG minimum, and shall not be run in same conduit with power wiring.
10. Lighting and power branch circuit conductors shall be sized such that the voltage drop from the panelboards to the farthest point on the circuits shall not exceed 2% at maximum load and 80% power factor, at 120/208 volts and 1% at maximum load and 80% power factor at 277/480 volts.

11. For 120 volt, 20 amp branch circuits with a length of 75' or more to the homerun junction box or first outlet, provide minimum No. 10 AWG conductors to the homerun junction box or first outlet. Where the additional circuit length from the homerun junction box or first outlet to the last outlet exceeds 75', provide minimum No. 10 AWG conductors to the last outlet.
12. For 208 volt, 20 amp branch circuits with a length of 100' or more, provide minimum No. 10 AWG conductors for the entire branch circuit.
13. For 208 volt, 30 amp branch circuits with a length of 100' or more, provide minimum No. 8 AWG conductors for the entire branch circuit.
14. For 277 volt, 20 amp branch circuits with a length of 150' or more, to the first outlet provide minimum No. 10 AWG conductors to the center of the load (minimum first outlet, where there is only one outlet).
15. Lighting fixtures shall not be used for raceways for circuits other than parallel wiring of fixtures.
16. Conductors for connection to individual light fixtures in grid type ceilings from their associated junction boxes, shall be 3 No. 14 AWG THHN copper 600 volt, solid conductors in 72" long 3/8" flexible metal conduit fixture-tails, or by Type MC cable fixture tails where permitted by the local authority having jurisdiction, in lengths not to exceed 8'.
17. All conductors in vertical conduits or raceways shall be supported in the manner set forth in the latest edition of the National Electrical Code.
18. 2 hour rated cables shall be installed in conduit and supported per UL to provide a 2 hour installed rating.
19. Do not use a pulling means, including fish tape, cable, or rope which can damage the raceway.
20. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
21. Install exposed wire and cable, parallel and perpendicular to surface or exposed structural members and follow the surface contours, where possible.
22. All wire on this project shall be new, unused, in good condition, and shall be delivered in standard coils, package, or rolls. Samples of all wire shall be submitted by the Contractor when requested by the Engineer for the purpose of determining acceptability of the wire.
23. Wire which has been rejected by the Engineer shall not be used again. Decisions as to the quality of the wire furnished and the acceptance of such wire shall be made by the Owner's duly authorized representative.
24. Do not permit conductors entering or leaving a junction or pull box to deflect so as to cause pressure on the conductor insulation.
25. Splices and taps on branch circuits shall occur only when such circuits divide as shown on the drawings and shall consist of one "through" circuit to which the circuit shall be spliced or tapped. Through wiring of receptacles and other devices is not allowed, except for GFI devices noted on the drawings to protect downstream devices.
26. Connections to devices (receptacles, switches, etc.) shall be made with individual conductors.

The devices shall not be used for "feed-thru" purposes. Where "feed-thru" conditions exist, use "pig-tail" splices as described above. Color coding of "pig-tail" splices shall conform to Section 26 05 53, "Identification for Electrical Systems".

27. No splices or taps shall be made in any conductor except in outlet boxes, junction boxes, splice boxes, or other devices and equipment in exposed and accessible locations approved for the purpose by the latest edition of the NEC.
28. All wire connections or splices on conductors No. 18 AWG through No. 8 AWG shall be made with pre-insulated spring type connectors. No other type of mechanical connector shall be used for No. 8 AWG and smaller conductors.
29. All No. 6 AWG and larger copper conductors terminated on the "load" side lugs of all switchboard circuit devices, and the "line" and "load" side lugs of all other devices shall be terminated with set-screw type pressure connectors approved for the purpose.
30. All No. 6 AWG and larger copper conductors which are to be spliced or tapped in wireways, gutters, or junction boxes shall be spliced or tapped using hydraulically applied, high conductivity compression connectors, or with set-screw type pressure connectors approved for the purpose, using 3-M electrical tape or manufactured connector covers approved for the purpose.
31. The manufacturer's recommended installing tool shall be used for the installation of all hydraulically applied compression type lugs or connectors.
32. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal clips or plastic cable ties to support cables from structure. Include bridle rings or drive rings.
33. Multiple circuit wires in bundles or harnesses terminating in control panels, switchboards, panelboards, etc., shall be loosely bundled, trained, and laced to achieve a neat and workmanlike appearance.
34. Surplus wire shall be trimmed to proper length. Do not fold and stuff surplus wires into wiring gutters.
35. Wires exiting harness shall be trained at 90 degree angles to termination point.
36. Refer to Section 25 05 53, "Identifications for Electrical Systems" for color coding and identification of conductors.

D. 300 Volt Control/Signal Cable and Wire:

1. Install all low voltage wiring in a suitable raceway except in areas with accessible (lay-in) ceilings unless otherwise noted on Drawings or other Division 26 sections. Where cable is routed without a raceway, bundle all cables and suspend to one foot above ceiling using loop rings on 5' centers. Do not run cable loose on top of suspended ceilings. Do not attach cables to suspended ceiling supports or any mechanical, plumbing, or sprinkler piping. Conceal conduit except in mechanical rooms and areas where other conduit and piping are exposed. Fasten flexible conductors, which bridge cabinets and doors, neatly along hinge side and protect against abrasion. Tie and support the conductors neatly.
2. Remote control wires shall be no smaller than No. 14 AWG. Control wires shall be run in

separate conduits. Departures from the sizes so determined shall be made only in those cases in which the National Electrical Code required the use of larger conductors. The sizes as determined from these tables shall be regarded as the acceptable minimum under all other circumstances. In no case, however, shall there be a voltage drop greater than that specified in any feeder or branch circuit. This voltage drop shall be based on the full load, 70% power factor, the total impedance drop of 60 Hz alternating current and with the reactance drop in the respective metal conduits duly considered. The Contractor may, if he deems it necessary or advisable, use larger sized conductors than those shown. Under no circumstances, however, shall the Contractor use any conductors sized in a manner which does not conform to the above mentioned tables without having first secured the written approval of the Owner's duly authorized representative.

3. Number code or color code conductors appropriately for future identification and servicing of the system. Refer to Section 26 05 53, "Identification for Electrical Systems", for additional requirements.
4. Make all splices and connections in stranded conductors using UL-approved solderless crimp connectors.

3.2 TESTING:

A. Feeder Insulation Resistance Test: Each new and reused existing 600 volt feeder conductor shall have its insulation resistance tested after the installation is complete except for connection at its source and point of termination.

1. Tests shall be made using a Biddle Megger or equivalent test instrument at a voltage of not less than 1000 volt dc. Resistance shall be measured between phase, neutral, and ground conductors and from conductors to raceway (ground). Readings shall be taken after 30 seconds and 60 seconds of Megger operation at slip speed and insulation resistance shall not be less than the following:

<u>Wire Size (AWG)</u>	<u>Insulation Resistance (Ohms)</u>
No. 12	1,000 K
No. 10 through No. 8	250 K
No. 6 through No. 2	100 K
No. 1 through No. 4/0	50 K
Larger than No. 4/0	25 K

2. New conductors which do not meet or exceed the insulation resistance values listed above shall be removed, replaced, and retested.
3. Where reused existing feeders fail to meet the above insulation requirements, notify the Engineer in writing for direction prior to placing the existing feeders back in service.

B. Neutral Testing: After all feeder and branch circuit conductors are terminated, neutral to ground testing shall comply with the following:

1. The resistance of the system's neutral to ground shall be greater than 10 Kohms with the system

bonding jumper disconnected.

2. Repeat neutral to ground test for neutrals of separately derived systems.

- C. Pre-energization Check: Prior to energization, check all new and reused existing branch circuit cable and wire for continuity of circuitry and for short circuits. Correct malfunction when detected. No submittal is required for this test.
- D. Voltage and Current Values: The voltage and current in each main feeder conductor shall be measured and recorded after all connections have been made and the feeder is under load.
- E. Submittals: Contractor shall furnish all instruments and personnel required for tests. Submit four copies of certified test results to Architect for review. Test reports shall include conductor tested, date and time of test, test results, relative humidity, temperature, and weather conditions. Refer to Section 26 01 25, "Electrical Testing", for additional requirements.

3.3 AS BUILT DRAWINGS:

- A. As-Built Drawings: Refer to Section 26 00 01, "Electrical General Provisions", for applicable requirements.

3.4 IDENTIFICATION:

- A. Identification: Refer to Section 26 05 53, "Identification for Electrical Systems", for color-coding and markings for all conductors and cables.

END OF SECTION 26 05 19

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SECTION 26 0526**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL**

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide electrical service, distribution, and equipment grounding as shown, scheduled, indicated, and as specified.
- B. Types: The types of electrical service and equipment grounding specified in this Section include, but are not necessarily limited to, grounding all equipment and devices shown and as required by the National Electrical Code (NEC), the local electrical inspection department, and The Power Company.

1.3 STANDARDS:

- A. Products shall be designed, manufactured, tested, and installed in compliance with the following Standards:
 - 1. ANSI/IEEE Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 2. ANSI/UL 467 - Safety Standard for Grounding and Bonding Equipment.
 - 3. NFPA 70 - National Electrical Code (NEC).

1.4 QUALITY ASSURANCE:

- A. NEC Compliance: Comply with Article 250 of the NEC for grounding.
- B. Approval: All grounding shall be in accordance with the requirements of, and shall be subject to the approval of the Engineer and the local electrical inspection department.
- C. UL Label: All grounding products shall be UL-labeled.
- D. Manufacturers: Provide grounding products complying with these specifications and as manufactured by Copperweld and Cadweld.

1.5 SUBMITTALS:

- A. Shop Drawing submittals shall include, but not be limited to, the following:
 - 1. A complete grounding system diagram for special grounding systems.

2. Cut sheets of grounding products.
3. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.6 STORAGE AND HANDLING:

- A. Store grounding products in a clean, dry space.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS:

- A. General: For each electrical grounding connection, provide a complete assembly of materials to construct a completely grounded electrical system.
- B. Raceways: Raceways for grounding conductors shall be as specified in Section 26 05 33 "Electrical Raceways", and Section 26 05 34, "Electrical Boxes".
- C. Cable, Wire, and Connectors: Grounding cable, wire and connectors shall be as specified in Section 26 05 19, "Low Voltage Conductors and Cables".
- D. Ground Clamps: Ground clamps for connecting grounding conductors to copper, brass, or lead pipes shall be made of copper and if pipes are of steel or iron, the ground clamps should be made of galvanized iron. These clamps shall be designed to provide permanent and positive pressure and to avoid mechanical injury to the pipe. Use exothermic welds for connecting ground wires to ground rods, for all below grade counterpoise ground grids, and elsewhere where noted on the Drawings.
- E. Ground Conductors and Jumpers: Grounding conductors and jumpers shall be connected to each other and to items to be grounded by means of approved type pressure connectors, clamps and other suitable methods approved by the Engineer. No solder connections shall be made.
- F. Grounding Electrode Rods: Grounding electrode rods used shall be a minimum of 3/4" diameter by 10' long, steel core and thick copper jacket. All concrete encased or direct buried underground grounding electrode conductors shall be of lead alloy-coated copper, Class B, stranded, conforming to ASTM B8-11(2017).
- G. Exothermic Welds: Use cadweld or an approved equal system of exothermic welding for welded grounding connections where shown on the Drawings or specified.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL GROUNDING:

- A. General: Install grounding connections as shown and specified, in accordance with applicable portions of the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended functions.

- B. Bonding: All metallic piping systems and building steel shall be effectively bonded to the electrical grounding system in accordance with Article 250 of the NEC. Install bonding jumpers to all piping systems and building steel.
- C. Building Equipment Grounding System: The building equipment grounding system shall consist of the ground wire and electrically continuous metallic conduit system as shown. Every item of equipment served by the electrical system shall be bonded to the building equipment ground. Portions of metallic piping and duct systems which are electrically isolated shall be bonded to the equipment grounding system with a flexible bonding jumper.
- D. System Neutral: The system neutral shall be grounded to the grounding electrode system at the service entrance only, and shall be kept isolated from the building grounding system throughout the building. The neutral of separately derived systems shall be grounded at one point as specified hereinbelow.
- E. Miscellaneous: Provide bonding and grounding wires run in conduit and sized per the NEC in accordance with the local electrical inspection department and the NEC. Metallic piping and duct systems which enter the building shall be grounded at the point of entry to the building, in accordance with the NEC.
- F. Continuity: Continuity of the building equipment grounding system shall be maintained throughout the project. Grounding jumpers shall be installed across conduit expansion fittings, all liquidtight flexible metal and flexible metal conduit, light fixture pigtails in excess of 6', and all other non-electrically continuous raceway fittings.
- G. Main Conductors: All main grounding conductors shall be stranded copper conductors, sized as shown or per the NEC, and run in a suitable raceway. All main grounding conductors shall be continuous without joints or splices over their entire length.
- H. Special Grounding: Provide special grounding systems where shown on the Drawings.
- I. Separately Derived System Grounding: Bond the case and neutral of each transformer directly to the nearest available effectively grounded structural metal member of the structure, the nearest available effectively grounded metal water pipe, or in accordance with the local electrical inspection department. Flexible conduit shall not be used as a ground path to a transformer.
- J. Voice/Data Equipment Grounding: Provide a ground conductor(s) as shown and specified on telecommunications drawings.
- K. LED Fixtures: Carefully and securely ground all fluorescent fixture bodies to the conduit grounding system. Flexible conduit longer than 6' shall not be considered a ground path.
- L. Receptacles: Ground all grounding type receptacles with a separate ground wire, where present in the branch circuit. Further, ground each outlet by the use of an approved grounding clip attached to the junction box in such a position to be readily inspected on removal of the coverplate; or by the use of an approved grounding yoke type receptacle.

- M. Isolated Ground Receptacles: Where isolated ground receptacles are shown on the Drawings, ground each isolated ground receptacle with a separate insulated ground wire; this ground wire shall not be connected to the outlet box. Ground each isolated ground receptacle outlet box with a separate grounding conductor unless a metal raceway is to be used and effectively grounds the outlet box.
- N. Motor Frames: Ground the frame of each motor with a properly sized separate ground wire around the liquidtight flexible conduit.
- O. Rigid Nonmetallic Conduit Systems: Install a continuous grounding conductor in accordance with NEC.
- P. Feeder and Branch Circuits: Provide a separate, insulated equipment grounding conductor in each feeder or branch circuit. Terminate each end on a grounding lug, bus, or bushing.
- Q. Bolted Connections: Connections requiring bolting shall be made up with Monel metal bolts, washers, and nuts. Connections shall be made only after surfaces have been cleaned, or ground to expose virgin metal. No strap grounding clamps shall be used.
- R. Isolated Grounding Systems: Use insulated equipment grounding conductor and connect only to service grounding electrode.
- S. Power Feeders: Ground the raceway, shield (where applicable), armor (where applicable), and ground conductors in 5/15 kV and 600 volt power feeders in accordance with the NEC. Bond all pull boxes and splice boxes in accordance with the NEC.
- T. Branch Circuits: Install an insulated ground wire, sized per the NEC, in all branch circuits.

3.2 COORDINATION:

- A. General: Coordinate installation of grounding connections for equipment with equipment installation work. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Connections: Use exothermic welds for connecting bonding and grounding conductors to ground rods, to counterpoise, structural steel, piping systems, and elsewhere where shown on the Drawings. Provide all accessories required for a complete installation.

3.3 TESTING:

- A. Ground Resistance Test: Perform a ground resistance test on the building grounding systems for comparison to future inspection and testing data by the Owner. Service ground resistance shall not exceed 5 ohms. Overall system resistance shall not exceed 15 ohms. Test shall be performed using a Biddle Megger or equivalent test instrument operated in accordance with the test instrument manufacturers operating/test procedure. Test readings shall be taken after 30 and 60 seconds of Megger operation at slip speed. The test shall not be performed immediately following wet weather conditions.
- B. Submittals: Contractor shall furnish all instruments and personnel required for tests. Submit two copies of certified test results for Owner's record and submit four copies of certified test results to

Architect for review. Test reports shall include date and time of tests, relative humidity, test results, temperature, and weather conditions.

END OF SECTION 26 05 26

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SECTION 26 0533

ELECTRICAL RACEWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide electrical raceway and fitting work as shown, scheduled, indicated, and specified.
- B. Conduit Systems: All electrical conductors shall be installed in conduit. Conduit shall be as specified herein. In addition, empty conduit shall be installed for the voice/data system and for other systems as indicated on the Drawings and in the Specifications.
- C. Types: The types of electrical raceways and fittings required for the project include, but are not limited to, the following:
 - 1. Rigid steel (RGS) and intermediate metal conduit (IMC).
 - 2. PVC-coated rigid steel conduit.
 - 3. Electrical metallic tubing (EMT).
 - 4. Flexible metal conduit.
 - 5. Liquidtight flexible metal conduit.
 - 6. Rigid nonmetallic conduit.
 - 7. Nonmetallic innerduct.
 - 8. RTRC Fiberglass Conduit.

1.3 STANDARDS:

- A. Products and installation shall comply with applicable sections of the following standards:
 - 1. ANSI C80.1 Electrical Rigid Steel Conduit (ERSC).
 - 2. ANSI C80.6 Electrical Intermediate Metal Conduit.
 - 3. ANSI C80.3 Electrical Metallic Tubing – Steel (EMT-S).

4. ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
5. NEMA TC 3 PVC Fittings for Use with Rigid PVC Conduit and Tubing.
6. NEMA TC14 Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.4 QUALITY ASSURANCE:

- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
 1. Rigid Steel and Intermediate Metal Conduit:
 - a. Allied Tube & Conduit Corporation.
 - b. Republic Steel Corporation.
 - c. Western Tube & Conduit Corporation.
 - d. Wheatland.
 2. PVC-coated Rigid Steel:
 - a. CalConduit.
 - b. KorKap.
 - c. NEC Inc. BlackGuard.
 - d. Plasti-Bond.
 - e. Perma-Cote.
 - f. Thomas & Betts.
 3. Electrical Metallic Tubing:
 - a. Allied Tube & Conduit Corporation.
 - b. Republic Steel Corporation.
 - c. Western Tube
 - d. Wheatland.
 4. Flexible Metal and Liquidtight Flexible Metal:
 - a. AFC Cable Systems.
 - b. Alflex
 - c. Anaconda Universal.

- d. Electri-Flex Company.
- e. HellermannTyton FlexiGuard.
- f. Wheatland.
- 5. Rigid Nonmetallic Conduit and Innerduct:
 - a. Carlon.
 - b. Cantex.
 - c. Triangle Wire & Cable.
- 6. Raceway Fittings:
 - a. Appleton - Emerson
 - b. Cantex (PVC).
 - c. Carlon (PVC).
 - d. Cooper Crouse-Hinds.
 - e. I-T-E Imperial Corporation EFCOR Division.
 - f. OZ-Gedney - Emerson.
 - g. Hubbell-Raco, Inc.
 - h. Republic Steel Corporation.
 - i. Steel City.
 - j. Orbit Industries, Inc.
 - k. Thomas & Betts Company.
- 7. Ductbank Spacers:
 - a. Formex Manufacturing, Inc.
 - b. Carlon.
- 8. Precast Manholes, Pull Boxes and Accessories:
 - a. Brooks.
 - b. A. B. Chance.
- 9. RTRC Conduit
 - a. Champion Fiberglass
 - b. United Fiberglass

- B. UL Label: All electrical raceways and fittings shall be UL-listed and labeled.
- C. NEMA Compliance: All electrical raceways and fittings shall comply with NEMA standards applicable to raceway construction.
- D. NEC Compliance: All electrical raceways and fittings shall comply with NEC requirements applicable to construction and installation.

1.5 SUBMITTALS:

- A. Shop drawing submittals shall include, but not be limited to, the following:
 - 1. The Contractor shall submit to the Engineer for review, a list of the proposed manufacturers of electrical raceways and fittings selected from the manufacturers listed herein. The Contractor may install conduit and fittings furnished by any manufacturer listed on the approved submittal.
 - 2. Cut sheets of electrical raceways and fittings.
 - 3. Manufacturers data on manholes, pull boxes and accessories.
 - 4. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.6 STORAGE AND HANDLING:

- A. Handle raceways and fittings carefully to avoid damage, breaking, denting and scoring. Damaged materials shall not be installed.
- B. Store raceways and fittings in a clean dry space and protect from the weather.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS:

- A. General:
 - 1. Provide metal conduit, tubing, and fittings of the type, grade, size, and weight (wall thickness) as shown and required for each service. Where type and grade are not indicated, provide proper selection determined by this Section to fulfill the wiring requirements and complying with the NEC for electrical raceways.
 - 2. For each electrical raceway system indicated, provide a complete assembly of conduit, tubing, or duct with fittings, including, but not necessarily limited to, connectors, nipples, couplings, expansion fittings, bushings, locknuts, other components and accessories as needed to form a complete system of the type indicated.
 - 3. Conduit fittings shall be designed and approved for the specific use intended. Conduit fittings, including flexible, shall have insulated throats or bushings. Rigid conduits shall have insulated bushings, except insulated throat grounding bushings shall be used on all conduits without ground conductors and where required by N.E.C. Article 250.

- B. Rigid Steel or Intermediate Metal Conduit: Rigid Steel shall be UL 6 and ANSI C80.1, hot-dipped galvanized steel. Intermediate Steel shall be UL 1242 and ANSI C80.6, hot-dipped galvanized steel. Both ends of conduits shall be threaded with factory-installed thread protectors. Fittings shall be threaded Type UL 6/1242 and ANSI C80.1 and C80.6, hot-dipped galvanized steel. Expansion fittings shall be OZ Type "DX", Appleton Type "XJ", Crouse-Hinds Type "XC" or an approved equal and shall have bonding jumpers.
- C. PVC Externally-Coated Rigid Steel Conduit: Shall be ANSI C80.1 hot-dipped galvanized rigid steel conduit with an external 0.040" minimum PVC protective coating per NEMA Standard RN1. Both ends of conduit shall be threaded and thread protectors shall be factory-installed. Fittings shall be threaded type ANSI C80.4, hot-dipped galvanized with a 0.055" minimum PVC coating to match the conduit.
- D. Electrical Metallic Tubing: Shall be UL 797 and ANSI C80.3 galvanized steel with plain ends. Fittings, couplings and connectors shall be UL 797 and ANSI C80.4 galvanized steel type. Fittings, couplings and connectors shall be all steel set-screw type. All EMT connectors shall have insulated throats or bushings.
- E. Flexible Conduit:
1. Flexible Metal Conduit: UL 1, zinc-coated steel
 2. Flexible Metal Conduit Fittings: UL 1, zinc-coated steel, insulated throat.
 3. Liquidtight Flexible Metal Conduit: Liquidtight flexible metal conduit comprised of single strip, continuous, flexible, interlocked, double-wrapped steel, galvanized inside and outside; forming smooth internal wiring channel; with liquidtight jacket of flexible polyvinyl chloride (PVC) or neoprene.
- F. Liquidtight Flexible Metal Conduit Fittings: UL 1, liquidtight, zinc-coated steel, neoprene gaskets and O-rings, insulated throat.
- G. Nonmetallic Conduit and Fittings:
1. Schedule 40 Rigid PVC Conduit: Per UL 651, and NEMA TC 2, 90°C conductor temperature rating.
 2. Schedule 80 Rigid PVC Conduit: Per UL 651 and NEMA TC 2, 90°C conductor temperature rating.
 3. Type "EB" Encased Burial PVC Conduit: Per UL 651A and NEMA TC 8, ASTM F512 - heavy wall, 90°C conductor temperature rating.
 4. PVC Conduit Fittings: Per NEMA TC 3 and compatible with PVC conduit system.
 5. Ductbank Spacers: Spacers shall be interlocking plastic designed for the conduit sizes and nominal 3" spacing being used.
- H. Nonmetallic Innerduct:
1. Innerduct: PVC corrugated flexible conduit, Carlon Optic-Gard PVC or an approved equal.

Duct shall be available in one inch (1"), 1-1/4", 1-1/2" and 2" sizes and orange, gray and white colors.

2. Couplings: PVC type, external, solvent cement type.

I. Conduit Tubing Accessories: Provide ANSI/NEMA FB I conduit and tubing accessories including straps, hangers and expansion joints as recommended by the conduit and tubing manufacturer and as specified in this Section.

J. Precast Concrete Manholes:

1. General: Provide precast concrete manholes as detailed on the Drawings and as required for installation of new ductbank systems and connection to existing ductbank systems at locations shown on the Drawings.
2. Design: Manholes shall be steel reinforced and the complete manhole assembly shall be designed for H-20-44 bridge loading. Submittals shall clearly indicate all dimensions and reinforcing steel.
3. Concrete: Manholes shall be constructed using concrete with a 4500 psi 28 day strength. Concrete mix shall be designed in accordance with ASTM standards.
4. Reinforcing Steel: Steel shall be intermediate or hard grade billet steel conforming to ASTM A615/A615M, deformed in accordance with ASTM A305.
5. Manholes: Manhole and pull box covers shall be cast iron cover mounted in a 30" Type "B" or "WRM" frame and shall be traffic type for heavy vehicular traffic. The frame and neck shall be doweled into the manhole to prevent movement away from the opening. Power manhole and pull box covers shall be marked "ELECTRIC". Communication manhole and pull box covers shall be marked "COMMUNICATIONS". Voice manhole and pull box covers shall be marked "TELEPHONE". Data manhole and pull box covers shall be marked "DATA".
6. Conduit Entry: Plastic conduits shall include a bell end inside the manhole or pull box, mounted flush and grouted to seal openings. Precast fiber type terminators shall be provided for each ductbank entry.
7. Grounding: A #4/0 bare copper ground wire shall penetrate the side wall in the bottom section of each manhole and pull box and extend 48" inside and outside of the manhole pull box.
8. Accessories: Knockouts, cable racks, sumps, steps, joint seals and other accessories shown on the Drawings or required for a complete installation shall be provided.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install electrical raceways and fittings as shown, in accordance with the manufacturer's written instructions, the applicable requirements of the NEC, and in accordance with recognized industry practices to ensure that products serve the intended function. Complete electrical raceway installation before starting the installation of wire and cable.

- B. Conduit Size: Minimum conduit size for power wiring shall be 3/4", except that 1/2" flexible metallic conduit may be used for fixture whips. Maximum conduit size for EMT shall be 4". Minimum conduit size for control wiring shall be 3/4". Minimum conduit size for voice/data wiring shall be one and a quarter inch (1 1/4").
- C. Rigid Steel and Intermediate Metal Conduit: Use rigid steel or intermediate metal conduit to run all electrical raceway systems where exposed to weather; in damp or wet locations; where subject to physical damage; and where cast in concrete walls or floor slabs which have waterproof membranes and where cast in masonry walls. Use rigid steel conduit for all power feeders, unless otherwise noted. Use rigid steel or IMC conduit for all feeders. IMC conduit shall not be used in sizes larger than 4". Use threaded type couplings and fittings. Split type couplings and fittings are not acceptable. EMT conduit may be used instead of rigid steel or IMC for feeder raceways, if the location is acceptable for use of EMT as described herein below, and if a properly sized ground wire is included with the feeder conductors in the EMT raceway.
- D. PVC-coated Rigid Steel: Use polyvinyl chloride (PVC) externally-coated rigid steel conduit and fittings for electrical raceway systems for branch circuits to wet areas; and elsewhere, as shown. Conduit and fittings shall be installed such that the PVC-coating is continuous and watertight such that no portion of the metal conduit or fittings is exposed to moisture.
- E. Electrical Metallic Tubing (EMT): Use EMT for branch circuit electrical raceway systems where concealed in furred ceilings or in walls; exposed inside where not exposed to physical damage; or cast in concrete walls or floor slabs which do not have waterproof membranes. EMT conduit shall not be installed where exposed to weather or in wet locations. Use set-screw type fittings, couplings and connectors made-up tight for all conduit sizes. Use watertight fittings, couplings and connectors where required. Where cast in concrete and floor slabs, use concrete tight fittings, couplings and connectors and terminate conduit in a box cast in concrete, or with rigid steel conduit turnouts from concrete. Crimp type fittings, couplings and connectors are not acceptable.
- F. Flexible Metal: Use flexible metal conduit (with internal ground wire) and fittings for lay-in lighting fixture connections and for other electrical equipment connections where subject to movement and vibration, but where liquidtight flexible metal conduit is not specified. Use flexible metal conduit in such lengths as required, 6'-0" maximum length and 3'-0" minimum length. 1/2" diameter conduit may be used for lighting fixture "pigtails".

- G. Liquidtight Flexible Metal: Use liquidtight flexible metal conduit and fittings for all motor connections and for other electrical equipment connections where subject to movement and vibration and when subject to one or more of the following conditions: exterior location; moist or humid atmosphere where condensate can be expected to accumulate; corrosive atmosphere; subject to water spray; subject to dripping oil, grease or water. Install internal ground wire in flexible conduit with grounding bushings. Maximum length shall be 6'-0" and minimum length shall be 3'-0".
- H. Rigid Nonmetallic: Use PVC conduit directly buried in earth, concrete encased, cast in concrete slabs, and where subject to corrosive environment. Use Schedule 40 where direct buried and Schedule 80 where exposed, with size adjusted to have same fill area as if Schedule 40 were used. Type "EB" encased burial duct shall be used in concrete encased applications where shown on the Drawings.
- I. RTRC Conduit: Use RTRC conduit for underground applications (UL 2420) and above ground (UL2515) use in wet locations of dairies, laundries, canneries and cooling towers. Also use for elbows coming from underground PVC conduit. Use XW Type for areas of extreme physical damage and Class 1 Division 2 locations. Also use in areas of severe corrosive influences. Conduit may also be used for vertical risers on electrical service poles. All RTRC conduit shall be marked for (AG) above ground use.

3.2 INTERIOR CONDUIT SYSTEM:

- A. Ground all metallic conduit in accordance with the requirements of the latest edition of the NEC.
- B. Install all conduit as a complete system without conductors, continuous from outlet to outlet and from fitting to fitting. Make up threaded joints of conduit carefully in such a manner as to ensure a tight joint. Field-cut threads shall be cold-galvanized after cutting. The entire conduit system shall be secured at all joints and boxes in such a manner that each system shall be electrically continuous throughout. Fasten the entire conduit system securely into position. A run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of four quarter bends, including those bends located immediately at the outlet or fitting. Install approved expansion fittings in all conduit runs as specified in paragraph 3.2/P.
- C. Ream all ends of conduit properly to remove rough edges. Whenever a rigid steel or IMC conduit enters a switchboard, panelboard, enclosure, or box, it shall be securely fastened by the use of a locknut inside and outside and an approved insulating bushing shall be installed. Insulated grounding bushings shall be installed on all conduits without ground conductors and where required by NEC Article 250. Whenever an EMT conduit enters a switchboard, panelboard, enclosure, or box, it shall be securely fastened by use of an insulated throat connector or a connector with an insulating bushing. Lay out and install all conduit systems as to avoid all other services or systems, the proximity of which may prove injurious to the conduit or the wires or conductors which the conduit confines.
- D. Conceal conduit systems in finished areas. Concealed metallic conduits shall be run in a direct manner, basically parallel to, and at right angles with the lines of the building, and with as long a bend as possible. Conduit may be exposed in mechanical rooms and where otherwise shown or indicated.

On exposed systems, run the conduit parallel or perpendicular to the structural features of the building and rigidly support with malleable iron conduit clamps at intervals as required by NEC or on conduit racks, neatly racked and bent in a smooth radius at corners insofar as practicable. All bends shall be field-made using an approved bending machine designed for the purpose, or using standard ells having a radius not less than that shown in Chapter 9, Table 2 of the National Electrical Code, and with approved fittings or connectors. All bends shall be free from dents or flattening.

- E. All conduit shall be run without traps. Where traps are unavoidable, a junction or pull box shall be placed at the low point. Metallic conduit systems which are exposed to the weather or water shall be made watertight. As soon as conduit has been permanently installed in place, conduit shall be capped or plugged with standard accessories. All metallic conduit shall be swabbed after plaster and dry wall is finished and dry.
- F. Support exposed raceway or grouped concealed raceways on galvanized channel using compatible galvanized fittings (bolts, beam clamps and similar items) and galvanized threaded rod pendants to secure raceway to channel and channel to structure. Support single conduit runs using a properly sized galvanized conduit hanger with galvanized closure bolt/nut and threaded rod. Support-spacing shall not exceed 10' apart for all EMT/IMC conduit and rigid conduit 2" and smaller and 15' apart for rigid conduit 2-1/2" and larger and within 3' from boxes and changes in direction. Support flexible conduit on maximum 4-1/2' centers and within one foot (1') of boxes. All raceway support system materials shall be galvanized and manufactured by Kindorf, Unistrut, Superstrut, Caddy, or Spring Steel Fasteners, Inc. Provide chrome or nickel-plated escutcheon plates on all conduit passing through walls and ceilings in finished areas.
- G. Support 1" and smaller EMT conduit concealed in ceiling cavities with No. 13 AWG galvanized iron wire pendants, spaced not to exceed 10' apart and 3' from boxes and changes in direction, secured to conduit with clips and properly secured to structure. Perforated strap shall not be used for conduit supports.] [Branch circuit EMT conduit 3/4" trade size and smaller may be suspended using "caddy clips" attached to the ceiling support system in a manner acceptable to the ceiling contractor. Support conduit sized one inch (1") and larger as described in Paragraph F.]
- H. Make all joints and connections to ensure mechanical strength and electrical continuity. PVC conduit shall be joined, or have fittings attached, by using a fusing (solvent) compound recommended by and applied as instructed by, the conduit manufacturer.
- I. Run conduit to avoid proximity to heat producing equipment, piping and flues, keeping a minimum of 8" clear. Whenever possible, install horizontal raceway runs above water piping. Unless shown otherwise, do not install conduit horizontally in concrete slabs without written approval. All roof penetrations shall be made in adequate time to allow the roofer to make proper flashings.
- J. Carefully review architectural, structural, mechanical, plumbing, and electrical Drawings and place boxes and conduit to avoid conflicts with structural members or other general construction.

- K. Conduit shall not be embedded in structural slabs without prior written permission from the Structural Engineer. Conduits embedded in structural slabs shall be installed in the middle of the slab below the top and above the bottom reinforcing steel. Maintain a minimum concrete coverage of one inch (1") except where penetration is made.
- L. Furnish sleeves for timely placing in construction for all conduit passing through concrete walls, partitions, beams, floors, and roofs while same are under construction.
- M. All conduit passing through the housing on connected equipment, shall pass through a cleanly cut hole protected with an approved grommet.
- N. Metallic conduit installed below grade shall have its entire length painted with two coats of protective finish unless encased in concrete. Each coat shall consist of 5 mils of PPG "Coat Cat Epoxy Coating" applied in accordance with the manufacturer's recommendations. The entire length of metallic conduit, including fittings, shall be protected to a point 6" above finished grade (or concrete slab).
- O. Coordinate locations of raceways in fire rated partitions so as not to affect the fire rating of the partition. Notify the Architect in writing where additional construction is required to maintain the partition fire rating.
- P. Install expansion fittings in all conduit as follows:
 - 1. All conduits crossing building expansion joints; unless some other form of thermal expansion compensation is approved in writing by the Engineer.
 - 2. All conduit straight runs in excess of 200' and on 400' centers in all longer conduit runs.
 - 3. Conduits entering environmental rooms.
 - 4. Locations subject to thermal expansion and as required by NEC.
 - 5. Unless expansion fitting has an integral bonding braid an external braid, approved for the purpose, shall be installed around the fitting.

3.3 EXTERIOR CONDUIT SYSTEMS:

- A. Exterior conduit systems shall meet all of the general installation requirements for interior conduit systems.
- B. All exterior conduit systems shall be completely watertight. All hangers, fasteners, and supports used with exterior conduit systems shall be hot dip galvanized.
- C. Conduit routed across roofs shall be attached to 4" x 4" redwood or penta-treated pine sleepers spaced on maximum 5'-0" intervals, unless otherwise detailed on the Drawings. Sleepers shall be installed in pitch pans or as otherwise detailed on the Drawings.
- D. Install underground conduits with sealing glands equal to OZ Type "FSK" or approved equal, exterior to the conduits and OZ Type "CSB" or approved equal internally at the point where conduits enter the building, to prevent water seepage.

- E. Install conduits outside the building lines a minimum of 36" below grade, unless noted otherwise on the Drawings. Maintain 12" of earth or 2" of concrete separation between electrical conduits and other services or utilities below grade. Maintain 10'-0" separation between parallel underground power and voice/data conduits. Where power and voice/data conduits cross below grade, crossing shall be at right (90 degree) angles with a minimum 2'-0" vertical separation.

3.4 VOICE/DATA AND SIGNAL SYSTEM RACEWAYS:

- A. General: Conduit shall be installed in accordance with the previous specified requirements for conduit and tubing and with the additional requirements as set forth in the telecommunications drawings and specifications.

3.5 EMPTY CONDUIT RACEWAY SYSTEMS:

- A. General: Empty conduit in which wire is to be installed by others shall have pull wires installed. The pull wire shall be No. 14 AWG zinc-coated steel, or plastic having not less than 200 pounds tensile strength. Not less than 12" of slack shall be left at each end of the pull wire.

3.6 IDENTIFICATION:

- A. General: Refer to Section 26 05 53, "Identification for Electrical Systems", for requirements concerning painting and marking of raceways and fittings.

END OF SECTION 26 05 33

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TX Firm Registration No. F-003068

SECTION 26 0534

ELECTRICAL BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

Work Included: Provide electrical box and fitting work as shown, scheduled, indicated, and as specified.

- A. Types: The types of electrical boxes and fittings required for the project include, but are not limited to, the following:

Outlet boxes.

1. Junction boxes.

Pull boxes.

2. Cabinets.

Floor boxes.

3. Fire-rated poke-thru boxes.

Conduit bodies.

4. Bushings.

Locknuts.

1.3 STANDARDS:

Products shall be designed, manufactured, tested, and installed in compliance with the following standards:

1. ANSI/NEMA OS 1 -Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports.

NEMA 250 -Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 QUALITY ASSURANCE:

Manufacturers: Provide products complying with these specifications and produced by one of the following:

1. Interior Outlet Boxes:

Appleton - Emerson.

- a. Arrow Hart - Eaton.

Bowers – Thomas & Betts.

- b. OZ-Gedney - Emerson.

National Electric & Products Company.

- c. Hubbell-Raco

Star Sheet Metal.

- d. Orbit Industries, Inc.

Steel City – Thomas & Betts.

- 2. Weatherproof Outlet Boxes:

Appleton - Emerson.

- a. Cooper Crouse-Hinds Company.

Harvey Hubbell, Inc.

- b. Steiner Pyle-National Company.

Hubbell-Raco

- c. Red Dot – Thomas & Betts.

Orbit Industries, Inc.

- 3. Junction and Pull Boxes:

Appleton -Emerson.

- a. Arrow Hart - Eaton.

OZ Gedney - Emerson.

- b. General Electric Company.

Hoffman Engineering Company.

- c. Square D Company.

Unity Manufacturing.

- d. Orbit Industries, Inc.

Cabinets:

- e. General Electric Company.

Hoffman Engineering Company

- f. Square D Company. Westinghouse.

- g. Orbit Industries, Inc.

Floor Boxes:

- h. Hubbell.

Legrand – Wiremold.

- i. FSR.

Orbit Industries, Inc.

- 4. Fire-rated Poke-thru Boxes:

Hubbell.

- a. Legrand – Wiremold.

FSR.

- b. Orbit Industries, Inc.

Conduit Bodies:

- c. Appleton - Emerson.

Cooper Crouse-Hinds Company.

- d. Hubbell-Killark.

Steiner Pyle-National Company.

- e. Orbit Industries, Inc.

Bushings, Knockout Closures and Locknuts:

- f. Allen-Stevens Conduit Fittings Corporation.

Allied Metal Stamping, Inc.

- g. Appleton - Emerson.

Carr Company.

- h. Hubbell-Raco, Inc.

Steel City – Thomas & Betts.

- i. Thomas and Betts.

Orbit Industries, Inc.

- B. UL Label: All electrical boxes and fittings shall be UL-labeled.

SUBMITTALS:

- C. Shop Drawing submittals shall include, but not be limited to, the following:

The Contractor shall submit to the Engineer for review, a list of proposed manufacturers of electrical boxes and fittings selected from the manufacturers listed herein. The Contractor may install electrical boxes and fittings furnished by any manufacturer listed on the approved submittal.

1. Cut sheets of electrical boxes and fittings.

Cut sheets on cabinets.

2. Drawings of any special boxes which must be fabricated, including construction details.

Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.5 STORAGE AND HANDLING:

Handle electrical boxes and fittings carefully to avoid damage, breaking, denting, and scoring. Damaged equipment or materials shall not be installed.

- A. Store electrical boxes and fittings in a clean dry space and protect from weather.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS:

Interior Outlet Boxes: Provide galvanized steel interior outlet wiring boxes, of the type, shape, and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Provide "gang" boxes where devices are shown to be grouped.

1. Type for Various Locations:

Ceilings: 4" square, 2-1/8" deep.

- a. Standard Partitions, Where 1/2" and 3/4" Conduits are Employed: 4" square by 2-1/8" deep boxes with one-gang or two-gang plaster covers shall be used.

Thin Partitions Measuring 3-1/2" or Less: 4" square by 1-1/2" deep boxes with one-gang or two-gang covers shall be used.

- b. Standard Partitions, Where Conduits of a Size Greater than 3/4" are Employed: 4-11/16" square by 2-1/8" deep boxes with one-gang or two-gang plaster covers shall be used.

Masonry Walls: Galvanized switch boxes made especially for masonry installations; depths of boxes must be properly coordinated for each specific installation.

- c. Poured Concrete: Provide plenum type boxes without any holes and with reset knockouts. Where extension rings are used to offset conduit between wall reinforcing steel, joint between extension ring and box shall be sealed to prevent concrete from entering box during pour.

Return Air Ceiling Plenum Boxes: In return air ceiling plenums, where 1/2" and 3/4" conduits are employed, 4" square by 2-1/8" deep plenum boxes shall be used.

- d. Surface: Type "FS" or Type "FD" box with surface cover.

Special: Where above types are not suitable, furnish boxes to suit the use taking into account space available, appearance, and Code requirements.

2. Switch Boxes:

One-gang/Two-gang Switch Boxes in Standard Walls or Partitions: Shall be 3" x 2" square corner boxes by 2-1/2" deep with appropriate mounting bracket for attachment to studs.

- a. One-gang/Two-gang Switch Boxes in Thin Walls or Partitions: Shall be 3" x 2" square corner boxes by 1-1/2" deep with appropriate mounting bracket for attachment to studs.

Three-gang and Up Switch Boxes in Standard Walls or Partitions: Shall be 4-1/2" wide solid gang boxes, with appropriate "gang" plaster covers as required.

3. Interior Outlet Box Accessories: Provide outlet box accessories as required for each installation, including proper covers or wall device plates, mounting brackets, wallboard hangers, extension rings, plaster rings for all boxes in plaster construction, fixture studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used, and meeting requirements of individual wiring situations.

Weatherproof Outlet Boxes: Provide hot-dipped galvanized cast iron weatherproof outlet wiring boxes, of the type, shape, and size, including depth of box, with threaded conduit ends, cast metal coverplate with spring-hinged waterproof caps suitably configured for each application, including face plate gasket and corrosion resistant fasteners.

- B. Junction and Pull Boxes: Provide galvanized sheet steel junction and pull boxes, with screw-on covers and welded seams with stainless steel nuts, bolts, screws and washers, of the type, shape, and size, to suit each respective location and installation.

Type for Various Locations:

- a. 100 Cubic Inches in Volume or Smaller: Standard outlet boxes with stamped knockouts.

150 Cubic Inches in Volume or Larger: Code gauge steel with sides formed and welded, screw covers unless shown to have hinged doors. Hinged doors with locking device same as furnished on panelboards. Knockouts factory-stamped or formed in field with a cutting tool to provide a clean symmetrically-cut hole.

- b. Exterior or Wet Areas: Weatherproof galvanized steel construction with proper gaskets and corrosion resistant fasteners. A parking garage is considered a wet area.

Cabinets: Provide cabinets of size and style noted on the Drawings.

2. Cabinet fronts shall be steel. Other sheet metal for boxes shall be galvanized steel. Details of construction and methods of assembly shall meet the requirements of the Underwriters' Laboratories, Inc.

The panel doors of cabinets shall be provided with locks. Single panel doors of cabinets shall have a lock with ring pull. Single doors 48" or longer and pairs of doors shall have a lock with vertical bolt operation, 3-point locking. Locks shall be keyed alike. Two keys shall be supplied for each cabinet.

3. Cabinets shall have concealed hinges.

Flush-mounted trim shall be fastened to cabinet with adjustable trim clamps. Fasteners for cabinets in concealed areas shall be concealed.

4. Each voice/data cabinet shall be equipped with 3/4" plywood backboard covering entire inside rear surface and painted matte white.

Trims and doors shall have a suitable primer coat and a finish coat of the manufacturer's standard color.

- C. Floor Boxes: Provide fully adjustable floor boxes for installation in concrete floors as indicated. Boxes shall be adjustable both before and after the concrete pour. Provide boxes to suit devices shown and as scheduled on the Drawings.

Fire-rated Poke-Thru Boxes: Fire-rated, UL-listed poke-thru boxes for installation through concrete slabs. Boxes shall be suitable for the slab thickness of the building and shall have UL-listed abandon plates for use where boxes are removed. Provide poke-thru boxes to suit devices shown and as scheduled on the Drawings.

- D. Conduit Bodies: Provide galvanized cast metal conduit bodies, of the type, shape and size, to suit each respective location and installation, constructed with threaded conduit ends, removable cover, and corrosion resistant screws.

Bushings, Knockout Closures, and Locknuts: Provide corrosion resistant punched-steel box knockout closures, conduit locknuts, gasketed locknuts, insulated conduit bushings and insulated grounding conduit bushings of the type and size to suit each respective use and installation.

PART 3 - EXECUTION

3.1 INSTALLATION OF BOXES AND FITTINGS:

Install electrical boxes and fittings as shown, in compliance with NEC requirements, or in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that the boxes and fittings serve the intended purposes. Where boxes are concealed in exterior walls, the continuity of the vapor barrier shall be maintained behind the box.

- A. Use outlet and switch boxes for junctions on concealed conduit systems except in utility areas where exposed junction or pull boxes may be located.

Determine from the Drawings and by actual determination on the site, the exact location of each outlet. The outlet locations shall be modified from those shown to accommodate changes in door swings or to clear other interferences that may arise from job construction details, as well as modification to center them within room spaces. These modifications shall be made with no change in contract price and shall be a matter of job coordination. Check these conditions throughout the entire job and notify the Architect of discrepancies, as they may occur, to verify the modifications, if any, before proceeding with the installation of the work. Set wall boxes in advance of wall construction, blocked in place and secured. Set all wall boxes flush with the finish and install extension rings as required to extend boxes to the finished surfaces of special furring or wall finishes.

- B. Install outlet boxes at heights as specified in Section 26 05 01, "Electrical Basic Materials and Methods".

On exposed conduit systems provide pull boxes, junction boxes, wiring troughs, and cabinets wherever necessary for

proper installation of various electrical systems.

- C. Provide weatherproof boxes for interior and exterior locations exposed to weather or moisture.

Provide knockout closures to cap unused knockout holes where blanks have been removed.

- D. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.

Secure boxes rigidly to the substrate upon which they are being mounted, or solidly imbed boxes in concrete or masonry. Boxes shall not be permitted to move laterally. Boxes shall be secured between two studs. Two gang (single or double device) boxes may be connected to one stud using an approved bracket, except where specific dimensioned locations must be met. Box recessing depths shall comply with Article 314.24 of the National Electrical Code.

- E. Boxes for any conduit system shall not be secured to the ceiling system, HVAC ductwork, or mechanical piping.

Provide junction and pull boxes for feeders and branch circuits where shown and where required by the NEC, regardless of whether boxes are shown or not.

- F. Coordinate locations of boxes in fire rated partitions and slabs so as to not affect the fire rating of the partition or slab. Notify the Architect in writing where modifications or additional construction are required to maintain the partition or slab fire rating.

All junction boxes in accessible locations shall be marked with a permanent marker to identify the circuit(s) within the box.

- G. Junction boxes utilized for emergency circuits shall be painted red in color.

Do not install boxes back-to-back in walls. Provide minimum 6" separation. Provide minimum 24" separation in acoustic-rated walls. If boxes are connected together, install flexible connection between the boxes and pack openings with fiberglass.

- H. The following requirements shall apply to exposed as well as concealed conduit systems when "gang" boxes shall be used. These "gang" boxes shall have dimensions which are not smaller than those shown in the following table:

<u>IN GANG</u>	<u>NUMBER SIZE</u>
3	4-1/2" x 8-5/8"
4	4-1/2" x 10-1/2"
5	4-1/2" x 10-1/2"
6	4-1/2" x 14"

- I. Switch boxes shall not be used as junction boxes.

Install boxes in walls without damaging wall insulation.

- J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

In inaccessible ceiling areas, position outlets and junction boxes within 6" of recessed luminaire, to be accessible

through luminaire ceiling opening.

- K. Outlet boxes supporting fixtures shall be securely anchored in place in an approved manner. Support outlet boxes and fixtures in acoustic ceiling areas from building structures, not from acoustic ceilings. Light fixture outlets shall be coordinated with mechanical and architectural equipment and elements to eliminate conflicts and provide a workable neat installation.

Set floor boxes level and flush with floor. Install nonrated floor boxes as detailed on the Architectural Drawings.

- L. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

Where outlet or switch boxes are not supported from studs or joists directly, they shall be supported by expandable clip type bar hangers, Appleton Catalog No. SX-18 or SX-26. In no case shall conduit be used to support switch or outlet boxes.

- M. Outlet boxes in plaster partitions shall be "shallow-type" set flush in wall so there is at least 5/8" plaster covering back of box.

Refer to Section 26 05 53, "Identification for Electrical Systems", for applicable painting and marking of electrical boxes.

END OF SECTION 26 05 34

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SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide identification for electrical systems as shown, scheduled, indicated, and specified.
- B. Types: The types of identification for electrical systems required for the project include, but are not limited to:
 - 1. Electrical system identification.
 - 2. Warning signs and operational tags.
 - 3. Cleaning and painting of electrical work.

1.3 SUBMITTALS:

- A. Shop Drawing submittals shall include, but not be limited to, the following:
 - 1. Cut sheets and samples of Electrical System Identification products.
 - 2. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver components in factory-fabricated water resistant packaging.
- B. Handle components carefully to avoid damage to components, enclosures, and finish.
- C. Store components in a clean, dry space and protect from weather.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General: Refer to PART 3 - EXECUTION of this Section and other Division 26 sections for basic electrical products and materials.

PART 3 - EXECUTION

3.1 ELECTRICAL SYSTEM IDENTIFICATION:

- A. Identification of Equipment:

1. All pieces of major electrical equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way.
2. The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment, junction boxes, etc., by marking them. All items of equipment, pull boxes, junction boxes, etc., shall be clearly marked using engraved nameplates as hereinafter specified. The item of equipment shall indicate the same number as shown on the Drawings, where applicable.
3. Equipment nameplates shall be three ply laminated plastic, a minimum of 3/32" thick, black-white-black for normal power, red-white-red for emergency power, and blue-white-blue for UPS power. Letters shall be similar to Roman Gothic of a size that is legible (1/2" minimum for main nameplates and 3/8" minimum for branch device nameplates) and appropriate to the application. Attachment of nameplates shall be by stainless steel screws. Rivets or adhesives are not acceptable. Nameplates on equipment installed in finished areas shall be installed inside equipment. Verify location with the Engineer.
 - a. Electrical equipment to be identified includes: All panelboards, disconnect switches, motor controller/starters, pull boxes, junction boxes, and similar equipment.
 - b. Nameplates on disconnect switches, motor controller/starters, and panelboards shall give voltage and current characteristics and the source feeding the panel. Current characteristics shall indicate the size of the overcurrent devices serving the equipment and not the equipment current rating.

Example:

PANEL 1LA
120/208V, 3 PH, 4 W, 225 A
Fed from DPA-3
Room 1.102

- c. Individual overcurrent devices and pilot lights in distribution panels and similar equipment shall have nameplates showing the load served and its location, where remote. Nameplates on motor starters shall indicate variable speed, time delay operation, etc., where applicable.
 - d. Blank nameplates shall be mounted on each spare or bussed space in motor control centers, and on each spare or space in distribution panels.
 - e. Branch circuit panelboards shall have neatly typed circuit directories behind clear plastic. Identify circuits by room numbers. Room numbers shall be those finally selected by the Owner; not necessarily those given on contract Drawings. Spares and spaces shall be indicated with erasable pencil; not typed. Circuit numbers shall be provided in the directory and at each circuit breaker.
- B. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces, to distinguish each run as either a normal power, emergency power, fire alarm, control wiring or voice/data conduit. Except as otherwise indicated, use orange banding with black lettering except that emergency power and fire alarm conduit markers shall use red banding. Provide self-adhesive or snap-on type plastic markers. Indicate voltage ratings of conductors exceeding 250

volts. Locate markers at ends of conduit runs, near switches and other control devices, near items of

equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 50' along each run of exposed conduit. Switch-leg conduit and short branches for power connections need not be marked, except where conduit is larger than one inch (1").

- C. Cable Tray Systems: Provide engraved nameplates identifying cable tray systems as to use, on maximum 50' centers on all exposed tray systems and whenever a tray enters a room or concealed accessible location. Nameplate text shall be submitted to the Engineer for review.
- D. Underground Cable Identification: Bury a continuous, preprinted, bright colored plastic ribbon cable marker, Brady No. 91600 Series or an approved equal with each underground cable (or group of cables), regardless of whether conductors are in conduit or direct buried. Locate each directly over cables, 6" to 8" below finished grade. Ribbons shall be detectable from above grade using a pipe or cable locator.
- E. Cable/Conductor Identification: Coordinate a uniform and consistent scheme of color identification of power wiring throughout the building system. Identification shall be by the permanent color of the selected covering. On large conductors, secure identification by means of painted color banding or plastic tape.

- 1. Color scheme shall be as follows, or as required to match the existing color coding in the building for 120/240 V systems with high leg provide Orange for phase B:

	<u>208/120 Volt</u>	<u>480/277 Volt</u>	<u>5 kV/15 kV</u>
Phase A	Black	Brown	Black
Phase B	Red	Purple	Red
Phase C	Blue	Yellow	Blue
Neutral	White	Gray	White
Ground	Green	Green	

- 2. Wiring for switches shall be same color as phase wire.
- 3. Colored insulation in sizes up through No. 10. Conductors No. 8 and larger may have black insulation, but color coded with 1/2" wide band of colored tape, at accessible locations.
- 4. Feeder cables shall be tagged in pull boxes, wireways, wiring gutters of panels, and at other accessible locations. Tags shall be fireproof, nonconductive material, approved by Architect.
- 5. Maintain same conductor color from service entrance to last device.

- F. Phase Rotation: Phase rotation shall be maintained throughout the project.

- 1. Phase rotation shall be clockwise or counterclockwise, per serving power company standards, A-B-C, and identified as such left-to-right, top-to-bottom, and front-to-back with color coding as specified above at switchboards, panelboards, substations, transformers, motor control centers, motor starters, and similar locations.
- 2. Motor phase reversal, if necessary, shall be made at motor terminals.

- G. Branch Circuit and Control Wiring Tags: All branch circuit and control wiring conductors shall be tagged using self-sticking vinyl cloth or mylar cloth wire markers. Embossed pressure sensitive plastic or metal ribbon markers will not be accepted. Tags shall be installed at all wiring splice, tap

and termination points and shall correspond to the designations shown on the control wiring diagrams or panel schedules.

- H. Branch Circuit Pull Boxes and Junction Boxes: Branch circuit pull boxes shall be neatly stenciled with a black permanent marker indicating the panel name and branch circuit number. Boxes on emergency power systems shall be painted red prior to marking.
- I. Manufacturers: Provide electrical identification products as manufactured by Ideal Industries, T&B, 3M, Panduit, Seaton, Emedco, or an approved equal.

3.2 WARNING SIGNS AND OPERATIONAL TAGS:

- A. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
- B. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical systems, provide tags of plasticized card stock, either preprinted or hand printed. Tags shall convey the message, example: **"DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING"**.

3.3 CLEANING AND PAINTING OF ELECTRICAL WORK:

- A. Prime, protective and touch-up painting is included in the Work of this Division. Finish painting in equipment spaces, concealed locations, and other locations not exposed to the view of building occupants is included in the work of this Division. Finished painting in areas exposed to the view of building occupants is specified under Division 9.
- B. All equipment and materials furnished by the electrical subcontractor shall be delivered to the job with suitable factory protective finish.
- C. Electrical switchgear, disconnect switches, contactors, etc., with suitable factory-applied finishes shall not be repainted; except for aesthetic reasons where located in finished areas as directed by the Architect and in a color selected by the Architect. Where factory-applied finishes are damaged in transit, storage or installation, or before final acceptance, they shall be restored to factory-fresh condition by competent refinishers using the spray process.
- D. All equipment not finished at the factory shall be given a prime coat and then finish painted with two coats of enamel in a color as directed by the Architect/Engineer. No nameplates on equipment shall be painted, and suitable protection shall be afforded such plates to prevent their being rendered illegible during the painting operations.
- E. The surfaces to be finish-painted shall first be prepared as follows:
 - 1. Galvanized and black steel surfaces shall first be painted with one coat of galvanized metal primer.
 - 2. Aluminum surfaces shall first be painted with one coat of zinc chromate primer.
- F. All ferrous metal surfaces without a protective finish and not galvanized in exposed and concealed areas including chases, under floor and above ceilings shall be painted with two coats of zinc chromate primer as the construction progresses to protect against deterioration.

- G. All junction and pull boxes and covers which are part of raceway systems distributing emergency power shall be painted red. Where a multiple branch emergency power system is installed, the branch designation (LS, CB or EQ) shall be stenciled on the box cover in minimum one inch (1") high white letters.
- H. All junction and pull boxes and covers and terminal cabinets which are part of the raceway/wiring system for fire alarm wiring shall be painted red. A system designation (FA) shall be stenciled on the box or cabinet cover in minimum one inch (1") high white letters.
- I. All conduit exposed to view shall be finish painted as directed by the Architect/ Engineer.
- J. Before painting, all surfaces to be painted shall be suitably prepared. This shall include removing all oil, rust, scale, dirt, and other foreign material. Surfaces shall be made smooth by grinding, filing, brushing, or other approved method. In the painting operations, the primer for metal surfaces shall be of the zinc dust type unless specified otherwise, and where finish painting is specified, it shall be painted using materials and colors selected and approved by the Architect/Engineer. Refer to Division 9 for additional requirements.

END OF SECTION 26 05 53

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SECTION 26 2416

PANEL BOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide panelboard and enclosure work, including cabinets, as shown, scheduled, indicated and as specified.
- B. Types: The types of panelboards and enclosures required for the project include, but are not limited to, the following:
 - 1. Power distribution panelboards.
 - 2. Lighting and appliance panelboards.
 - 3. Circuit breakers for existing building panelboards.

1.3 STANDARDS:

- A. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
 - 1. NEMA AB 1 Molded Case Circuit Breakers.
 - 2. NEMA PB 1 Panelboards.
 - 3. NEMA PB 1.1 Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - 4. W-P-115C Panel, Power Distribution.
 - 5. W-C-375B Circuit Breakers, Molded Case; Branch Circuit and Service.
 - 6. NFPA 70 National Electrical Code.
 - 7. UL 67 Standard for Panelboards.
 - 8. UL 489 Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.
 - 9. UL 943 Ground-Fault Circuit-Interrupters.
 - 10. UL 1283 Electromagnetic Interference Filters.

11. UL 1449 Surge Protective Devices.

1.4 QUALITY ASSURANCE:

- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
 1. Cutler-Hammer - Eaton.
 2. General Electric Company.
 3. Schneider Electric - Square D Company.
 4. Siemens.
- B. UL Standards: Panelboards and enclosures shall conform to all applicable UL standards and shall be UL-labeled.

1.5 SUBMITTALS:

- A. Shop Drawing submittals shall include, but not be limited to, the following:
 1. Cut sheets of the circuit breaker distribution panels and panelboards with construction, circuit breaker amperage and poles, interrupting ratings, and quantities clearly listed, and with bus amperage, voltage, phase and wires, integrated equipment ratings and all associated accessories clearly indicated.
 2. Equipment arrangement must include panelboard schedules. Panelboard schedules must be identical to the schedules in the project documents unless there is a technical reason for a deviation. Reasons for any deviation shall be included in the Submittal.
 3. Include dimensioned drawings of distribution panels, panelboards and enclosures. Submit, if requested, transparencies of circuit breaker characteristics with unlatch times.
 4. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver distribution panels and panelboards in factory-fabricated water-resistant wrapping.
- B. Handle distribution panels and panelboards carefully to avoid damage to material component, enclosure and finish.
- C. Store distribution panels and panelboards in a clean, dry space and protect from the weather.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS:

- A. General: Lighting and appliance panelboards shall be dead front safety type equipped with molded case circuit breakers as shown and scheduled. Load center panels are not acceptable. Power

distribution panelboards shall be dead front type equipped with molded case circuit breakers as shown and scheduled.

- B. Busing Assembly: Panelboard and power distribution panel board busing shall be tin or silver-plated 98% conductivity copper. Bus structure and mains shall have ratings as shown and scheduled and shall be phase sequence construction. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or busbar not to exceed 65°C rise above 40°C ambient. Heat rise test shall be conducted in accordance with UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests. All bus joints shall be bolted with medium carbon steel, zinc or cadmium plated hardware equipped with conical lock washers and torqued to the manufacturer's recommended settings (typically ASTM standards). All multi-section panelboards shall be connected with copper cable, with an ampacity meeting or exceeding the main bus ampacity.
- C. Neutral Buses: Furnish an isolated full-size neutral bus with the same ampacity rating and material as the phase busses, insulated where noted, with lugs for connecting main and circuit neutral conductors in all distribution panels and panelboards where the neutral is present. All panels serve by K-rated or phase cancellation transformers shall have a 200% rated neutral.
- D. Ground Buses: Furnish a bare uninsulated or an isolated, where noted, 1 inch x 1/4 inch tin-plated copper ground bus inside each distribution panel and panelboard enclosure with lugs for connecting main and circuit ground conductors.
- E. Molded Case Panelboard Circuit Breakers:
1. Panelboard circuit breakers shall be of the molded case, thermal magnetic type equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Tripped indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF". Provisions for additional breakers shall be such that no additional connectors will be required to add breakers. Circuit breakers shall bolt in to the main bus for 480/277 volt panels (except Square D I-line panels which may have plug-in breakers) and bolt on to the main bus for 208/120 volt panels. All 2 and 3-pole breakers shall have common trips.
 2. Circuit breakers installed in existing building panelboards shall be from the same manufacturer as and compatible with the existing panelboard and shall have an interrupting rating equal to or greater than the interrupting rating of the existing breakers installed in the panelboard.
 3. All single-pole and multi-pole panelboard circuit breakers shall be either ambient or case-compensated (calibrated 40°C) thermal-magnetic type breakers, with inverse time delay on overloads and instantaneous magnetic trip on short circuits. All multiple-pole breakers shall be common trip. Twin, tandem and half-size single-pole breakers and breaker tie handles are **not** acceptable.
 4. Panelboard circuit breakers shall employ quick-make, toggle mechanism for manual operation, as well as automatic operation. Breakers shall have provisions for manually testing the tripping mechanism with the breaker removed from the panel. Automatic tripping shall be indicated by the breaker handle assuming a clearly distinctive position from the manual "on" and "off"

positions.

5. Panelboard circuit breakers used as switches in 120 volt and 277 volt fluorescent lighting circuits, the circuit breakers shall be approved for such switching duty and shall be marked "SWD".
6. Provide panelboard circuit breakers with interrupting ratings which equal or exceed the preliminary calculated short circuit current indicated on the Drawings and the calculated short circuit current indicated in the initial Short Circuit Analysis specified in Section 26 05 73 "Short Circuit Analysis/Coordination Study/Arc Flash Study" but in no case less than the following minimum RMS symmetrical amperes:

<u>Voltage (volts)</u>	<u>Interrupting Capacity</u>
120/208	10,000 AIC
277/480	14,000 AIC
7. Fully Rated Panelboard Circuit Breakers: All panelboard circuit breakers shall be fully rated to interrupt the short circuit current available at the circuit breaker. Series breaker rating are not acceptable.
8. Ground fault interrupter (GFI) circuit breakers, where shown, shall be 5 ma ground fault trip and shall include a TEST button.

F. Molded Case Distribution Panel Circuit Breakers:

1. Distribution panel circuit breakers shall be of the molded case, thermal magnetic type equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Tripped indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF". Provisions for additional breakers shall be such that no additional connectors will be required to add breakers. Circuit breakers shall bolt in to the main bus (except Square D I-line panels which may have plug-in breakers). All 2 and 3-pole breakers shall have common trips.
2. Circuit breakers installed in existing building distribution panels shall be from the same manufacturer as and compatible with the existing distribution panel and shall have an interrupting rating equal to or greater than the interrupting rating of the existing breakers installed in the distribution panel.
3. Distribution panel circuit breakers shall be equipped with solid-state programmable trip complete with built-in current transformers, solid-state trip unit and flux transfer shunt trip. The solid-state electronic programmable trip device shall have the following features and tripping functions.
 - a. Adjustable current setting.
 - b. Adjustable long-time delay.
 - c. Adjustable instantaneous pick-up.
 - d. Adjustable short time delay.
 - e. Adjustable short time pick-up.

- f. Adjustable ground fault delay
- g. Adjustable ground fault pick-up
- 4. Provide distribution panel circuit breakers with interrupting ratings which equal or exceed the preliminary calculated short circuit current indicated on the Drawings and the calculated short circuit current indicated in the initial Short Circuit Analysis specified in Section 26 05 73 “Short Circuit Analysis/Coordination Study/Arc Flash Study” but in no case less than the interrupting rating shown on the drawings.
- 5. Distribution panel circuit breakers shall be equipped with the following accessories as noted on the Drawings or required:
 - a. Shunt Trip Device: 120 volts, AC.
 - b. Auxiliary Switch: 120 volts, AC.
 - c. Alarm Switch: 120 volts, AC.
 - d. Electrical Operator: 120 volts, AC.
 - e. Handle Lock: Provisions for padlocking.
- 6. Circuit Breaker Coordination: Circuit breaker types shall be selected and circuit breaker frame sizes shall be increased from the minimum frame sizes shown on the Drawings as required to provide the selective coordination for the electrical distribution specified in Section 26 05 73 “Short Circuit Analysis/Coordination Study/Arc Flash Study” to be provided with circuit breaker products supplied for the project.
- G. Lugs: Distribution panels and panelboards shall be provided with main lugs, main overcurrent devices, and feed-thru lugs as noted on the Drawings. Lugs shall be suitable for use with the cable size and material installed. Panel wireways shall provide adequate space for wiring to all lugs.
- H. Spaces: Where space for future breakers is shown, panelboard enclosure shall include removable blank panels or knockouts to allow installation of future breakers and panelboard bussing shall be complete, including all required connectors.
- I. Integrated Equipment Rating: Each distribution panel and panelboard, as a complete unit, shall have short circuit bracing and a short-circuit rating equal to the interrupting rating of the weakest overcurrent device installed in the distribution panel or panelboard which shall equal or exceed the preliminary calculated short circuit current indicated on the Drawings and the calculated short circuit current indicated in the initial Short Circuit Analysis specified in Section 26 05 73 “Short Circuit Analysis/Coordination Study/Arc Flash Study”. Such ratings shall have been established by tests on similar panelboards with the circuit breakers installed.
- J. Short Circuit Bracing: Distribution panel and panelboard bussing shall have short circuit bracing which shall equal or exceed the preliminary calculated short circuit current indicated on the Drawings and the calculated short circuit current indicated in the initial Short Circuit Analysis specified in Section 26 05 73 “Short Circuit Analysis/Coordination Study/Arc Flash Study”. This rating shall be

clearly indicated on the distribution panel or panelboard nameplate.

- K. Surge Protection Devices (SPDs): All distribution panels and panelboards shall have factory installed integral surge protection devices with overcurrent protection where shown, scheduled or noted on the drawings. SPDs shall be provided with the following features:
1. SPD shall be fused with blown fuse indicators.
 2. SPD shall provide L-L, L-N, L-G, N-G protection modes.
 3. SPD shall be listed to UL 1449 Fourth Edition revision 2014. The unit shall also be listed to UL 96 as a secondary Surge Arrestor. Approved as a Transient Voltage Surge Suppressor and UL 1283 Listed as an Electromagnetic Interference Filter.
 4. SPD shall be UL labeled with 20 kA nominal discharge current test (I-n).
 5. SPD shall be equipped with surge counter.
 6. SPD shall be equipped with dry contact for remote monitoring.
 7. SPD shall be equipped with diagnostics.
 8. SPD shall provide noise rejection (-20 to -40db @ 5K-10MHZ).
 9. Surge Protection for Distribution Panel Locations (277/480V, 3 phase, 4 wire)
 - a. SPD shall have a minimum surge current rating of 80kA per protection mode and 160kA per phase.
 - b. SPD shall be life cycle tested to survive 6,000 IEEE Category C3 impulses in each protection mode, with less than 10% degradation.
 10. Surge Protection for Distribution Panel Locations (120/208V, 3 phase, 4 wire)
 - a. SPD shall have a minimum surge current rating of 80kA per protection mode and 160kA per phase.
 - b. SPD shall be life cycle tested to survive 6,000 IEEE Category C3 impulses in each protection mode, with less than 10% degradation.
 11. Surge Protection for Panelboard Locations (277/480V, 3 phase, 4 wire)
 - a. SPD shall have minimum surge current rating of 65kA per protection mode and 130kA per phase.
 - b. SPD shall be life cycle tested to survive 6,000 IEEE Category C3 impulses in each protection mode, with less than 10% degradation.
 12. Surge Protection for Panelboard Locations (120/208V, 3 phase, 4 wire)
 - a. SPD shall have minimum surge current rating of 65kA per protection mode and 130kA per phase.
 - b. SPD shall be life cycle tested to survive 6,000 IEEE Category C3 impulses in each protection mode, with less than 10% degradation.
 13. Refer to Section 26 43 13 "Transient Voltage Surge Protection Devices" for additional requirements.

- L. Panelboard Enclosures: Panelboard enclosures shall be code gauge galvanized steel with wire bending space per the NEC. Panelboard enclosures shall be NEMA Type 1 surface or flush mounted as shown, scheduled or noted for indoor locations and NEMA 3R for outdoor locations, minimum 16 gauge thickness, minimum 20" width, with multiple knockouts, unless shown, scheduled or noted otherwise. Panelboard fronts shall be full-height hinged door-in-door front covers with an interior access door hinged to the main front cover providing dead-front access to the panelboard overcurrent devices (interior) and the dead front main cover over the interior and wireway full-height hinged to the panelboard back box with fastening, concealed on flush mounted panelboards, on the non-hinged side. Provide flush spring latch and keyed locks for all panelboard access doors. All distribution panel and panelboard locks shall be keyed alike. Provide an interior circuit directory frame, card and clear plastic covering inside the interior access door for all lighting and appliance panelboards. Door and cover trim shall be painted with manufacturers standard gray enamel finish over a rust inhibitor. Trim on flush mounted panels shall have concealed fasteners. Enclosures shall be fabricated by the same manufacturer as panelboards to be enclosed. Multi-section panelboards shall have separate covers and trims. Multi-section panel cans shall be installed side by side with covers butted together.
- M. Distribution Panel Enclosures: Distribution panel enclosures shall be code gauge galvanized steel with wire bending space per the NEC. Distribution panel enclosures shall be NEMA 1 surface or flush mounted as shown, scheduled or noted for indoor locations and NEMA 3R for outdoor locations. The distribution panel interior assembly shall be dead front with panel front removed. Main lugs or main circuit breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers. Interior surface distribution panels shall have full height front covers full height hinged to the distribution panel back box with fastening on the non-hinged side. Interior flush and exterior distribution panel fronts shall be full-height hinged door-in-door front covers with an interior access door hinged to the main front cover providing dead-front access to the panelboard overcurrent devices (interior) and the dead front main cover over the interior and wireway full-height hinged to the panelboard back box with concealed fastening on the non-hinged side. Cabinet interior doors shall be equipped with a latch and tumbler type lock. Doors over 48" long shall be equipped with a three-point latch and vault lock. All distribution panel and panelboard locks shall be keyed alike. Cabinets shall be of sufficient size to allow a width of gutter to conform with Underwriters' Laboratories, Inc. Standards. Panel trim shall be full finish sheet steel finished with two coats of paint, the first being a prime coat and the second a finish coat of light gray lacquer.
- N. Service Entrance Panelboards: Distribution panels and panelboards that serve as service entrance equipment shall be constructed to meet the requirements of UL 67. Any single service disconnect distribution panel or panelboard must have provisions such that, when the service disconnect is opened, no person in the field servicing the equipment load side can make accidental contact with live circuit parts. Barriers to protect against unintended contact shall be constructed in such a way that they are easily installable and removable without contacting or damaging bare or insulated live parts.

PART 3 - EXECUTION

3.1 INSTALLATION OF PANELBOARDS AND ENCLOSURES:

- A. General: Install distribution panels, panelboards and enclosures as shown, including electrical connections, in accordance with the manufacturer's written instructions, the applicable requirements of NEC, the NECA's "Standard of Installation", and recognized industry practices to ensure that products serve the intended function. Clean the top, all sides and inside of the distribution panels and panelboards. All distribution panels and panelboards shall free from dust and debris at all times.
- B. Coordination: Coordinate installation of distribution panels, panelboards and enclosures with cable and raceways installation work. Verify that wall thickness is adequate where recessed panels are shown.
- C. Anchoring: Anchor enclosures firmly to walls and structural surfaces ensuring that they are permanently and mechanically secured. Install surface-mounted cabinets and panelboards with a minimum of four anchors. In wet and damp locations use hot dip galvanized steel channel supports to stand cabinets and panelboards one inch off wall. Install a plastic bushing in all conduits. Install cabinets, distribution panels and panelboards plumb.
- D. Concrete Pads: Install each floor-mounted power distribution panelboard on a reinforced concrete housekeeping pad. The housekeeping pad shall extend 3" beyond the housing of the distribution panel, unless otherwise shown. Furnish the exact position of any block outs, dimensions, and location of the housekeeping pads in time to prevent delay of the concrete work. Refer to Section 26 05 01, "Electrical Basic Materials and Methods", for additional requirements.
- E. Directory Card: Type the enclosure's circuit directory card upon completion of work. Refer to Section 26 05 53, "Identification for Electrical Systems", for additional requirements.
- F. Circuit Arrangement: Branch circuit connections to 3-phase lighting and appliance panelboards shall be arranged such that when two or three circuits are run with a common neutral, each circuit shall be connected to a different phase unless otherwise shown. At the completion of the electrical system this Contractor shall check each phase of all panels under full load and arrange so that all phases shall carry the same load as near as possible.
- G. Spare Conduits: Stub three empty one inch (1") conduits to accessible location above ceiling out of each recessed panelboard.

3.2 CLEANING AND HOUSEKEEPING

- A. Distribution panels and panelboards shall be thoroughly cleaned on the interior and exterior prior to being energized and shall be maintained in that condition after being energized.
- B. Prior to energizing distribution panels and panelboards, thoroughly clean interior and exterior of distribution panels and panelboards. Remove all trash and debris, use a vacuum to pick up all dirt and dust and dry wiping bus bars, bracing, insulators, conductors, circuit breakers, enclosure framing and top, front and side covers with a clean white cloth to remove all dust, debris, dirt, oil and moisture.
- C. Use a vacuum cleaner to remove debris, dust and dirt from outside and inside distribution panels and panelboards and then dry wipe the inside and outside of switchboards and other electrical equipment with a clean white cloth to remove all dust, oil and debris. Do not use a blower or compressed air to

blow dust from distribution panels and panelboards. Do not use CRC spray or similar sprays for cleaning.

3.3 TESTING AND ENERGIZATION:

- A. General: Contractor shall furnish all instruments, personnel and third-party testing required for distribution panel and panelboard testing and energization and shall submit of certified test results to the Architect Engineer for review.
- B. Pre-Energization Checks: Prior to energization, Contractor shall check distribution panels and panelboards for continuity of circuits and for short circuits.
 - A. Construction Circuit Breaker Adjustment: Prior to energization and for the duration of construction, all adjustable distribution breaker current trip settings shall be set to their minimum current and time values and ground fault trip current setting and time delays shall be set to their minimum values. During construction, current trip settings shall be increased where the construction/startup loads exceed the minimum current trip settings.
 - B. Construction Completion Circuit Breaker Adjustment/Testing: Following completion of the construction work and prior to final acceptance testing, an independent third-party testing laboratory shall adjust all adjustable distribution panel breakers to trip and ground fault settings recommended in the coordination study and test main and distribution circuit breaker tripping and ground fault protection, where provided, using current injection. Circuit breaker testing shall be per NETA, Section 7.6.1.2.2. Submit an electronic copy of certified setting and test results to Architect/Engineer for review. Test reports shall include switchboard tested, test results, data values, date and time of test, relative humidity, temperature and weather conditions. All test reports, data and results shall be recorded as part of these submittals and included in the O&M manuals.
- C. Thermographic Testing: Refer to Section 26 01 25, "Electrical Testing", for thermographic testing.

3.4 IDENTIFICATION:

- A. Identification: Refer to Section 26 05 53, "Identification for Electrical Systems", for applicable painting, nameplates, and labeling requirements.
- B. Conductor Identification: All distribution panel and panelboard branch circuit phase, neutral and ground conductors shall be labeled label with the circuit number associated with the conductor.
- C. Conduit Identification: All conduits entering and exiting distribution panels and panelboards shall be clearly marked with the circuits contained in the conduit using a black permanent marker.

END OF SECTION 26 24 16

E&C Engineers & Consultants Inc.
TX Firm Registration No. F-003068

SECTION 26 2726

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Divisions 0 and 1 and Section 26 00 01, "Electrical General Provisions", govern this Section.

1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide wiring device work as shown, scheduled, indicated, and as specified.
- B. Types: The types of wiring devices required for the project include, but are not limited to, the following:
 - 1. Receptacles.
 - 2. Switches.
 - 3. Wallbox dimmers.
 - 4. Pushbuttons.
 - 5. Wall plates.

1.3 STANDARDS:

- A. Products shall be designed, manufactured, tested, and installed in compliance with the following standards:
 - 1. NEMA WD 1 General-purpose wiring devices.
 - 2. NEMA WD 5 Specific-purpose wiring devices.

1.4 QUALITY ASSURANCE:

- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
 - 1. Bryant.
 - 2. Harvey Hubbell, Inc.
 - 3. Intermatic.
 - 4. Leviton.
 - 5. Lightolier, Inc.
 - 6. Lutron, Inc.

7. Legrand (Pass and Seymour, Inc).
8. Prescolite.
9. Hubbell-Raco.
10. Taymac Corporation.
11. Wiremold Company.

B. UL Label: All wiring devices shall be UL-labeled.

1.5 SUBMITTALS:

A. Shop Drawings submittals shall include, but not be limited to, the following:

1. Cut sheets of the receptacles, switches, wall box dimmers, and pushbuttons.
2. Cut sheets of the wall plates.
3. Additional information as required in Section 26 00 01, "Electrical General Provisions".

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Deliver wiring devices individually wrapped in factory-fabricated containers.
- B. Handle wiring devices carefully to avoid damage, breaking, and scoring.
- C. Store in a clean dry space and protect from the weather.

PART 2 - PRODUCTS

2.1 WIRING DEVICES:

- A. General: Provide factory-fabricated wiring devices in the type, color, and electrical rating for the service indicated. Where type and grade are not indicated, provide proper selection to correspond with branch circuit wiring and overcurrent protection. Attachment of wires to devices shall be by screw pressure under the head of binding screws. Arrangements depending on spring pressure or tension are not acceptable. All binding screws shall be brass or bronze.
- B. Receptacles: Comply with NEMA Standard WD1 and as follows:
 1. General Duty Decorator: Provide simplex or duplex commercial specification grade decorator type receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke, with metal mounting straps, back and side wired with screw type terminals, molded high impact thermoplastic compound, NEMA configuration as indicated.
 - a. 20 amp, 125 volt grounded simplex NEMA #26361-*. Legrand (Pass & Seymour)
#5-20R Leviton #16351-*

- | | |
|---|---|
| b. 15 amp, 125 volt grounded duplex NEMA #26252-*.
#5-15R | Legrand (Pass & Seymour)
Leviton #16252-* |
| c. 20 amp, 125 volt grounded duplex NEMA #26352-*.
#5-20R | Legrand (Pass & Seymour)
Leviton #16352-* |
| d. 20 amp, 125 volt, Class A, GFCI duplex receptacle with integral ground fault current interrupter, back and side wired with indicator light. | Legrand (Pass & Seymour) #2095*L.
Leviton #GFNT2-* |
| e. 20 amp, 125 volt, Class A, GFCI duplex #2095HG*L.
receptacle with integral ground fault current interrupter, back and side wired with indicator light hospital grade. | Legrand (Pass & Seymour)
Leviton #7899-HG* |

* Color designation, refer to Paragraph 2.3.

Wiring devices connected to emergency power circuits shall be as specified hereinabove except that wiring devices shall be red in color with coverplates color-matching other devices in the room.

2. General Duty Standard: Provide simplex or duplex commercial specification grade standard type receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke, with metal mounting straps, back and side wired with screw type terminals, molded high impact thermoplastic compound, NEMA configuration as indicated.
- | | |
|---|--|
| a. 20 amp, 125 volt grounded simplex NEMA #5-20R | Legrand (Pass & Seymour) #5361-*.
Leviton #5891-* |
| b. 15 amp, 125 volt grounded duplex NEMA #5-15R | Legrand (Pass & Seymour) #5252-*.
Leviton #BR15-* |
| c. 20 amp, 125 volt grounded duplex NEMA #5-20R | Legrand (Pass & Seymour) #5352-*.
Leviton #BR20-* |
| d. 20 amp, 125 volt, Class A, GFCI duplex receptacle with integral ground fault current interrupter, back and side wired with indicator light. | Legrand (Pass & Seymour) #2095*L.
Leviton #8898-* |
| e. 20 amp, 125 volt, Class A, GFCI duplex #2094HG*L.
receptacle with integral ground fault current interrupter, back and side wired with indicator light hospital grade. | Legrand (Pass & Seymour)
Leviton #8898HG-* |

h. 20 amp, 250 volt, isolated ground twist lock, Pass & Seymour #L620R.
simplex receptacle NEMA #L6-20R Leviton #2320.

i. 30 amp, 250 volt, isolated ground twist lock, Pass & Seymour #L630R.
simplex receptacle NEMA #L6-30R Leviton #2620.

* Color designation, refer to Paragraph 2.3.

Wiring devices connected to emergency power circuits shall be as specified hereinabove except that wiring devices shall be red in color with coverplates color-matching other devices in the room.

5. Data Receptacles Standard: Provide simplex or duplex commercial specification grade standard type receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke, with metal mounting straps, back and side wired with screw type terminals, molded high impact thermoplastic compound, NEMA configuration as indicated.

a. 15 amp, 125 volt, grounded duplex receptacle Pass & Seymour #5252-*.
NEMA #5-15R Leviton #BR15-*

b. 20 amp, 125 volt, grounded duplex receptacle Pass & Seymour #5352-*.
NEMA #5-20R Leviton #BR20-*

* Color designation, refer to Paragraph 2.3.

Wiring devices connected to emergency power circuits shall be as specified hereinabove except that wiring devices shall be red in color with coverplates color-matching other devices in the room.

6. Housekeeping Receptacles: Provide simplex specification grade twist-lock receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, NEMA configuration as indicated.

a. 20 amp, 125 volt grounded simplex NEMA Leviton #2310*.
#L5-20R

* Color designation, refer to Paragraph 2.3.

7. Transient Voltage Surge Suppression Receptacles: Provide duplex commercial specification grade decorator type receptacles, 2-pole, 3-wire, grounding, with integral surge suppression, green hexagonal equipment ground screw, back and side wired with screw type terminals, NEMA configuration as indicated. Surge suppressor shall provide an equal surge protection of not less than 80 joules in all three modes (hot to neutral, hot to ground, and neutral to ground), minimum 7:1 RFI and EMI noise suppression and a front face LED indicator for positive indication of surge protection. Surge suppression receptacles shall comply with LIL 1449 (Category A&B) and ANSI/IEEE 62.41-1991.

a. 15 amp, 125 volt, surge suppression duplex, Pass & Seymour #6262-* -SP.
NEMA #5-15R Leviton #8280-*

- b. 20 amp, 125 volt, surge suppression duplex, NEMA #5-20R Pass & Seymour #6362-*-SP.
Leviton #8380-*
- c. 15 amp, 125 volt, isolated ground surge suppression duplex, NEMA #5-15R Pass & Seymour #IG 6261-*-SP.
Leviton #8280-IG*
- d. 20 amp, 125 volt, isolated ground surge suppression duplex, NEMA #5-20R Pass & Seymour #IG 6362-*-SP.
Leviton #8380-IG*

* Color designation, refer to Paragraph 2.3.

8. General Duty Clock Simplex: Provide single commercial specification grade type receptacles, 2-pole, 3-wire grounding, recessed to contain male plug and permit clock to cover outlet, with metal hook for supporting clock, ivory molded phenolic compound, side wired with screw type terminals, NEMA configuration as indicated.

- a. 15 amp, 125 volt, grounded single NEMA #5-15R Pass & Seymour #S3713-I.
Leviton #688-I

9. Specific-use receptacles shall have volts, amps, poles, and NEMA configuration as noted on Drawings.

C. Switches: Comply with NEMA Standard WD1 and as follows:

1. Rocker: Provide commercial specification grade flush rocker switches, with mounting yoke insulated from mechanism, equipped with plaster ears, white switch rocker and side-wired screw terminals.

- a. Single pole, 120/277 volt, 20 amp switch Pass & Seymour #2621*.
Leviton #5621-2*.
- b. Three-way, 120/277 volt, 20 amp switch Pass & Seymour #2623*.
Leviton #5623-2*.
- c. Four-way, 120/277 volt, 20 amp switch Pass & Seymour #2624*.
Leviton #5624-2*.
- d. Single Pole, 120/277 volt, 20 amp switch, illuminated when on Pass & Seymour #2629*.
Leviton #5628-2*.
- e. Single pole, double throw, momentary contact, Leviton #5657-2*.
center off, 120/277 volt, 15 amp switch

* Color designation, refer to Paragraph 2.3.

Wiring devices connected to emergency power circuits shall be as specified hereinabove except that wiring devices shall be red in color with coverplates color-matching other devices in the room.

2. Toggle: Provide commercial specification grade flush toggle switches, with mounting yoke insulated from mechanism, equipped with plaster ears, white switch handle, side-wired terminals, horsepower rated.

- a. Single pole, 120/277 volt, 20 amp switch, key-operated Pass & Seymour #PS20AC1-KL.
Leviton #1221-2K*L.
- b. Single pole, 120/277 volt, 20 amp switch Pass & Seymour #20AC1-*.
Leviton #CSB1-20*.
- c. Three-way, 120/277 volt, 20 amp switch Pass & Seymour #20AC3-*.
Leviton #CSB3-20*.
- d. Single pole, 120/277 volt, 20 amp switch, red pilot light Pass & Seymour #20AC1-RPL.
Leviton #1221-PLR.
- e. Single pole, double throw, momentary contact, center off, 120/277 volt, 20 amp switch Pass & Seymour #1091-*.
Leviton #1285-*.

* Color designation, refer to Paragraph 2.3.

Wiring devices connected to emergency power circuits shall be as specified hereinabove except that wiring devices shall be red in color with coverplates color-matching other devices in the room.

D. Decorator Wall Box Dimmers: Provide commercial specification grade linear slide dimmers with separate positive on/off button and LED indicator, voltage compensation circuitry for constant light output and toroidal filters for suppression of RFI and lamp sing. Dimmers shall be "decorator face" size and shall gang with standard decorator rocker switches. Wall box dimmers shall be as follows:

- 1. Single pole, 120 volt, 600 watt dimmer Lightolier #ZP600-*.
- 2. Single pole, 120 volt, 1,000 watt dimmer Lightolier #ZP1000-*.
- 3. Single pole, 120 volt, 600 watt inductive load dimmer Lightolier #ZP600VA-*.
- 4. Single pole, 120 volt, 1,000 watt inductive load dimmer Lightolier #ZP1000VA-*.
- 5. Single pole, 120 volt, 260 watt electronic transformer low voltage dimmer Lightolier #ZP260QE-*.
- 6. Single pole, 120 volt, 425 watt electronic transformer low voltage dimmer Lightolier #ZP425QE-*.
- 7. Multiple location remote on-off switch Lightolier #ZPR-3-*.

* Color designation, refer to Paragraph 2.3.

E. Custom Wall Box Dimmers: Provide commercial specification grade linear slide dimmers with separate positive on-off switch with LED indicator, voltage compensation circuitry for constant light output and toroidal filters for suppression of RF and lamp sing. Matching switches shall be available for ganging with dimmers. Ganged dimmers and/or switches shall be provided with a single coverplate to match the installed configuration. Wall box dimmers shall be as follows:

- 1. Single pole, 120 volt, 600 watt dimmer Lightolier #MP600-*.

- | | |
|---|--|
| 2. Single pole, 120 volt, 1000 watt dimmer | Lightolier #MP1000-* |
| 3. Single pole, 120 volt, 1500 watt dimmer | Lightolier #MP1500-* |
| 4. Single pole, 120 volt, 2000 watt dimmer | Lightolier #MP2000-* |
| 5. Single pole, 120 volt, 600 watt inductive load dimmer | Lightolier #MP600VA-* |
| 6. Single pole, 120 volt, 1000 watt inductive load dimmer | Lightolier #MP1000VA-* |
| 7. Single pole, 120 volt, 1500 watt inductive load dimmer | Lightolier #MP1500VA-* |
| 8. Single pole, 120 volt, 2000 watt inductive load dimmer | Lightolier #MP2000VA-* |
| 9. Single pole, 120 volt, 525 watt electronic transformer low voltage dimmer | Lightolier #MP525QE-* |
| 10. Single pole, 120 volt, 625 watt electronic transformer low voltage dimmer | Lightolier #MP625QE-* |
| 11. Multiple location remote on-off remote | Lightolier MRP-3-* |
| 12. Matching single pole switch | Lightolier MP-1P-* |
| 13. Matching 3-way switch | Lightolier MP-3P-* |
| 14. Matching 4-way switch | Lightolier MP-4P-* |
| 15. Dimmer ganging faceplates | Lightolier FB/NFB/
Custom as required-* |

* Color designation, refer to Paragraph 2.3.

- F. Pushbutton: Emergency power off, single pole, 120 volt ac, 20 amp, momentary contact nonilluminated push button, red color cap and guard: Square D Company, Class 9001, KR2RH5 pushbutton, K25 flush stainless steel plate, KN805 legend plate, and K60 cover.

2.2 WIRING DEVICE ACCESSORIES:

- A. Wall Plates: Provide switch, duplex outlet and telephone [screwless] wall plates, with single or multigang cutouts as indicated, [complete with metal screws for securing plates to devices.] [Screw heads shall be colored to match finish of plate.] Wall plates shall possess the following additional construction features:
1. Material and Finish:
 - a. Specification grade, smooth, and Lexan for general duty receptacles, data receptacles, and switches. Pass & Seymour #RP series or approved equal. Jumbo plates are not acceptable.
 - b. Specification grade, Type 302, satin-finished stainless steel, 0.1" thick for heavy duty receptacles and kitchen receptacles.

- c. Specification grade, weatherproof, coverplate, gasketed UV stabilized polycarbonate with hinged gasketed device cover, for exterior and wet area receptacles. Coverplates shall be NEMA 3R rated and shall be watertight when in use. Coverplates shall be as manufactured by Taymac Corporation, RACO, Intermatic or an approved equal.

2.3 WIRING DEVICE/COVERPLATE COLORS:

- A. General: Provide general duty wiring devices and coverplates in colors as follows:
 1. Painted Drywall: Provide white general use receptacles and switches and gray data receptacles with matching white thermoplastic coverplates in occupied areas and white Lexan coverplates in mechanical/electrical and maintenance areas.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Installer must examine the areas and conditions under which wiring devices and floor boxes are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Inspect devices for physical damage. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF WIRING DEVICES:

- A. General:
 1. Install wiring devices where shown, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to ensure that products serve intended function. Delay installation of devices until wall construction and wiring is completed.
 2. Special purpose switches and/or outlets not covered by the specifications, but noted on the Drawings shall be of the amperage, voltage rating, and NEMA configuration indicated. The switches and/or outlets shall be specification grade of the same quality as those specified.
 3. When "**EQUIPMENT ONLY**" or "**JUNCTION BOX ONLY**" is indicated for equipment, it shall be the responsibility of the Electrical Subcontractor to obtain from the supplier, the complete data as related to the electrical portion of the equipment, including rough-ins, mounting height, type of outlet, items furnished by the supplier, etc. The Electrical Subcontractor shall be responsible for furnishing and installing all materials which are usually the Electrical Subcontractor's responsibility with the installation of the equipment.
 4. The approximate location of switches, power outlets, floor boxes, etc., is indicated on the Drawings. These Drawings, however, may not give complete and accurate information in regard to locations of such items. Determine exact locations by reference to the general building Drawings and by actual measurements during construction of the building before rough-in, subject to the approval of the Construction Inspector.
- B. Box Condition: Install receptacles and switches only in electrical boxes which are clean, free from

excess building materials, debris, and similar matter.

- C. Alignment: Install all wiring devices plumb and aligned in the plane of the wall, floor, or ceiling in which they are installed.
- D. Switches and Dimmers: Install switches and wall box dimmers at a height as specified in Section 26 05 01, "Electrical Basic Materials and Methods", to switch center line, unless otherwise noted on Drawings, on the strike side of doors as hung and in a uniform position so that the same direction will open and close the circuit throughout the project. Where shown near doors, install switches and dimmers not less than 2" and not more than 12" from door trim. Where more than one switch is in the same location, install switches in a multi-gang box with a single coverplate. Use toggle switches for motor disconnect switches only when installed in a ceiling plenum or in a mechanical, electrical, or telephone room.
- E. Receptacles: Install receptacles vertically at a height as specified in Section 26 05 01, "Electrical Basic Materials and Methods", to receptacle center line above finished floor and horizontally at a height as specified in Section 26 05 01, "Electrical Basic Materials and Methods", to receptacle center line above counter tops unless shown or specified otherwise. Where splash backs occur above counters, mount devices horizontally at a height as specified in Section 26 05 01, "Electrical Basic Materials and Methods", to receptacle center line above splash backs. **Receptacles shall be installed with ground pin receiver down.** All devices shall be installed complete with coverplates. Use 20 ampere receptacle when only one receptacle is installed on a branch circuit.
- F. Coverplates:
1. Install stainless steel coverplates on all heavy-duty receptacles and wiring devices located in kitchen areas. Coffee bars shall not be considered kitchen areas. Install weatherproof coverplates on all exterior and wet area receptacles. Refer to Paragraph 2.03 for additional requirements.
 2. Multi-gang wall plates shall be used for each group of ganged devices. Mounting screws shall be installed for each device covered by the wall plate.
 3. Wall plates for concealed work shall be flush against the finished wall, and shall completely cover the wall opening. Wall plates shall not be installed until all painting has been completed. Devices shall be protected by masking tape or other coverage until painting is complete. Any device with paint on it shall be replaced at no expense to the Owner. Jumbo plates are not acceptable.
 4. Engrave and black paint fill text descriptions and branch circuit numbers on switch and receptacle coverplates where shown on the Drawings or specified herein.
- G. Mounting Heights: Refer to Section 26 05 01, "Electrical Basic Materials and Methods", for wiring device mounting heights.

3.3 PROTECTION OF WALL PLATES AND RECEPTACLES:

- A. General: Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.4 IDENTIFICATION:

- A. Refer to Section 26 05 53, "Identification for Electrical Systems", for wiring device identification requirements.

3.5 TESTING:

- A. General: Prior to energization, check for continuity of circuits, for short circuits and check grounding connections. After energization, check wiring devices to demonstrate proper operation and receptacle polarization.

END OF SECTION 26 27 26

E&C Engineers & Consultants Inc.
TX Firm Registration No. F-003068

**DIVISION 26 – ELECTRICAL
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E&C Engineers & Consultants Inc.
TX Firm Registration No. F-003068

Date: 11-08-2021
Engineer of Record: Larkin Gentry
State: Texas
License No.: 97304



THE SEAL APPEARING ON THIS DRAWING WAS AUTHORIZED BY:

Larkin Gentry Larkin Gentry
2021.11.04
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E&C Engineers & Consultants Inc.
Texas Firm Registration No: F-003068

PART 1 - GENERAL

1.1 PROJECT SCOPE SUMMARY

1.2 SECTIONS INCLUDES

- A. This section includes specifications for the installation of interior communications pathways.
- B. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification sections, apply to the work of this section.
- C. Interior Communication Pathways are defined to include, but are not limited to innerduct, flexible multi-cell innerduct, conduit, pull boxes, cable/j-hooks, cable trays, supports, accessories, associated hardware and fire stopping materials.

1.3 REFERENCES

- A. Related Sections: Use these Specifications for all related work not specifically covered in this specification.
 - 1. Section 270553: Identification and Labeling of Communication Infrastructure
 - 2. Section 271500: Horizontal Media Infrastructure
 - 3. Section 270553: Identification and Labeling of Communication Infrastructure
 - 4. Section 271100: Communication Cabinets and Equipment Rooms
 - 5. Section 271300: Backbone and Riser Media Infrastructure
 - 6. Section 271500: Horizontal Media Infrastructure
 - 7. Section 272100: Data Communication Network Equipment
 - 8. Section 272200: PC, Laptop, Servers and Equipment
 - 9. Section 275113: Audio Communication System
 - 10. Section 281300: Access Control System
 - 11. Section 232313: Video Surveillance Control and Management System
- B. American National Standards Institute / Telecommunications Industry Association / Electronic Industries Alliance (ANSI/TIA/EIA): Most current standard revision
 - 1. 569-B, Commercial Building Standard for Telecommunications Pathways and Spaces.
 - 2. 568-D, Commercial Building Telecommunications Cabling Standard
- C. American National Standards Institute (ANSI):
 - 1. C80.1 Rigid Steel Conduit - Zinc Coated
 - 2. C80.4 Fittings for Rigid Metal Conduit

- D. Federal Specifications (FS):
 - 1. W-C-58C Conduit Outlet Boxes, Bodies Aluminum and Malleable Iron
 - 2. W-C-1094 Conduit and Conduit Fittings Rigid
 - 3. WW-C-581D Coatings on Steel Conduit
- E. Building Industry Consulting Services International (BICSI):
 - 1. Telecommunications Distribution Methods Manual (latest issue)
 - 2. Customer Owned Outside Plant Design Manual (latest issue)
- F. National Electrical Manufacturers Association (NEMA).
 - 1. VE 1-1998 - Metallic Cable Tray Systems
 - 2. VE 2-2000 - Cable Tray Installation Guidelines
 - 3. RN1 Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing
 - 4. TC2 Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
 - 5. TC3 PVC Fittings for Use with Rigid PVC Conduit and Tubing
- G. Underwriters laboratories (UL) Cable Certification and Follow Up program
 - 1. UL 6: Rigid Metal Electrical Conduit.
 - 2. UL 514B: Fittings for Conduit and Outlet Boxes.
 - 3. UL 651: Schedule 40 and 80 Rigid PVC Conduit.
 - 4. UL 651A: Type EB and A Rigid PVC Conduit and High-Density Polyethylene (HDPE) Conduit.
 - 5. UL 886: Electrical Outlet Boxes and Fittings for Use in Hazardous Locations.
- H. American Society for Testing Materials (ASTM).
 - 1. ASTM B633 – specification for Electro-Deposit Coating of Zinc on iron and Steel.
 - 2. ASTM A653 – Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process.
 - 3. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
 - 4. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low Alloy with Improved Formability (Formerly ASTM A570 &A607)
 - 5. ASTM A1008 – Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A611)
- I. National Electrical Code (NEC latest issue).
- J. Institute of Electrical and Electronic Engineers (IEEE)
- K. Systimax generic specifications: Fiber Optic outside Plant Cable, Latest issue.
- L. International Standards Organization/International

- M. Electromechanical Commission (ISO/IEC) DIS 11801
- N. Conflicts:
 - 1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
 - 2. Between reference requirements and contract documents: Comply with the one establishing the more stringent requirements.

1.4 SUBMITTALS

- A. Submit Shop Drawings to include but not limited to plan and section drawings detailing proposed communication pathway routing prior to installation. Communication pathway installation plan to include but not limited to:
 - 1. Room penetration plan.
 - 2. Communication pathway extension plan.
 - 3. Riser conduit anchoring plan.
 - 4. Conduit chase plan.
 - 5. Communication pathway labeling plan.
 - 6. Junction box, gutter, and pull-box labeling plan.
- B. Shop Drawings shall be submitted and approved before implementation is
- C. started. Shop Drawings shall be submitted in accordance with Specification 01340.
- D. Submit prototype test reports for all vault covers verifying conformance to the specification requirements in this document and HAS.
- E. Submit catalog data sheets of conduit, innerduct, raceway, cable tray, cable hook, and associated hardware. Product data to include, but not limited to materials, finishes, approvals, load ratings, and dimensional information.
- F. Test Reports: Submit certified test reports indicating compliance with material reference standard indicated for material performance characteristics and physical properties of fire stopping materials
- G. Certificates: Submit product certificates, signed by manufacturer certifying materials comply with specified performance characteristics and physical properties of fire stopping materials.
- H. Copy of Building Industry Consulting Services International (BICSI) Registered Communication Distribution Designer (RCDD) certificate for Contractor's on-site RCDD supervisor. RCDD to supervise all parts of communications installation at all times.

1.5 QUALITY ASSURANCE

- A. Verify conduit, raceway, cable tray runs, etc. do not interfere with existing or new systems within each facility.

- B. Fire stopping: Manufacturer trained and approved installer to perform fire-stopping work who has specialized in the installation of work similar to that required for this project.
- C. Communication Pathway Minimum Clearances:
 - 1. Motors or transformers: 4 feet
 - 2. Power cables and conduits: 1 foot parallel, 3 inches crossover
 - 3. Fluorescent lights: 5 inches
 - 4. Above ceiling tiles: 3 inches
 - 5. Access above cable tray: 12 inches
 - 6. Hot Flues, Steam pipes, Hot water pipes and other hot surfaces: at least 6"
- D. Furnish products of latest proven design, new and in current production. Do not use obsolete components or out-of-production products.
- E. Assure that the "as installed" system is correctly and completely documented including engineering drawings, manuals, and operational procedures in such a manner as to support maintenance and future expansion of the system.
- F. All installed materials and accessories shall be new from the manufacture. No used components shall be accepted by HAS.
- G. All Documentation submittals shall be reviewed by the supervising RCDD and stamped prior to submittal.
- H. Contractor Qualifications:
 - 1. The Contractor shall submit references and other related evidence of installation experience for a period of three years prior to the issue date of this Specification.
 - 2. A BICSI RCDD shall supervise ALL work on-site. Must demonstrate knowledge and compliance with all BICSI, ANSI/TIA/EIA, UL, and NEC standards, and codes.
- I. HAS retains the right to have access and inspect all work during the entire duration of the project and any items that do not adhere to the standards, reference, contract, bid, or project documents will be corrected immediately at NO cost to HAS.
- J. All communication media will be installed in conduit or cable tray unless alternate method has been approved by HAS/IT.
- K. Exception: MATV/CATV horizontal media must be installed in conduit from faceplate to MDF/IDF

PART 2 - PRODUCTS

2.1 GENERAL

- A. Where conduit, pull boxes, cable tray and other raceway sizes are not specifically shown on contract drawings. All communication pathways shall be sized in accordance with the

requirements of BICSI and the NEC. No conduit shall be less than 1". [Except for those locations specified in the contract documents under section 281300 Access Control with HAS approval.]

- B. All raceways exposed to the elements or possible physical damage or installed below 8 feet shall be Rigid Metal Conduit.
- C. Raceway exposed to elements, not exposed to physical damage and above 8 feet shall be Intermediate Metal Conduit.
- D. Raceways installed in stud walls or above suspended ceilings shall be Electrical Metallic Tubing.
- E. All backbone and riser conduits installed shall be populated with MaxCell flexible innerduct. Cable fill ratio not to exceed 40%.

2.2 CONDUIT AND ACCESSORIES

A. MANUFACTURES:

- 1. Allied
- 2. Triangle
- 3. Wheatland

- B. Rigid Steel Conduit shall pass all bending, ductility, and thickness of zinc coating in ANSI C80.1 and UL 6. Conduit shall be galvanized have threaded end with 1" minimum size and 4" maximum size. Fittings shall be cast iron or alloy steel, threaded and galvanized.
- C. Intermediate Metal Conduit (IMC) shall be manufactured in accordance with UL 1242. Conduit shall be low carbon, hot-dipped galvanized inside and out, with threaded ends, 1" minimum size, and 4-inch maximum size. Fittings shall be cast iron or alloy steel, threaded and galvanized.
- D. Electrical Metallic Tubing (EMT) shall be manufactured in accordance with UL 797 and ANSI C80.3. EMT shall be high-strength, zinc-coated, 1-inch minimum size. EMT may be used for sizes greater than 2" where physically protected. EMT shall not be utilized for service entrance conductors. Fittings shall be of same finish and material as tubing. Fittings shall be compression type with insulated throat.
- E. Expansion Joint Fittings: OZ type AX or Appleton type XJB, watertight, permitting two-way movement up to 4 inches, equipped with bonding jumpers around or through each fitting.
- F. Thruwall Sealing Fittings: Type WSK by O-Z Gedney Company.
- G. Fire-Seal Fittings: Type CFSI by O-Z Gedney Company.
- H. Sealing Material for Sealing Fittings: Chico X Fiberdam, and Chico A sealing compound, or Chico A-P interpak by Crouse-Hinds or Apelco sealing cement and fiber filler by Appleton.
- I. Insulated Bushings: Type B or SBT, as applicable, by O-Z Gedney or series B1900, series BU500 or series TC700, as applicable, by Steel City.

- J. Provide a measured pull tape in each empty conduit, empty innerduct for backbone and riser pathways.
- K. Provide a pull string for all horizontal conduits with a minimum pulling tension of 200 pounds.
- L. Thread lubricant/sealant shall be Crouse-Hinds type STL or T & B Kopr-Shield except, when required on joints for heat producing elements such as lighting fixtures; it shall be Crouse-Hinds type HTL.
- M. PVC Conduit shall not be used in intercommunication pathways. Except when encased in concrete.

2.3 FLEXIBLE MULTI-CELL INNERDUCT

A. Manufacturers:

- 1. MaxCell
- 2. Or HAS approved equivalent

B. Flexible Innerduct

- 1. Flexible innerduct is the HAS standard for multi-path applications within conduit.
- 2. All riser/backbone fiber shall be installed in flexible innerduct.
- 3. Flexible Innerduct shall be UL Listed with Flame Propagation compliant with UL 2024A.
- 4. All flexible innerduct shall be installed per manufacture requirements.
- 5. Only manufacturer’s fittings, transition adapters, terminators, accessories, and installation kits shall be used.
- 6. All flexible innerduct will be populated with a measured pull tape.
- 7. All interior flexible innerduct shall be plenum rated.
- 8. Flexible innerduct shall only be used when installed in conduit and shall consist of a different color for the Maxcell.

MaxCell 4” 3 Cell

Min Conduit ID	Suggested Product	Max # of Packs	Max # of Cables	Maximum Cable Diameter per Cell	Rec. Pull Length*	Max Pull Length*
3"	MaxCell 4" 3 Cell	1	3	1.34"	1500'	2000'
4"	MaxCell 4" 3 Cell	2	6	1.34"	1500'	2500"
5"	MaxCell 4" 3 Cell	3	9	1.34"	1500'	2500'
6"	MaxCell 4" 3 Cell	4	12	1.34"	1500'	2500'

*Use of Optical Fiber Nonconductive Riser (OFNR) cable may result in reduced pulling lengths

MaxCell 3” 3 Cell

Min Conduit ID	Suggested Product	Max # of Packs	Max # of Cables	Maximum Cable Diameter per Cell	Rec. Pull Length*	Max Pull Length*
3"	MaxCell 3" 3 Cell	2	6	1.03"	1200'	2000'
4"	MaxCell 3" 3 Cell	3	9	1.03"	1500'	2500"
5"	MaxCell 3" 3 Cell	4	12	1.03"	1500'	2500'
6"	MaxCell 3" 3 Cell	5	5	1.03"	1500'	2500'

*Use of Optical Fiber Nonconductive Riser (OFNR) cable may result in reduced pulling lengths

MaxCell 2” 3 Cell

Min Conduit ID	Suggested Product	Max # of Packs	Max # of Cables	Maximum Cable Diameter per Cell	Rec. Pull Length*	Max Pull Length*
2"	MaxCell 2" 3 Cell	1	3	.70"	800'	1500'

*Use of Optical Fiber Nonconductive Riser (OFNR) cable may result in reduced pulling lengths

2.4 INNERDUCT

A. Manufacturers:

1. Carlon
2. Pyramid
3. Or HAS approved equivalent

B. Innerduct

1. All fiber placed in cable tray shall be installed in corrugated innerduct.
2. One-inch corrugated non-metallic innerduct.
3. Innerduct shall be UL Listed with Flame Propagation compliant with UL 2024.
4. Only manufacturer’s fittings, transition adapters, terminators, and fixed bends shall be used.
5. All empty innerduct will be populated with a measured pull tape.
6. Where more than one innerduct is routed in a conduit, each innerduct shall consist of a different color from end to end (ex. Orange, Blue, Black, and White). Do not couple innerduct of different colors without HAS approval.
7. All interior innerduct shall be plenum rated, unless installed in conduit.

2.5 CABLE TRAYS

A. Manufacturers:

1. B-Line
2. Cope
3. Panduit

B. CABLE TRAY

1. Except as otherwise indicated, provide metal cable trays, of types, classes and sizes indicated; with splice plates, bolts, nuts and washers for connecting units. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additional construction features.

2. Materials and Finish: Material and finish specifications for each tray type are as follows:
 - a. Aluminum: Straight section and fitting side rails and rungs shall be extruded from Aluminum Association Alloy 6063. All fabricated parts shall be made from Aluminum Association Alloy 5052.
 - b. Pre-galvanized Steel: Straight sections, fitting side rails, rungs, and covers shall be made from steel meeting the minimum mechanical properties in accordance with ASTM A653 SS.
 - c. Hot-dip Galvanized Steel: Straight section and fitting side rails and rungs shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS, Grade 33 for 14 gauge and heavier, ASTM A1008, Grade 33, Type 2 for 16 gauge and lighter, and shall be hot-dip galvanized after fabrication in accordance with ASTM A123. All covers and splice plates must also be hot-dip galvanized after fabrication; mill galvanized covers are not acceptable for hot-dipped galvanized cable tray.
 - d. Stainless Steel: Straight section and fitting side rails and rungs shall be made of AISI Type 304 or Type 316 stainless steel. Transverse members (rungs) or corrugated bottoms shall be welded to the side rails with Type 316 stainless steel welding wire.
 - e. Rigid PVC (Channel), ABS (Fittings) with the Flammability rating 94V-0, UL listed to 2024A Optical Fiber Cable Routing Assemblies Compliant with the applicable tests in Telcordia GR-63-CORE Network Equipment Building Systems Level 3

2.6 TYPE OF TRAY SYSTEMS

- A. Ladder type trays shall consist of two longitudinal members (side rails) with transverse members (rungs) welded to the side rails. Rungs shall be spaced 6 or 12 inches on center. Rungs shall have a minimum cable-bearing surface of 7/8 inch with radiused edges. No portion of the rungs shall protrude below the bottom plane of the side rails. Each rung must be capable of supporting the maximum cable load, with a safety factor of 1.5 and a 200-pound concentrated load when tested in accordance with NEMA VE-1, section 5.4.
- B. Ventilated trough type trays shall consist of two longitudinal members (side rails) with a corrugated bottom welded to the side rails. The peaks of the corrugated bottom shall have a minimum flat cable-bearing surface of 2-3/4 inches and shall be spaced 6 inches on center. To provide ventilation in the tray, the valleys of the corrugated bottom shall have 2-1/4 inch by 4-inch rectangular holes punched along the width of the bottom.
- C. All tray sizes and types shall have a minimum of 4-inch usable load depth.
- D. All straight sections shall be supplied in standard 10-foot length, except where shorter lengths are permitted to facilitate tray assembly lengths as shown on drawings.
- E. Tray widths shall be 6, 12, 18, 24, or 36 inches. Designer to specify width per the infrastructure needs.
- F. All fittings must have a minimum radius of 12, 24, 36, or 48 inches.
- G. Splice plates shall be the bolted type made as indicated below for each tray type. The resistance of fixed splice connections between adjacent sections of tray shall not exceed .00033 ohms. Splice

plate construction shall be such that a splice may be located anywhere within the support span without diminishing rated loading capacity of the cable tray.

1. Aluminum Tray - Splice plates shall be made of 6063-T6 aluminum, using four square neck carriage bolts and serrated flange locknuts. Hardware shall be zinc plated in accordance with ASTM B633, SC1.
 2. Steel (including Pre-galvanized and Hot-dip galvanized) - Splice plates shall be manufactured of high strength steel, meeting the minimum mechanical properties of ASTM A1011 HSLAS, Grade 50, Class 1. Hardware shall be zinc plated in accordance with ASTM B633 SC1 for pre-galvanized cable trays, or Chromium Zinc in accordance with ASTM F-1136-88 for hot-dip galvanized cable trays.
- H. Cable Tray Support shall be placed so that the support spans do not exceed maximum span indicated on drawings or by the manufacturer. Supports shall be Trapeze style support. Cable trays installed adjacent to walls shall be supported on wall-mounted brackets as specified by the manufacturer.
- I. Trapeze hangers shall be supported by 3/8-inch (minimum) diameter all thread rods.
- J. Accessories shall be furnished as required to protect, support, and install a cable tray system. Accessories shall consist of but are not limited to; section splice plates, expansion plates, blind-end plates, specially designed ladder dropouts, waterfall plates, barriers, etc.
- K. All cable tray components and accessories will be from the same manufacturer. Parts from different manufacturer will not be intermixed.

2.7 CABLE HOOK SYSTEMS (J-Hooks)

- A. Cable hooks must be pre-approved by HAS/IT prior to installation.
- B. Cable hooks shall have a flat bottom and provide a minimum of 1-5/8-inch cable bearing surface.
- C. Cable hooks shall have 90-degree radiused edges to prevent damage while installing cables.
- D. Cable hooks shall be designed so the mounting hardware is recessed to prevent cable damage.
- E. Cable hooks shall have a cable latch retainer to provide containment of cables within the hook. The retainer shall be removable and reusable.
- F. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions.
- G. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.
- H. Cable hooks for corrosive areas shall be stainless steel, AMERICAN IRON STEEL INSTITUTE Type 304.
- I. All Cable Hooks shall be supported with minimum 1/4" all thread with the appropriate fasteners.

2.8 FIRESTOPPING MATERIALS

A. Manufacturers:

1. Johns Manville
2. Hilti
3. 3M
4. Unique

B. Description:

1. Performance requirements: Provide firestopping systems that are produced and installed to resist spread of fire according to requirement indicated, resist passage of smoke and other gases, and maintain fire resistance rating of assembly.
 - a. F-Rated Systems: in accordance with ASTM E 814
 - b. T-Rated Systems: in accordance with ASTM E 814
2. Fire stopping flame spread performance requirements: Provide products with flame- spread ratings of less than 25 and smoke development ratings of less than 50 as determined in accordance with ASTM E 84.
3. Fire Stopping UL performance requirements: Provide products with UL ratings specified for assembly indicated as determined in accordance with UL listings.

2.9 JUNCTION BOXES/PULL BOXES

- A. All pull boxes shall be constructed with a minimum of 14 gauge-galvanized steel with an ANSI 61 grey polyester powder finish inside and out over phosphatized surfaces or galvanizes steel unless otherwise specified.
- B. All pull boxes shall have flat, removable covers fastened with plated steel screws with unique keyhole screw slots in the cover to permit removal of the cover without extracting screws unless otherwise specified.
 1. All removable box covers shall be connected to box with a safety strap or chain for all boxes 8” X 8” or larger.
- C. All pull boxes shall provide the appropriate provisioning for grounding.
- D. All pull boxes shall be NEMA Type 1 and sized according to the table below unless otherwise specified.

Maximum Trade Size of Conduit (inches)	Minimum Box Size (inches)			For Each Additional Conduit Increase Width (Inches)
	Width	Length	Depth	
1	4	16	3	2

1.25	6	20	3	3
1.5	8	27	4	4
2	8	36	4	5
2.5	10	42	5	6
3	12	48	5	6
3.5	12	54	6	6
4	15	60	8	8

2.10 WALL BACKBOARD

- A. Reference Specification 271100 Section 2.04

PART 3 - EXECUTION

3.1 GENERAL

- A. Raceways shall be mechanically and electrically connected to all boxes and fittings and shall be properly grounded per NEC.
- B. The routing and location of all conduits, cable tray, cable hooks and other raceways shall be coordinated with other trades prior to and during building construction to avoid delays and conflicts.
- C. Where raceways pass through walls, partitions and floors, seal penetrations to provide a neat installation, which will maintain the integrity of the waterproofing or fireproofing, as applicable, of the structure. Coordinate installation requirements with roofing installer where conduits pass through the roof.
- D. All raceways entering a building from underground shall be sealed to prevent water, moisture, gas, or any other foreign matter from entering the building. Service conduits shall be sealed in accordance with NEC 230-8.
- E. Contractor's on-site RCDD supervisor shall review, approve, and stamp all shop drawings, coordination drawings and records drawings.
- F. Do NOT route communication pathways under HVAC condensing units.
- G. Expansion Fittings:
1. Raceways shall be provided with expansion fitting where necessary to compensate for thermal expansion and contraction.
 2. Use expansion-deflection fittings on conduit crossing structural expansion joints and on exposed conduit runs where necessary. Provide bonding jumpers across fittings in metal raceways systems

3.2 CONDUIT INSTALLATION

- A. Rigid and IMC shall be installed with threaded fittings and couplings.
- B. All metallic couplings, connectors, and fittings shall be malleable iron or steel and finished with zinc plating or by galvanizing.
- C. All conduits shall be plugged immediately upon installation to prevent the entrance of construction dirt and debris. All conduits shall be swabbed and cleaned before wires are pulled.
- D. Expansion fittings shall be utilized in all cases where conduits pass through building expansion joints. Fittings shall be of an approved weatherproof telescopic type permitting a movement of up to four inches and shall be provided with approved bonding jumpers around or through the fitting.
- E. Connection of Conduit to pull / junction Boxes and Enclosures:
 - 1. Connection to NEMA 1 type boxes and enclosures:
 - a. Rigid: Install insulated bushings and double locknuts.
 - b. IMC: Install insulated bushings and double locknuts.
 - c. EMT: shall be installed with compression box connectors, insulated throats and bushings.
 - 2. Connection to NEMA 3R, 4, 4X, and 12 type boxes: Install insulated bushings and sealing locknuts or hubs.
 - 3. When conduits enter floor mounted enclosures from below and there is no sheet metal to which to attach; install grounding bushings on the conduit. Bond bushings to ground bus using a conductor the same size as required for an equipment grounding conductor sized for the given circuit.
 - 4. Install sealing bushing within all conduits which have entered a building from outside, whether from above or below grade.
- F. No section of conduit shall be longer than 30m (100ft) or contain more than two 90- degree bends between pull points, pull boxes, or reverse bends. Offset is considered two equal bends in opposite direction, the two angles of which cannot exceed 45 degrees in each direction. In all cases, the two angles comprising the offset shall be considered 90 degrees. Any conduit bends less than 90 degrees and is not associated with the offset as described herein is considered a 90-degree bend.
- G. The inside radius of bends in conduit shall be:
 - 1. 6 times the internal diameter for 2" or less.
 - 2. 10 times the internal diameter for greater than 2".
- H. With prior HAS/IT APPROVAL. For Backbone and riser conduit runs ONLY (2" to 4"), a special LBD conduit (Crouse-Hinds or approved equal) may be used for CMU penetration where a swept 90 will not work. LBD condulets are designed for communications cable installation to maintain bend radius requirements.
- I. A measured pull tape shall be placed in all installed conduit with pull strength of 200 pounds.

- J. Any single conduit run extending from a Telecommunication Room shall not serve more than one outlets.
- K. All communications conduits shall be identified with color coded orange tape marked "Communications" every 50 feet. Tag conduit termination points (to include J-box locations) with the origination and destination location.
Example: IDF.AMDF > CAM.1023
- L. Conduit shall be reamed to eliminate sharp edges and terminated with an insulated throat bushing along with a screw on bushing and/or grounding bushing.
- M. Conduit protruding through the floor shall be terminated at a minimum of 4 inches above the floor surface.
- N. All stubbed conduit ends shall be provided with a ground bushing.
- O. All conduit penetrations shall be provided with the proper conduit sleeves.
1. Sleeves shall extend three inches AFF or four inches below finished ceiling, with a bushing.
 2. Sleeves shall be installed in the communications room floor or ceiling a minimum of six inches on center from the wall.
 3. Conduit floor sleeves shall be spaced to allow space for insulated ground bushing for cable protection.
 4. Shall be installed in a single tier or row from left to right horizontally. If two tiers or rows are required, the conduits shall be staggered minimum of 2 inches between tiers.
 5. Cable support anchors shall be installed 18 to 24 inches above the sleeves.
- P. All cable (horizontal, riser, or backbone) wall or ceiling penetrations shall be provided with the proper conduit sleeves.
1. Sleeves shall extend three inches AFF or four inches below finished ceiling, with a bushing.
 2. Sleeves shall be installed in the floor or ceiling a minimum of two to four inches on center from the wall.
 3. Sleeves shall be installed in the walls at a minimum of two inches extended on each side of the wall.
 4. Cable floor, ceiling, and wall sleeves shall be spaced to allow space for ground bushing and insulated bushing for cable protection.
 5. Shall be installed in a single tier or row from left to right horizontally.
 6. If two tiers or rows are required, the conduits shall be staggered minimum of 2 inches between tiers.
 7. Cable support anchors shall be installed 18 to 24 inches above the sleeves.
- Q. All conduit and cabinet entrances shall be sealed with an approved, re-enter able sealant material to prevent ingress of water, dust or other foreign materials.
- R. Conduit shall not be embedded in the required fire protective covering of a structural member that is to be individually encased in accordance with Building Officials and Code Administrators International, Inc. (BOCA).

- S. Install all exposed conduit parallel or perpendicular to lines of existing construction and grouped together where possible, without interfering with use of premises or working areas. Prevent safety hazards and interference with operating and maintenance procedures.
- T. ALL Conduit Sizing and supports:
1. Support conduit 2 inches and larger at 10 feet on center maximum, and conduit less than 2 inches {1½ inch and smaller} at eight feet on center maximum.
 2. Fasten 1½ inch and smaller conduit to concrete, masonry or steel with either one-hole malleable iron conduit straps, or "Korn" clamps, or U-bolts; for larger diameters, use two-hole straps. Use "clamp backs" for strapping conduits to planar surfaces.
 3. Multiple runs shall be supported on channel adequately secured to walls or hung from structure above with conduits fastened to channel with clamps designed for the purpose.
 4. When installation requires trapeze/rack support minimum 3/8 inch all thread shall be used.
 5. When installation requires a single 1-inch conduit ¼ inch all thread shall be used. No hanger wire for any installation.
 6. When installation requires single conduit greater than 1 inch, 3/8 inch all-thread shall be used.
 7. Cable fill rates should not exceed 40% of the cross-sectional area of the installed conduit.
- U. Horizontal Conduit Routes:
1. Horizontal (station) conduit is defined as the conduit run between the communications outlet and the cable tray or communications room as indicated on Drawings.
 2. Each horizontal conduit run shall be a one-inch metallic conduit and shall be home run from each communications outlet box to the equipment room, terminating equipment or cable tray, as indicated in Drawings.
 3. Each single horizontal conduit run shall be provided with a junction or pull box every 30m (100ft) or contain more than two 90-degree bends between pull points, pull boxes, or reverse bends. Offset is considered to be two equal bends in opposite direction, the two angles of which cannot exceed 45 degrees in each direction. In all cases, the two angles comprising the offset shall be considered 90 degrees. Any conduit bends less than 90 degrees and is not associated with the offset as described herein is considered a 90-degree bend.
 4. Each dual horizontal conduit run shall be provided with a junction or pull box every 30m (100ft) or contain more than two 90-degree bends between pull points, pull boxes, or reverse bends. Offset is considered two equal bends in opposite direction, the two angles of which cannot exceed 45 degrees in each direction. In all cases, the two angles comprising the offset shall be considered 90 degrees. Any conduit bend less than 90 degrees and is not associated with an offset as described herein is considered a 90-degree bend. The quantity of conduits entering the junction or pull box shall equal the number of conduits exiting the junction or pull box.
 5. Each terminating (outlet end) conduit connection shall be provided with the proper connecting insulated bushing or fitting.
 6. Each originating end (communications room end) shall be provided with the proper connecting insulated ground bushing and properly bonded to ground.
 7. If flexible conduit is required install must not be longer than 7 feet and must have HAS/IT approval prior to installation.
- V. Horizontal conduit entrance in communications rooms – wall entry

1. Horizontal conduits shall enter the communications room wall 12 to 18 inches above the top of the cable tray. Maintain cable bend radius with supporting device as required.
 2. Conduit wall stubs shall be spaced in increments equal to the conduit outside diameter (OD) from each other.
 3. All conduit wall stubs shall be extended to the terminating equipment, electronics, or cable tray, as noted in Drawings.
 4. Conduit crossovers are not permitted.
- W. Horizontal conduit entrance in communications rooms – ceiling entry
1. Horizontal conduits shall enter or be extended from the equipment room ceiling 12 to 18 inches above the top of the cable tray.
 2. Ceiling conduit stubs shall be spaced in increments equal to the conduit OD from each other.
 3. All ceiling conduit stubs shall be extended to the terminating equipment, electronics, or cable tray, as noted in Drawings.
 4. Conduit crossovers are not permitted.
- X. Horizontal conduit entrance in communications rooms – floor entry
1. Horizontal conduits shall enter the communications room floor two inches to four inches on center from the wall and shall be stubbed 4 inches AFF.
 2. Conduit floor stubs shall be spaced in increments equal to the conduit OD from each other.
 3. Conduit crossovers are not permitted.
- Y. Horizontal conduit to cable tray
1. No horizontal conduit runs shall be attached to the cable tray in any fashion.
 2. Conduit terminating end shall be self-supporting above the cable tray side rail. Not attached.
- Z. Horizontal Junction/Outlet Boxes
1. Each horizontal conduit shall be terminated into an outlet box.
 2. Each outlet box shall be a deep four-inch square junction box with a minimum of two one-inch knockouts on each of the sides.
 3. Each conduit home run shall be provided with a deep 4 11/16” inch square junction box (w/cover) at 100-foot intervals and six inches above each ceiling and wall intersection.
- AA. Backbone/Riser conduit entrance in communications rooms – wall entry
1. BB/Riser conduits shall enter the communications room wall a minimum of 24 inches above the top of the cable tray.
 2. Conduit wall stubs shall be spaced in increments to equal the conduit OD from each other.
 3. BB/Riser conduits shall be installed in a single tier or row from left to right horizontally.
 - a. If two tiers or rows are required, the conduits shall be staggered between tiers.
 - b. No more than two tiers or rows are permitted.

4. All conduit wall stubs shall be extended to and over the cable tray to access cable tray pathway.
5. All BB/riser conduit stubs shall be provided with the proper universal dropout/ waterfall cable exit runway, which shall be supported by and mounted to channel strut.
6. Conduit crossovers are not permitted.

BB. Backbone/Riser conduit entrance in communications rooms – floor entry

1. BB/Riser conduits shall enter the communications room floor two inches to four inches on center from the wall and shall stub up six inches AFF.
2. Conduit floor stubs shall be spaced in increments to equal the conduit OD from each other.
3. BB/Riser conduits shall be installed in a single tier or row from left to right horizontally.
 - a. If two tiers or rows are required, the conduits shall be staggered between tiers.
 - b. No more than two tiers or rows are permitted.
4. Exiting cable shall be extended to the bottom of the cable tray and be provided with cable support anchors and secured with supporting hardware every six inches above the conduit bushings.
5. Conduit floor stubs shall be extended 6 inches from wall on center and 6 inches above AFF.
6. The BB/riser cable shall be extended in the cable tray to the terminating equipment, as noted in the Drawings.
7. Conduit crossovers are not permitted.

3.3 CABLE TRAY INSTALLATION

A. Cable tray shall be supported as follows:

1. Where tray is suspended above equipment cabinets, it shall be supported by a Trapeze type hanger and per manufacture instructions. In all other applications, unistrut trapeze type hangers affixed to the structure above via minimum 3/8-inch threaded rod shall support the tray.
2. Threaded rod shall be fitted with a 6-inch long tube where it resides in cable tray to protect cables.
3. Minimum of 12 inches of vertical clearance above all cable tray.

B. Installation shall be in accordance with equipment manufacturer's instructions, and with recognized industry practices to ensure that cable tray equipment comply with requirements of NEC and applicable portions of NFPA 70B. Reference NEMA-VE2 for general cable tray installation guidelines.

C. Provide sufficient space encompassing cable trays to permit access for installing and maintaining cables.

D. Cable tray fitting supports shall be located such that they meet the strength requirements of straight sections. Install fitting supports per NEMA VE-2-2006 guidelines, or in accordance with manufacturer's instructions.

E. A support must be place within 24 inches on each side of a connection or fitting.

- F. Maintain a minimum of 12 inches of clearance above cable tray for cable installation. Maintain a minimum of 3 inches between ceiling tile and bottom of cable tray support.
- G. Cable tray installation will be completed in one continuous run with no separations between sections.
- H. Vertical cable or ladder racks shall be used to route cable up and down the wall.
- I. Dropout/Water Fall of the same make and size of the cable tray shall be used to route cables in or out of the tray.
- J. Matted "T" and elbows shall be used of the same make and size for all interchanges and directional changes

3.4 JUNCTION BOX/PULL BOX INSTALLATION

- A. Pull boxes shall be installed in sections of conduit that are 100 feet in length, or that contain more than two 90-degree bends.
- B. A pull box shall NOT be used in lieu of a conduit bends.
- C. All pull boxes shall be installed in an easily accessible location with unobstructed entry to the pull box access panel.
- D. Pull boxes 6"x 6" or larger shall be supported on all four corners in such a manner that the cable running through does not support the pull box or conduit attached to the pull box.

3.5 CABLE HOOK INSTALLATION (J-HOOKS)

- A. Cable hook systems must be pre-approved by HAS/IT prior to installation.
- B. Installation and configuration shall conform to the requirements of the ANSI/ EIA/TIA Standards 568A & 569, NFPA 70 (National Electrical Code), and applicable local codes.
- C. Cable hooks shall be capable of supporting a minimum of 30 pounds with a safety factor of three.
- D. Spring steel cable hooks shall be capable of supporting a minimum of 100 pounds with a safety factor of three where extra strength is required.
- E. Cable Hook spacing maximum four feet on center.
- F. Maintain maximum cable sag between cable hooks of 12 inches.
- G. Do not fill cable hook greater than manufacturer recommended guidelines.

3.6 FIRESTOPPING MATERIAL INSTALLATION

- A. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instruction, and product carton instruction for installation.
- B. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.
- C. Install fire stopping to comply with performance requirements specified herein.
 - 1. Install fire stopping to comply with listed fire rated assemblies in accordance with ASTM and UL requirements
 - 2. Installer shall be trained and approved by the manufacturer
- D. Protect installed products from damage during construction operations until completions.
- E. Inspection: Code official or building inspectors to review proper installation using manufacturer guidelines.

END OF SECTION 27 05 28

SECTION 27 05 53
IDENTIFICATION AND LABELING OF COMMUNICATION INFRASTRUCTURE

PART 1 - GENERAL

1.1 INTRODUCTION

- A. As the Houston Airport System (HAS) continues to develop both its private and commercial interests, it is essential that an effective telecommunications infrastructure be developed and maintained to ensure the support of any and all services which rely on the electronic transport of information. To effectively administer these assets requires a disciplined effort that begins with a systematic practice and procedure for capturing useful data regarding inventories that might be conducted at any point during the lifecycle of a project.

1.2 OBJECTIVE

- A. The objective and intent of this standard is to provide uniform GIS inventory and documentation practices/guidelines for any person or party directly involved with data collection, administration and/or accountability of the HAS IT telecommunications infrastructure or related systems.

1.3 INTENDED USE

- A. Any designer, consultant or engineering entity contracting with the Houston Airport System to inventory/document the telecommunications physical and network configurations will need to refer to this document for clarification regarding standard operating procedures. The guidelines given here provide for effective documentation of the HAS telecommunications network. The result of following this standard will be a telecommunications infrastructure that is well documented and easily managed by the administrator.

1.4 LIFE OF THE STANDARD

- A. This standard is a living document. The criteria contained in this standard are subject to revision without notice, as warranted by advances in administration techniques related to telecommunications technology.
- B. This manual is the property of the Houston Airport System. The contents of this manual are proprietary and should not be copied or disclosed without prior written permission of the Houston Airport System. Any variation from the standards in this manual should be addressed by the Houston Airport System IT GIS contact listed below for approval prior to implementation on a project.

1. Houston Airport System IT GIS contacts:

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1.5 SCOPE

- A. This standard specifies the GIS inventory and documentation requirements for the Houston Airport System IT Telecommunications Infrastructure, Network Engineer and associated information databases. Areas of the infrastructure and/or databases to be inventoried, administered, monitored or maintained include:
1. Terminations for the telecommunications media located in work areas, telecommunications closets, equipment rooms, and entrance facilities;
 2. Equipment/devices hosting physical terminations;
 3. Telecommunications media (cable) between terminations;
 4. Pathways (spans) between terminations that contain the media;
 5. Spaces (structures) where terminations are located;
 6. Bonding/grounding as it applies to telecommunications;
 7. Geophysical plant networks i.e., manhole, handhole, pullbox, cabinet, pedestal, building access points;
 8. Splice enclosures.
- B. This standard also specifies requirements for the collection, organization, and presentation of as-built data.
- C. In addition to providing requirements and guidelines for a traditional paper-based documentation system, this standard will serve as the reference for all associated computer-based administration tools.

1.6 REFERENCES

- A. The latest published version at the date of contract applies to all references. Related Documents include all Drawings and General Provisions of the Contract. In Conflict between contract documents, the most stringent will be applied.
- B. Related Specifications: Use these Specifications for all related work not specifically covered in this specification.
1. Section 270526: Telecommunication Grounding and Bonding
 2. Section 270528: Interior Communication Pathways
 3. Section 270543: Exterior Communication Pathways
 4. Section 270553: Identification and Labeling of Communication Infrastructure

5. Section 271100: Communication Cabinets and Equipment Rooms
6. Section 271300: Backbone and Riser Media Infrastructure
7. Section 271500: Horizontal Media Infrastructure
8. Section 272100: Data Communication Network Equipment
9. Section 272200: PC, Laptop, Servers and Equipment
10. Section 275113: Audio Communication System
11. Section 281300: Access Control System
12. Section 232313: Video Surveillance Control and Management System

1.7 DEFINITIONS

A. General

1. This section contains definitions of terms, acronyms, abbreviations, and formats that have special technical meaning or that are unique to the technical content of this standard.

B. Definitions

1. For the purposes of this standard, the following definitions apply:
 - a. **Assignment** - A unique designation assigned to a person who is expected to use the circuit, equipment, service, etc., serving a particular work area. Examples of an assignment: telephone number, a name, a circuit number or a logical address.
 - b. **Backbone** - Network of copper and fiber connections between termination panels/switches.
 - c. **Cable** - An assembly of one or more copper conductors or optical fibers within an enveloping sheath, constructed so as to permit use of the conductors singly or in groups.
 - d. **Campus** - The buildings and grounds have legal contiguous interconnection. (TIA)
 - e. **Equipment** - Generally, an endpoint for cable lengths; any hardware device/component. Used to terminate cable for cross-connection or interconnection to other cables or devices.
 - f. **Grounding Electrode Conductor** - The conductor used to connect the grounding electrode to the equipment grounding conductor and/or to the grounded conductor of the circuit at the service equipment or at the source of a separately derived system.
 - g. **Handhole (HH)** - A structure similar to a small maintenance hole in which cable can be pulled, but not large enough for a person to fully enter to perform work.
 - h. **Identifier** - An item of information that links a specific element of the telecommunications infrastructure with its corresponding record. (TIA)
 - i. **Linkage** - A connection between a record and an identifier or between records. (TIA)
 - j. **Location** - A position occupied or available for occupancy within a site or infrastructure network.
 - k. **Manhole (MH)** - A vault located in the ground or earth as part of an underground duct system and used to facilitate placing, establishing connections and maintenance of cables as well as placing associated equipment, in which it is expected that a person will enter to perform work. (TIA).

- l. **Outlet Box (telecommunications)** - A metallic or nonmetallic box mounted within a floor, wall or ceiling and used to hold telecommunications outlet/connectors or transition device. (TIA)
- m. **Outlet / Connector (telecommunications)** - A connecting device in the work area on which horizontal cable or outlet cables terminates. (TIA)
- n. **Pathways** - A raceway, conduit, sleeve, or exposed location, for the placing of telecommunications cable that links telecommunications spaces together.
- o. **Record** - The permanent documentation of installed telecommunications infrastructure obtained from as-built.
- p. **Record Drawing (as-built)** - The documentation of measurements, location, and quantities of material work performed. May be in the form of marked up documents or other work order forms.
- q. **Report** - A presentation of a collection of information from various records.
- r. **Site** - Spatial location of an actual or planned structure or set of structures
- s. **Span** - A raceway, conduit, sleeve, or exposed location, for the placing of telecommunications cable that links telecommunications spaces together
- t. **Splice** - A joining of conductors meant to be permanent. (TIA)
- u. **Splice Box** - A box, located in a pathway run, intended to house a cable splice. (TIA)
- v. **Splice Enclosure** - A device used to protect a cable or wire splice. (TIA)
- w. **Structure** - Generally an endpoint for span lengths; i.e., manhole, handhole, cabinet, junction box, pedestal, building access point, communications rooms, work areas.
- x. **Structure Unit** - A component of the structure; usually housing equipment i.e., cabinet, rack.
- y. **Telecommunications** - Any transmission, emission, or reception of signs, signals, writings, images, and sounds; that is, information of any nature by cable, radio, optical or other electromagnetic systems. (TIA)
- z. **Telecommunications Infrastructure** - The components (telecommunications spaces, cable pathways, grounding, wiring and termination hardware) that together provide the basic support for the distribution of all telecommunications information.
- aa. **Telecommunications Media** - Wire, cable, or conductor used for telecommunications.
- bb. **Telecommunications Space** - Areas used for the installation and termination of telecommunications equipment and cable, e.g., telecommunications closets, work areas, false ceilings, and manholes/handholes.
- cc. **Termination Position** - A discrete element of termination hardware where telecommunications conductors are terminated.
- dd. **Work Area; Work Station** - A building space where the occupants interact with telecommunications equipment. (TIA)

1.8 DOCUMENTATION CONCEPTS

A. General

- 1. This section describes the concepts of identifiers, records, linkages among records, and presentation of information necessary to administer infrastructure cable, spans and structures.

B. Identifiers

1. An identifier is assigned to an element of the telecommunications infrastructure to link it to its corresponding record. Identifiers shall be marked at the elements to be administered.
2. Identifiers used to access record sets of the same type shall be unique. For example, each identifier for each one of the sets of cable records shall be unique. Unique identifiers across all types of telecommunications records are mandatory. For example, no cable record identifier should be identical to any pathway record identifier.
3. Labeling is the marking of an element of the telecommunications infrastructure with an identifier and (optionally) other relevant information. Labeling shall be accomplished in either of two ways: separate labels may be securely affixed to the element to be administered, or the element itself may be marked.

C. Records

1. A record is a collection of information about or related to a specific element of the telecommunications infrastructure.
2. Elements identified as required information and required linkages shall constitute the minimum requirements for these records. Specific information and other linkages suggest additional elements that may be useful to the administrative system, such as cable length.
3. Telecommunications records are typically used in conjunction with other records. For example, a user record or assignment may contain an identifier to the record of the cable that serves an individual's workspace. Conversely, a cable record may also contain an identifier for a user record or assignment.
4. By this standard, the Houston Airport System utilizes AutoCAD and ArcGIS as the software platforms by which all telecommunications infrastructure records and linkages are recorded and maintained.

D. Relationships

1. Relationships are the logical connections between identifiers and records. The records for infra- structure elements shall be interlinked. For example, in a cable record, termination port identifiers point to specific termination port records that contain additional information about each of the cable termination ports.

E. Assignment

1. An "assignment" is a specific term of reference that allows the association of the end location, cable pairing record or termination port record with additional information. For example, an assignment such as a telephone number or circuit number can associate a user with elements of the telecommunications infrastructure. This aids in troubleshooting by identifying both the physical and logical connectivity from a single circuit assignment.

F. Presentation of Information

1. A typical documentation system includes labels, records, reports, drawings, and work orders. Reports compile and present information found in the records. Graphical information regarding the relationship of the telecommunications infrastructure to other infrastructures within the campus or site is present- ed in drawing format. Work orders

document the operations needed to implement changes affecting the telecommunications infrastructure.

2. Reports present information selected from the various telecommunications infrastructure records. Reports may be generated from a single set of records or from several sets of interlinked records.
3. Drawings are used to illustrate different stages of telecommunications infrastructure planning and development. Generally, conceptual and installation drawings supply input to the record drawings that graphically document the telecommunications infrastructure. These record drawings as well as some equipment schedules and installation drawings (i.e., rack layouts) become part of the administration system documentation.
4. Conceptual drawings (i.e., one-line or riser diagrams) are used to illustrate the proposed design intent. They do not typically include all telecommunications infrastructure elements or identifiers and do not necessarily become part of the administration documentation.
5. Installation or bid drawings are used to document (graphically) the telecommunications infrastructure to be installed. They should illustrate relevant infrastructure elements and may also describe the means of installation. Identifiers may or may not be included on the drawings.
6. Record drawings (as-builts) graphically document the installed telecommunications infrastructure through floor plans, elevation, and detail drawings. These drawings may differ from installation drawings because of changes and specific site conditions. Key elements of the telecommunications infrastructure shall have identifiers assigned. The span/structure and wiring portions of the infrastructure each may have separate drawings if warranted by the complexity of the installation or the scale of the drawings.
7. ESRI (ArcGIS) formatted feature class and feature class layers graphically depict data in a spatial environment and are linked via physical relationship protocols established by the administrator through the utilization of software engineered towards GIS applications.

G. Work Orders (Symantec)

1. Work orders document the actions needed to implement changes affecting the telecommunications infrastructure as it was actually installed. The changes may involve several telecommunications components as well as other related systems. The Documentation Team utilizes Symantec software as its change-management notification platform. Typical Symantec tickets document actions such as moving a patch cord, installing a conduit, cross-connect or relocating an outlet box. A Symantec ticket may involve structures, spans, cable, splices, terminations, or grounding, either individually or in combination. A Symantec ticket should list both the personnel responsible for the physical action and those responsible for updating various portions of the documentation to assure its accuracy. Prior to commencement of an action that would result in a change to any telecommunications infrastructure component or related system; a Symantec ticket should be submitted in accordance with departmental and operational requirements.

H. Summary

1. This section has presented basic concepts of documentation for the Houston Airport System Tele- communications Infrastructure. The sections that follow specify the administration of each of the components of the infrastructure in greater detail.

PART 2 - PRODUCTS

2.1 APPROVED PRODUCTS

- A. Dymo RhinoPro 5000 industrial label maker
- B. Dymo 3/4" flexible industrial strength nylon label tape – yellow
- C. Noted products.

PART 3 - EXECUTION

3.1 HAS IT INFRASTRUCTURE STANDARDS FOR DOCUMENTATION

- A. Data Collection and Administration Concepts
 - 1. This section describes the documentation of assets within the administrative jurisdiction of the Houston Airport System - Public Safety and Information Technology department. As changes are made to the assets, affected labels, records, reports and drawings shall be updated or revised.

3.2 STRUCTURES

- 1. Manhole
 - 2. Handhole
 - 3. Pullbox
 - 4. Cabinet (Pole Mounted, Pedestal)
 - 5. Building Access
 - 6. Dog House
 - 7. Remote Location
 - 8. Entrance Facility
 - 9. Workspace
 - 10. Main Distribution Frame (MDF)
 - 11. Building Distribution Frame (BDF)
 - 12. Intermediate Distribution Frame (IDF)
 - 13. Point of Presence (POP)
 - 14. Pathway Transition
 - 15. Aerial Pole
- A. Identification
 - 1. Each Structure has been assigned a unique GIS database identifier. This identifier serves as a primary-key for each database record. Each record contains additional fields and values relative to the feature identified by the primary-key.

2. All structure identifiers follow a specific schema; new structures must be identified accordingly. In the event that a determination cannot be made regarding the identification of a structure, please contact an HAS IT GIS representative prior to documenting.
3. All structures are identified through a numerical range with prefix characters specific to a respective airport campus, technology asset designation, and feature-category.
 - a. Airport Campus Characters:
 - 1) IAH: I
 - 2) HOU: H
 - 3) EFD: E
 - b. Asset Designation Character:
 - 1) Technology: T
 - c. Feature-Category Characters:
 - 1) Structure: S
 - 2) Pathway: P
 - 3) Equipment: E
 - 4) Cable: C
 - d. Numerical Range:
 - 1) 0000 - 9999
 - 2) Example:
 - a) ITS0054 (IAH Structure)
 - b) HTS0054 (HOU Structure)
 - c) ETS0054 (EFD Structure)

B. Labeling

1. Labeling should follow the identification schema and further be accomplished via an approved method described below.
2. Newly constructed structures (manhole, handhole, pullbox, cabinet) will require that their identifiers be etched onto the lid or affixed with an appropriate label material. Manholes and handholes should be stamped on the lid itself, as well as the metal ring/material surrounding the opening; or the concrete foundation (topside). Utilize an appropriate chisel or stamp, or labeling device to accomplish the task.
3. The Technology Infrastructure group does not maintain the specification for labeling newly constructed structures (dog house, remote location, entrance facility, workspace, MDF, BDF, IDF, POP, Pole). These should be placarded according to current HAS Infrastructure specification. The Technology Infrastructure GIS identifiers (described in the previous paragraphs) relevant to these spaces and locations are preserved for GIS database record keeping purposes only. Contact an HAS Infrastructure representative for clarification on physical labels for architectural spaces.

C. Required Fields

1. Each structure requires that specific data be collected per unit. GPS equipment should be formatted to account for this information:
 - a. TELECOM_ID
 - b. COORD_X
 - c. COORD_Y COORD_Z
 - d. AIRPORT AGENCY
 - e. LID_TYPE
 - f. DEPTH_INCH
 - g. SPLICE_CLOSURE
 - h. SLACK_LOOP
 - i. GROUNDING
 - j. COMMENTS
 - k. BUILDING_NAME
 - l. LEGACY_ID STRUCTURE_TYPE
 - m. STRUCTURE_SUBTYPE HAS_LEVEL
 - n. LID_SIZE PROJECT
 - o. COLLECTION_DATE
 - p. LID_SHAPE
 - q. LID_MATERIAL
 - r. PROJECT_CLASS

D. GPS

1. Each manhole should be recorded as follows:
 - a. Single shots; taken on-center. Offset shots are acceptable for manholes not available to satellite coverage but these shots must be coordinated with an HAS-IT GIS contact prior to.

E. Supporting Documentation Deliverables

1. Additional documentation records are required to support GPS data. The documentation is as follows:
 - a. Manholes and Handholes only
 - 1) Digital photos – top (north to top of photo), north wall, west wall, south wall, east wall; for manholes not true to cardinal compass points adjust call-outs as necessary.
 - 2) AutoCAD – butterfly diagram of manhole depicting pathway orientation, conduit layout, innerduct configurations, cabling locations, and cabling counts for each manhole unit in both .dwg 2010 or higher and .pdf formats; (See manhole AutoCAD butterfly exhibit; see also the OASIS standards for IT specific AutoCAD layering).
 - 3) Video – 360-degree imagery of interior; .mpg format.
 - b. Communication Rooms

- 1) AutoCAD – floorplan (where applicable) layouts of structure units depicting orientation, and/or configurations in both .dwg 2010 or higher and .pdf formats; (See AutoCAD communications room exhibit).

F. Spatial Data Deliverables

1. The entire manhole inventory should be delivered separately in ArcGIS feature class (version 10) format along with any records outlined in the ‘Supporting Documentation’ paragraph. This feature class (STRUCTURE) should contain the attribute values from the ‘Required Fields’ paragraph.

G. Special Instructions

1. None

3.3 CABINETS/RACKS

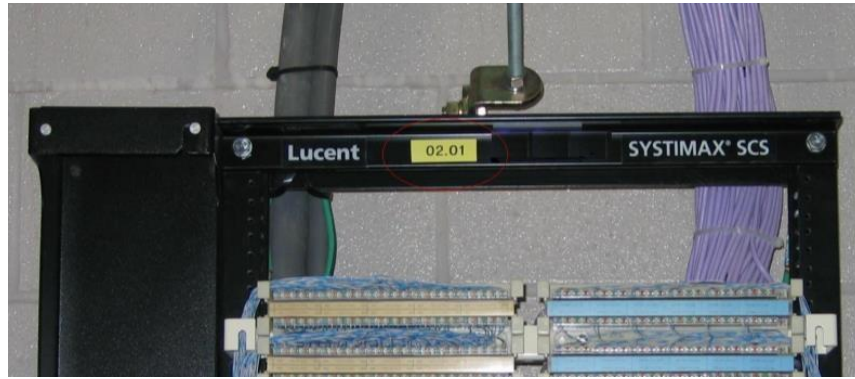
A. Identification

1. Each cabinet/rack has been assigned a unique campus identifier. All structure identifiers follow some specific schema; new structures must be identified accordingly. In the event that a determination cannot be made regarding the identity of the structure, please contact the HAS IT GIS representative prior to documenting.
2. All cabinets are identified through a numerical range specific to its respective campus and should be pre- fixed with ‘PC’ (pedestal cabinet) or ‘PM’ (pole mounted cabinet). The ranges are as follows:
3. Example:
 - a. ITS0054.02.01
 - b. ITS0054.BB01

B. Labeling

1. Labeling should follow the identification schema and further be accomplished via the use of below specified labeling device or approved equivalent:
 - a. DYMO RhinoPRO 5000 Industrial Label Maker
 - b. 3/4” Flexible Industrial Strength Nylon label tape - yellow
 - c. Labels should be affixed to the cabinet housing.
 - d. Labels should be affixed to top-center of identified structure unit. For labeling purposes only, the structure identifier can be omitted from the structure unit identifier to minimize space required for the label. It will be assumed that all structure units located in the same structure will carry the same structure identifier. Note: this is for labeling purposes only; data collection records/tables must use complete identifier including telecom structure identifier.

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C. Required Fields

1. No Action required

D. GPS

1. No Action required

E. Supporting Documentation Deliverables

1. AutoCAD – floorplan and rackface layouts of structure units depicting orientation, and/or configurations in both .dwg 2010 or higher and .pdf formats; (See AutoCAD communications room exhibit).

F. Spatial Data Deliverables

1. No Action required

G. Special Instructions

1. Structure units are visibly marked with a reference tag identifying its column and row. The telecom structure (ITS, HTS, ETS) is omitted from the reference tag but should be included in the structure unit tables. Newly placed structure units will require that their identifiers be affixed to the cabinet face or rack frame. Utilize specified labeling device to accomplish the task.

3.4 PATHWAYS

1. Ductbank
2. Trench
3. Direct Buried
4. Cable Tray

A. Identification

1. Each Pathway has been assigned a unique GIS database identifier. This identifier serves as a primary- key for each database record. Each record contains additional fields and values relative to the feature identified by the primary-key.
2. All pathway identifiers follow a specific schema; new pathways must be identified accordingly. In the event that a determination cannot be made regarding the identification of a pathway, please contact an HAS IT GIS representative prior to documenting.
3. All pathways are identified through a numerical range with prefix characters specific to a respective air- port campus, technology asset designation, and feature-category.
 - a. Airport Campus Characters:
 - 1) IAH: I
 - 2) HOU: H
 - 3) EFD: E
 - b. Asset Designation Character:
 - 1) Technology: T
 - c. Feature-Category Characters:
 - 1) Structure: S
 - 2) Pathway: P
 - 3) Equipment: E
 - 4) Cable: C
 - d. Numerical Range:
 - 1) 0000 – 9999
 - e. Example:
 - 1) ITP0054 (IAH Pathway)
 - 2) HTP0054 (HOU Pathway)
 - 3) ETP0054 (EFD Pathway)

B. Labeling

1. Pathways are identified for the purposes of GIS referencing and are linked to structure inventories but are not physically labeled per current guidelines.

C. Required Fields

1. Each pathway requires that specific data be collected per unit. GPS equipment should be formatted to account for this information.
 - a. CONDUIT_SIZE
 - b. COMMENTS
 - c. AIRPORT
 - d. HAS_ENCASEMENT

- e. AGENCY
- f. CONDUIT_QTY
- g. PATH_ID
- h. PATH_NUMBER
- i. PATH_TYPE
- j. END1_COORD_X
- k. END1_COORD_Y
- l. END1_COORD_Z
- m. END2_COORD_X
- n. END2_COORD_Y
- o. END2_COORD_Z
- p. HAS_LEVEL
- q. COLLECTION_DATE
- r. PROJECT
- s. TICKET
- t. LEGACY_ID
- u. PATHWAY_MATERIAL
- v. FROM_TELECOM_ID
- w. TO_TELECOM_ID
- x. TELECOM_ID
- y. PROJECT_CLASS
- z. DEPTH_END1
- aa. DEPTH_END2

D. GPS

- 1. Each pathway must be recorded as follows:
 - a. Care should be taken to accurately locate the pathways prior to commencing with documentation.
 - b. Continuous-line shots; taken on center. Line-shots should begin and end on-center of endpoint (structure) locations.

E. Supporting Documentation Deliverables

- 1. No action required

F. Spatial Data Deliverables

- 1. The entire pathway inventory should be delivered separately in ArcGIS feature class (version 10.x) format along with any records outlined in the 'Supporting Documentation' paragraph. This feature class (PATHWAY) should contain the attribute values from the 'Required Fields' paragraph.

G. Special Instructions

- 1. No action required

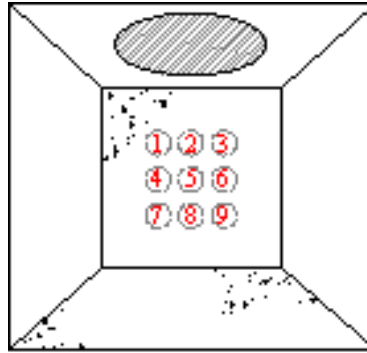
H. Cable Tray

1. Identification
 - a. no requirements per current guidelines
2. Required Fields
 - a. no requirements per current guidelines
3. GPS
 - a. no requirements per current guidelines
4. Supporting Documentation Deliverables
 - a. no requirements per current guidelines
5. Spatial Data Deliverables
 - a. no requirements per current guidelines
6. Special Instructions
 - a. no requirements per current guidelines

3.5 PATHWAY UNITS

A. Conduits

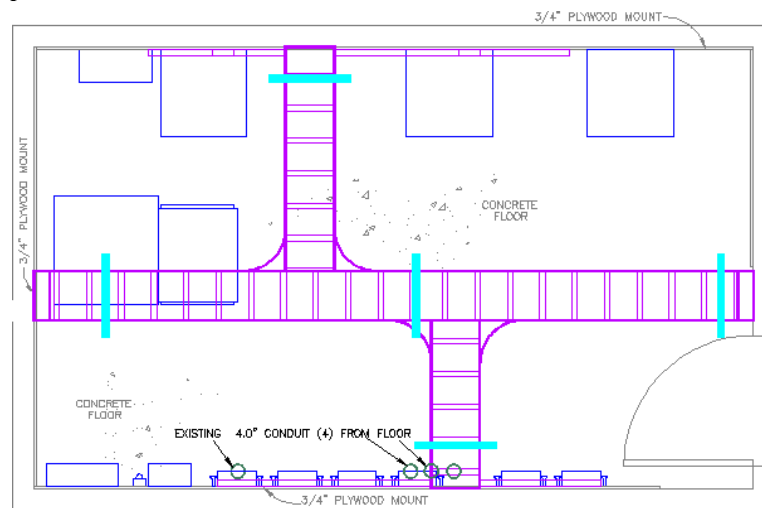
1. Identification
 - a. For deliverable purposes conduits are only being depicted via AutoCAD formats; i.e. butterfly diagrams or floorplans (see Exhibits: Communication Room Exhibit, Rackface Exhibit)
 - b. In the outside plant environment, conduits should be identified where applicable by size, location and position respective to their endpoints (structures) i.e. handhole wall, building access point, etc.
 - c. Further, on manhole / handhole butterfly diagrams, OSP conduits are depicted relevant to their size, position and orientation. As a general rule, conduits are identified left-to-right and top-to-bottom as you're facing the wall to be inventoried and should be prefixed with 'CD' on the AutoCAD documents.



MANHOLE

- d. For the purposes of illustration and to be included as part of the manhole butterfly diagram draft document, each wall should identify the following:
- e. Ductbank (Telecom Pathway Identifier for each respective manhole / handhole wall face) Conduits (Count, Orientation)
- f. Cabling (Telecom Cable Identifier, Cable Type, Cable Count, location within respective conduit)
- g. In the inside plant environment, conduits should be identified where applicable by position and location respective to their endpoints (telecom structures) i.e. communications rooms, vaults
- h. ISP conduits are depicted on communication-room AutoCAD layouts as to their position and orientation; and are not numbered.

Example:



2. Labeling

- a. Not physically labeled per current guidelines.

3. Required Fields

- a. Conduit counts, and size as prescribed in the pathway sub-topic

4. GPS
 - a. No action required
5. Supporting Documentation Deliverables
 - a. AutoCAD manhole / handhole butterfly diagrams for OSP conduits and communication-room layouts for ISP conduits; (See manhole / handhole AutoCAD butterfly exhibit).).
6. Spatial Data Deliverables
 - a. No action required
7. Special Instructions
 - a. See note regarding annotation above.

3.6 CABLE

1. Inside Plant Copper
2. Inside Plant Fiber (Single-Mode, Multi-Mode)
3. Outside Plant Copper
4. Outside Plant Fiber (Single-Mode, Multi-Mode)
5. Inside Plant Copper Coax
6. Outside Plant Copper Coax
7. Inside Plant Hybrid
8. Outside Plant Hybrid

A. Identification

1. Each Cable has been assigned a unique GIS database identifier. This identifier serves as a primary-key for each database record. Each record contains additional fields and values relative to the feature identified by the primary-key.
2. All cable identifiers follow a specific schema; new cable must be identified accordingly. In the event that a determination cannot be made regarding the identification of a cable-run, please contact an HAS IT GIS representative prior to documenting.
3. All cables are identified through a numerical range with prefix characters specific to a respective airport campus, technology asset designation, and feature-category.
 - a. Airport Campus Characters:
 - 1) IAH: I
 - 2) HOU: H
 - 3) EFD: E
 - b. Asset Designation Character:
 - 1) Technology: T

- c. Feature-Category Characters:
 - 1) Structure: S
 - 2) Pathway: P
 - 3) Equipment: E
 - 4) Cable: C
- d. Numerical Range:
 - 1) 0000 – 9999
- e. Example:
 - 1) ITC0054 (IAH Cable)
 - 2) HTC0054 (HOU Cable)
 - 3) ETC0054 (EFD Cable)

B. Labeling

- 1. Labels should be affixed to all connection ends of identified cable and on any visible length at key access points, i.e. manhole, handhole cable ladder runs.
- 2. "All adhesive inside/outside plant cable labels for horizontal and backbone cables shall be covered with clear heat shrink tubing"

C. Required Fields

- 1. Each cable requires that specific data be collected per unit. GPS equipment should be formatted to account for this information.
 - a. TELECOM_ID
 - b. LEGACY_ID
 - c. AIRPORT
 - d. AGENCY
 - e. CABLE_TYPE
 - f. CABLE_COUNT
 - g. FROM_TELECOM_ID
 - h. TO_TELECOM_ID
 - i. FROM_STRUCTURE_UNIT_ID
 - j. TO_STRUCTURE_UNIT_ID
 - k. FROM_EQUIPMENT_ID
 - l. TO_EQUIPMENT_ID
 - m. HAS_LEVEL
 - n. PROJECT
 - o. PROJECT_CLASS
 - p. COLLECTION_DATE
 - q. SYMANTEC_TICKET
 - r. COMMENTS

D. GPS

1. Each cable should be recorded as follows:
 - a. OSP – continuous GPS shot between identified structures
 - b. ISP – conventional GPS services are unavailable inside-plant; therefore inside-plant cabling will need to be digitized and included in the ArcGIS CABLE feature class spatial data deliverable.

E. Supporting Documentation Deliverables

1. ISP Horizontal cabling (see Exhibits – iPatch SOP.pdf).
2. Cable testing records; .pdf format (see Exhibits – C_Cable Test Exhibit, F_Cable Test Exhibit.pdf).
3. Butterfly diagrams (OSP) AutoCAD format; (See AutoCAD manhole / handhole butterfly exhibit).

F. Spatial Data Deliverables

1. The entire OSP cable inventory should be delivered separately in ArcGIS feature class (version 10.x) format along with any records outlined in the ‘Supporting Documentation’ paragraph. This feature class (CABLE) should contain the attribute values from the ‘Required Fields’ paragraph.
2. No Spatial Data required for ISP inventory.

G. Special Instructions

1. No cable testing should be conducted on any live circuit. Ensure that necessary precautions are observed to guarantee existing network integrity and no active circuits are impacted.

H. Jumper Cables / Patch Cords / Cross-Connects:

1. Identification
 - a. No action required
2. Labeling
 - a. No action required
3. Required Fields
 - a. Refer to iPatch SOP (see Exhibits - iPatch SOP.pdf)
4. GPS
 - a. No action required
5. Supporting Documentation Deliverables
 - a. ISP cabling (see Exhibits - iPatch SOP.pdf)
6. Spatial Data Deliverables

- a. No action required

7. Special Instructions

- a. No cable testing should be conducted on any live circuit. Ensure that necessary precautions are observed to guarantee existing network integrity and no active circuits are impacted.
- b. As iPatch is the administration application for these assets - all project managers, inspectors and consultants overseeing 'new-build' infrastructure configurations must strictly adhere to guidelines specified in the iPatch SOP (see Exhibits - iPatch SOP.pdf). Further, you must contact an iPatch database administrator directly to coordinate the data collection and documentation-deliverable evolution.
- c. Bulk import of key iPatch modeling components can be facilitated by utilization of a specifically formatted spreadsheet (see Exhibits - iPatch Bulk Import.xls).
- d. Updates/changes to fiber patching can be facilitated by utilization of a specifically formatted cut-sheet (see Exhibits – Fiber Patching Cut Sheets.xls).

3.7 EQUIPMENT

A. Equipment

- 1. Termination Point
- 2. Patch Panel
- 3. Network Switch
- 4. 110 Block
- 5. Splice Enclosure
- 6. Cable Transition
- 7. EFSO Button
- 8. Copper Modem
- 9. Tap
- 10. Camera

B. Identification

- 1. All Equipment has been assigned a unique GIS database identifier. This identifier serves as a primary-key for each database record. Each record contains additional fields and values relative to the feature identified by the primary-key.
- 2. All equipment identifiers follow a specific schema; new equipment must be identified accordingly. In the event that a determination cannot be made regarding the identification of a piece of equipment, please contact an HAS IT GIS representative prior to documenting.
- 3. All equipment is identified through a numerical range with prefix characters specific to a respective airport campus, technology asset designation, and feature-category.
 - a. Airport Campus Characters:
 - 1) IAH: I
 - 2) HOU: H
 - 3) EFD: E

- b. Asset Designation Character:
 - 1) Technology: T
- c. Feature-Category Characters:
 - 1) Structure: S
 - 2) Pathway: P
 - 3) Equipment: E
 - 4) Cable: C
- d. Numerical Range:
 - 1) 0000 – 9999
- e. Example:
 - 1) ITE0054 (IAH Equipment)
 - 2) HTE0054 (HOU Equipment)
 - 3) ETE0054 (EFD Equipment)

C. Labeling

- 1. Labeling should follow the identification schema and further be accomplished via the use of below specified labeling device or approved equivalent:
 - a. DYMO rhinoPRO 5000 Industrial Label Maker
 - b. 3/4" Flexible Industrial Strength Nylon label tape - yellow
 - c. Labels should be affixed to the splice enclosure housing.
 - d. Label placement should be affixed to or as near to equipment as possible.

D. Required Fields

- 1. All equipment requires that specific data be collected per unit. GPS equipment should be formatted to account for this information.
 - a. EQUIPMENT_ID
 - b. TELECOM_ID
 - c. SYMANTEC_TICKET
 - d. CABLE_ID
 - e. TELECOM_CABLE_ID
 - f. LEGACY_CABLE_ID
 - g. AIRPORT
 - h. AGENCY
 - i. PROJECT
 - j. PROJECT_CLASS
 - k. COLLECTION_DATE
 - l. COMMENTS
 - m. LEGACY_ID
 - n. EQUIPMENT_TYPE

o. HAS_LEVEL

E. GPS

1. No action required for ISP equipment
2. Each splice enclosure (OSP) should be recorded as follows:
 - a. Single shots; taken on-center. Offset shots or other means of location are acceptable for splice enclosures not available to satellite coverage but these shots or options must be coordinated with an HAS-IT GIS contact prior to.

F. Supporting Documentation Deliverables

1. AutoCAD – one-line diagram of ACCESSIBLE for splice enclosures depicting cable identifiers, connections and cable counts for each splice enclosure in both .dwg 2010 or higher and .pdf formats; (See AutoCAD splice enclosure exhibit).
2. AutoCAD – rackface layouts of structure units depicting orientation, and/or configurations in both .dwg 2010 or higher and .pdf formats; (See AutoCAD communications room exhibit).

G. Spatial Data Deliverables

1. The entire equipment inventory should be delivered separately in ArcGIS feature class (version 10.x) for- mat along with any records outlined in the ‘Supporting Documentation’ paragraph. This feature class (EQUIPMENT) should contain the attribute values from the ‘Required Fields’ paragraph.

H. Special Instructions

1. Do not attempt to open a splice enclosure that appears to be in a fragile state or does not provide for ready access (sealed). Note in ‘comments’ field that the enclosure was inaccessible.
2. Do not move, adjust ‘live’ equipment in order to identify or label. Ask for assistance from qualified HAS Technology Infrastructure personnel.
3. Do not disconnect cabling in order to identify or label. Ask for assistance from qualified HAS Technology Infrastructure personnel.

I. Outlets

1. Identification
 - a. Each outlet-faceplate is identified specific to its servicing IDF; regardless of the number of outlets within a given location. All outlet-faceplate ports are labeled to correspond with the servicing IDF panel port. Note: These space identifiers are architectural identifiers and are designated by reference to the HAS Infrastructure schema for identifying building spaces. This is not a GIS Technology Infrastructure database identifier.
 - b. Example Outlet-Faceplate Identifier:
 - 1) S103.1

- c. In the event that a determination cannot be made regarding the identity of the outlet, please contact the HAS IT GIS representative prior to documenting.

2. Labeling

- a. Outlet label placement 2-port: under top-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right.



- b. Outlet label placement 3-port: under top-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right. Under bottom-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right.



- c. Outlet label placement 4-port: under top-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right. Under bottom-

aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right. Follow 3-port example.

- d. Outlet label placement 6-port: under top-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right. Any mid-faceplate ports will require an adhesive label - servicing IDF identifier over port identifiers. Ports should be identified left-to-right. Under bottom-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right. These types of outlets are ‘Non-Standard’.

3. Required Fields

- a. No action required

4. GPS

- a. OSP – No GPS action required ISP – No GPS action required

5. Supporting Documentation Deliverables

- a. Additional documentation records are required to support iPatch data. The documentation is as follows:
- b. AutoCAD – floorplan (where applicable) depicting outlet locations; (See AutoCAD communications room exhibit.).

6. Spatial Data Deliverables

- a. No action required

7. Special Instructions

- a. Outlets are visibly marked with a reference tag indicating the outlet identifier. Additionally any port associated to the outlet is identified with a port number related specifically back to its respective servicing equipment. Newly placed outlets will require that their identifiers be affixed to the outlet face. Utilize specified labeling device to accomplish the task.

J. Door Contacts

1. Identification

- a. Each door-contact sensor (without card-reader) is identified by an alpha-numeric sequence specific to its location. All door-contact identifiers are coded with building or complex character, followed by level character, followed by numerical sequence character, followed by ‘CCM’ designation. ‘CCM’ is an acronym for ‘Control Contact Monitoring.’
- b. Example Outlet-Faceplate Identifier:

- 1) B-2057CCM

- c. In the event that a determination cannot be made regarding the identity of a door contact, please contact the HAS IT Project Manager prior to documenting.
 2. Labeling
 - a. Door-contacts (without card-reader) require identifier plates per ‘Special Instruction’ specification below
 3. Required Fields
 - a. TBD
 4. GPS
 - a. OSP – No GPS action required ISP – No GPS action required
 5. Supporting Documentation Deliverables
 - a. AutoCAD floorplans indicating door contact location including label plate identifier annotation
 6. Spatial Data Deliverables
 - a. No action required
 7. Special Instructions
 - a. Install Black Lexan Label Plate: sized 1 ½” X 4”, black background, white lettering and Door Alarm Identifier engraved (i.e. B-2057CCM). Locate plate on door frame above contact. Clean door frame prior to placement. Affix with 3M double-sided tape.
 - b. Provide paper and electronic copies (.pdf format) of all Electronic Lock Permits and Submittal Documents for any door requiring City of Houston door lock permit to the HAS IT Project Manager prior to Acceptance Testing.

K. Card Readers

1. Identification
 - a. Each electronic lock is identified by an alpha-numeric sequence specific to its location. All electronic lock identifiers are coded with building or complex character, followed by level character, followed by numerical sequence character.
 - b. Example Outlet-Faceplate Identifier:
 - 1) C-1015
 - c. In the event that a determination cannot be made regarding the identity of a door contact, please contact the HAS IT Project Manager prior to documenting.
2. Labeling

- a. Electronic locks require identifier plates per ‘Special Instruction’ specification below
3. Required Fields
 - a. TBD
4. GPS
 - a. OSP – No GPS action required ISP – No GPS action required
5. Supporting Documentation Deliverables
 - a. AutoCAD floorplans indicating card reader location including label plate identifier annotation
6. Spatial Data Deliverables
 - a. No action required
7. Special Instructions
 - a. Install Black Lexan Label Plate: sized approximately 3 ¼” X 5 ½”, black background, white lettering and Card Reader Identifier engraved (i.e. C-1015). Affix plate to single-gang cabinet with 5/32” screws.
 - b. Provide paper and electronic copies (.pdf format) of all Electronic Lock Permits and Submittal Documents for any door requiring City of Houston door lock permit to the HAS IT Project Manager prior to Acceptance Testing.

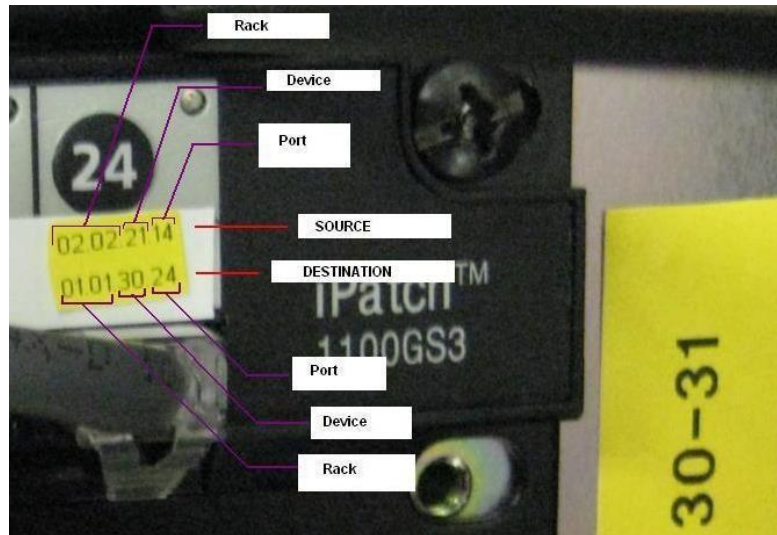
3.8 CONNECTIONS

A. Ports

1. Identification

- a. Each port has been assigned an identifier; combined with the equipment identifier, the sequence becomes unique. Therefore, port identifiers may be replicated on separate pieces of equipment because again, the true and complete port ID is coupled to the equipment ID.
- b. Example:
 - 1) 100.20.01.02.35-39 (equipment ID) + FP03 = 100.20.01.02.35-39
FP03
 - 2) 100.25.01.01.12-17 (equipment ID) + FP03 = 100.25.01.01.12-17
FP03
- c. All ports are identified through a numerical range specific to its respective equipment. Ports may be pre-fixed with ‘FP’ (fiber port) or ‘CP’ (copper port) as is pertinent to the cable category and space allows on the equipment.

- d. Regarding service outlets: ports are identified via reference to IDF and IDF equipment (see Outlet). This data should be recorded in the Excel data record tables.
- e. Regarding termination panels: ports are identified according to equipment port capacity.
- f. Regarding patch panels: ports are identified in sequence and may be prefixed with structure identifier references.
- g. Regarding switches: ports are identified in sequence and may be prefixed according to cable compatibility; i.e. 'FP' or 'CP'. The port sequence should follow left-to-right and top-to-bottom.
- h. Regarding devices housing multiple blades: ports are identified in sequence as related to respective blades and may be prefixed according to cable compatibility; i.e. 'FP' or 'CP'. The port sequence should follow left-to-right and top-to-bottom.
- i. Regarding SYSTIMAX (iPatch) 'equipment panels': ports are identified with a source-over-destination, (panel-to-panel) schema and inclusive of rack/cabinet (structure-unit) identifiers.
- j. Regarding SYSTIMAX (iPatch) 'service panels': ports are identified in sequence and may be prefixed with structure identifier references.



- k. All port identifiers follow some specific schema; new ports must be identified accordingly. In the event that a determination cannot be made regarding the identity of the port, please contact the iPatch database administrator prior to documenting.

2. Labeling



- a. Regarding switches: generally space does not allow for switch port labeling; ports must be identified how- ever in order to correlate circuit connectivity to/from/through the device.

- b. Labeling should follow the identification schema and further be accomplished via the use of below specified labeling device or approved equivalent:
 - 1) DYMO rhinoPRO 5000 Industrial Label Maker
 - 2) 3/4" Flexible Industrial Strength Nylon label tape - yellow
 - c. Labels should be affixed to applicable port locations. Not all ports allow for label placement but these ports should be identified and recorded as part of iPatch SOP; respective to cable or equipment.
3. Required Fields
- a. Each port requires that its relationship be established between cable and equipment via use of the iPatch cut sheet (see Exhibits – iPatch SOP.pdf).
4. GPS
- a. No action required
5. Supporting Documentation Deliverables
- a. ISP cabling/port configurations (see Exhibits – iPatch SOP.pdf)
6. Spatial Data Deliverables
- a. No action required
7. Special Instructions
- a. Careful attention should be given to accurately accounting for and recording relationships established between ports – cable, and ports – equipment.

3.9 STANDARD OPERATING PROCEDURES – BEST PRACTICES

A. Data Collection Methodology

- 1. This section includes a general outline of procedures that can be utilized towards the collection and processing of HAS' IT physical data requirements. The outline establishes some of the recommended methods which have proven to be most successful during previous data collection cycles.
- 2. This guide does not mandate adherence to these methods provided that the contracting party can determine a like process to produce the intended results. Said process must however provide for the specific formatting of all aforementioned physical data deliverables including data record tables, .DWF / .DWG, .PDF, feature class, feature class, and photo imagery.

B. Outside Plant

1. Identify outside plant network locations as defined by project scope of work including all structures, pathways, cable and equipment. This requires extensive communication and coordination with HAS air- port campus authorities before and during the evolution. Contracting parties will be provided with respective contact information prior to commencement of data collection effort.
2. Coordinate with HAS IT representative to determine existing network identifiers and to specify any new network identifiers that must be incorporated into data deliverables.
3. If applicable to the GPS equipment that will be utilized to collect data, format custom projections to cam- pus, format code-list.
4. GPS locate structures; ensure all attribute fields are populated. For MH, HH produce field sketch - butter- fly layout depicting pathways unit counts orientation; cable types / counts, location. These field sketches should be used to create AutoCAD .DWF / .DWG deliverables.
5. Produce photo imagery
6. GPS locate all splice enclosures, slack loops.
7. Label all end-equipment, splice enclosures, slack loops, cable, pullboxes, cabinets, pedestals. Stamp all MH, HH per guidelines.
8. GPS locate pathways; ensure all attribute fields are populated.
9. Physically locate outside plant associated equipment; ensure all attribute fields are populated.
10. Building Access Points can be approximated where the PATHWAY intersects the building face for purposes of GPS data collection; single-shot.
11. GPS locate cable routing; ensure all attribute fields are populated including end-equipment identifiers.
12. QA/ QC to ensure that all data relationships have been established; i.e. equipment-structure, structure- pathways, pathways-cable and that all attribute fields have been populated.
13. Finalize, format deliverables

C. Inside Plant

1. Identify inside plant network locations as defined by project scope of work including all structures, cable and equipment. This requires extensive communication and coordination with HAS airport campus authorities before and during the evolution. Contracting parties will be provided with respective contact information prior to commencement of data collection effort.
2. Coordinate with iPatch database administrator to determine existing network identifiers and to specify any new network identifiers that must be incorporated into data deliverables.
3. Prepare field sketch (floorplan, rackface) of interior space and equipment. Document and dimension structure space and contents required to generate layouts for the floorplan, cable ladder, conduit, room details, and Install details. Rackface layouts should be created in a separate document. These field sketches should be used to create AutoCAD .DWF / .DWG deliverables.
4. Label all structure units, cable and equipment per guidelines.
5. Record information specific to iPatch SOP for structure units, equipment, cable; this process will be covered in depth at the coordination meeting held prior to commencement of data collection effort. This in- formation establishes infrastructure relationships that will be used to model the communications environment.
6. Test Cable.

7. QA/ QC to ensure that all data relationships have been established; i.e. structure – structure, structure – structure units, structure units – equipment, equipment – ports, ports – cable.
8. Finalize, format deliverables.

END OF SECTION 27 05 53

SECTION 27 11 00
COMMUNICATIONS CABINETS AND EQUIPMENT ROOMS

PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes the specifications for constructing and building out of Telecommunications Equipment Rooms (MDF/IDFs) to be used for supporting telecommunications and other special systems.
- B. Upon completion of the installation, a third-party field verification firm will independently verify the installation for compliance to the TIA/EIA-568 standard and/or additional requirements as stated in this specification. Contractor shall be responsible for fully rectifying all indicated faults by the third-party field verification firm in accordance with the approved project schedule

1.2 RELATED SECTIONS:

- A. Specification 270553: Identification and Labeling of Communication Infrastructure
- B. Specification 271300: Backbone/Riser Media Infrastructure
- C. Specification 271500: Horizontal Media Infrastructure
- D. Specification 272100 Data Communication Network Equipment
- E. Specification 272200 PC, Laptop, and Server Equipment
- F. Specification 270528: Interior Communications Pathways
- G. Specification 270543: External Communication Pathways
- H. Specification 270526: Telecommunications Grounding and Bonding

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

- C. Conflicts:
 - 1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
 - 2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.
- D. Telecommunications Industry Association /Electronic Industries Association (TIA/EIA) 568-D - Commercial Building Telecommunications Wiring Standards.
- E. TIA/EIA-569-B -Commercial Building Standard for Telecommunications Pathways and Spaces.
- F. ANSI/TIA/EIA 607-B -Commercial Building Grounding and Bonding Requirements.
- G. Underwriters Laboratories (UL®) Cable Certification and Follow Up Program.
- H. National Electrical Manufacturers Association (NEMA).
- I. National Electric Code (NEC®).
- J. UL Testing Bulletin.
- K. Houston Airport System Standards and Specifications

1.4 DEFINITIONS AND ABBREVIATIONS

- A. Asynchronous Transfer Mode - ATM
- B. American Wire Gauge – AWG
- C. Computer Aided Drafting - CAD
- D. Polyvinyl Chloride – PVC
- E. Megabits per second - Mbps
- F. Main Distribution Frame – MDF
- G. Intermediate Distribution Frame - IDF

1.5 SUBMITTALS

- A. Contractor shall submit the proposed layout for each communications room in the airport. This should be in accordance with the drawings in for a “typical” room layout and is required for every room.
- B. The contractor will need to submit proposed layout and as-build drawings that depict the complete layout of each communications room prior to implementation. Drawings must be entered into the ECN process

- C. Shop Drawings and Systems cutover schedules for all services to be submitted and approved before implementation is started. Shop Drawings to be submitted in accordance with Specification 01340.
- D. Record Drawings: Furnish CAD drawings of all installed equipment within each communications room. All CAD work performed as part of the design effort shall be in compliance with the current City of Houston CAD standards as well as the U.S. National CAD Standard. This should apply to all CAD layering, symbols, etc.
- E. Include spares list to be approved by HAS IT Project Manager for approval.

1.6 QUALITY ASSURANCE

- A. Furnish, erect, install, connect, clean, adjust, test and condition all manufactured articles, materials, and equipment, and place in service in accordance with the manufacturer's directions and recommendations except as otherwise indicated in the contract documents.
- B. See Appendix A – MDF/IDF Readiness Checklist
- C. See Appendix B – Typical Inspector Checklist

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. MDF space allocation shall be a minimum of 1000 sqft.
- B. IDF space allocation shall be a minimum of 250 sqft.
- C. The manufacturers and specific part numbers listed in this section are provided as an aid in the RFP process and are not meant to preclude other manufacturers that may be qualified to provide communications components. Other manufacturers with comparable qualifications may be proposed but shall be subject to review as an approved equivalent.

2.2 RELAY RACKS

- A. Manufacturer: Chatsworth or submitted and owner-approved equivalent.
- B. Seven-foot double-sided, high cable density style relay rack shall comply with following specifications:
 - 1. 19" rack width
 - 2. Double-sided universal mounting spacing
 - 3. #12-24 panel mounting holes
 - 4. Conformance to EIA-310-D
 - 5. Self-squaring with tapped assembly holes
 - 6. Material: aluminum extrusion
 - 7. Provide Horizontal and Vertical wire management

8. Finish: Black Finish
9. Part number: 55053-703
10. Isolation kit for mounting
11. Power Strip – Chatsworth or owner approved equivalent QTY (2) Horizontal Metered Power Strip (Part # 13239-755) Input Nema 5-20P; Output (12) Nema 5-20R
12. All Cabinets/Rack are to have a 24-port standard RJ45 patch panel installed with 12 ports cabled back to the Horizontal cable cabinet on an approved patch panel

2.3 FREESTANDING VERTICAL EQUIPMENT CABINETS

A. Manufacturer: Chatsworth F Series Gen 3 cabinets or submitted and owner-approved equivalent.

B. General

1. The work covered here consists of the furnishing of all necessary labor, supervision, materials, accessories, parts, equipment, and services to provide and install a complete freestanding equipment cabinet.
2. The standard freestanding equipment cabinets are defined to include, but not limited to, cabinet frames, cabinet front and rear doors, top and side panels.
3. All internal cabinetry hardware shall be 19-inch rack mountable.
4. Provide and install freestanding vertical cabinets, with hinge placement as indicated in the Drawings.
5. Provide vertical and horizontal wire management for all cabinets
6. All cabinets once installed must have padlock eyes installed on front and back cabinet doors.
7. All Cabinets/Rack are to have a 24-port standard RJ45 patch panel installed with 12 ports cabled back to the Horizontal cable cabinet on a iPatch panel.

C. Standard Network cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.
 - a. Chatsworth part # TS1023813 – 45RU; 800mm W; 1075mm D; F Series Gen 3
 - 1) 12-24 Tapped sliding rails / 2-pair
 - 2) Single perforated metal front door with swing latch w/padlock feature
 - 3) Double perforated metal rear door with swing latch w/padlock feature
 - 4) Network / One-piece / 4 cable openings
 - 5) Two solid two-piece side panels
 - 6) 6-slide
 - 7) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
 - 8) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
 - 9) Glacier white
 - b. All Network cabinets to have 24 iPatch panel installed. See Specification 271500
 - c. PDU Power Strips:

- 1) Core Switch Cabinet QTY (2) Chatsworth Vertical eConnect Monitored Pro

PDU's (Part # P4-1F0C3) Input Nema L6-30P; Output (18) C13s and (6) C19s.
And (1) Horizontal Metered Power Strip (Part # 13239-755) Input Nema 5-20P; Output (12) Nema 5-20R.

- 2) All other Cabinets QTY (2) Chatsworth Vertical eConnect Monitored Pro PDU's (Part # P4-1D0A5) L5-30P input; output (24) 5-20Rs.

2. Grounding Bus Bar:

- a. Provide Rack-Mounted Ground Bar. See Specification 270526

D. Standard Server Cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.

- a. Chatsworth part # TS1023812 – 45RU; 600mm W; 1200mm D; F Series Gen 3

- 1) Square-punched rails / 2-pair
- 2) Single perforated metal front door with swing latch w/padlock feature
- 3) Double perforated metal rear door with swing latch w/padlock feature
- 4) Server / Two -piece / 4 cable openings
- 5) Two solid two piece side panels
- 6) 6-slide
- 7) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
- 8) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
- 9) Glacier white

- b. All Server cabinets to have 24 patch panel installed. See Specification 271500 PDU

- c. PDU Power Strips:

- 1) Server Cabinet QTY (4) Chatsworth Vertical eConnect Switched Pro PDU's (Part # P6-1F0C3) Input Nema L6-30P; Output (18) C13s and (6) C19s.

2. Grounding Bus Bar:

- a. Provide Rack-Mounted Ground Bar. See Specification 270526

E. Data Center Network cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.

- a. Chatsworth part # TS1023649 – 45RU; 800mm W; 1200mm D; F Series Gen 3

- 1) 12-24 Tapped sliding rails / 2-pair
- 2) Single perforated metal front door with swing latch w/padlock feature
- 3) Single Solid metal rear door with swing latch w/padlock feature
- 4) Vertical Exhaust Duct System 34in-60in H (863mm-1523mm)
- 5) Network / One-piece / 4 cable openings
- 6) Two solid two piece side panels
- 7) 6-slide

- 8) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
 - 9) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
 - 10) Bottom Panel Installed
 - 11) Air Detector Installed
 - 12) No Casters
 - 13) No Leveling Feet
 - 14) Glacier white
- b. All Network cabinets to have 24 iPatch panel installed. See Specification 271500
 - c. PDU Power Strips:
 - 1) Data Center Switch Cabinet QTY (2) Chatsworth Vertical eConnect Switched Pro PDUs (Part # P6-1F0C3) Input Nema L6-30P; Output (18) C13s and (6) C19s.
 - 2) And (1) Horizontal Metered Power Strip (Part # 13239-755) Input Nema 5-20P; Output (12) Nema 5-20R.
2. Grounding Bus Bar:
 - a. Provide Rack-Mounted Ground Bar. See Specification 270526
- F. Data Center Server Cabinet:
1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.
 - a. Chatsworth part # TS1023645 – 45RU; 600mm W; 1200mm D; F Series Gen 3
 - 1) Square-punched rails / 2-pair
 - 2) Single perforated metal front door with swing latch w/padlock feature
 - 3) Single Solid metal rear door with swing latch w/padlock feature
 - 4) Vertical Exhaust Duct System 34in-60in H (863mm-1523mm)
 - 5) Server / Two -piece / 4 cable openings
 - 6) Two solid two-piece side panels
 - 7) 6-slide
 - 8) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
 - 9) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
 - 10) Bottom Panel Installed
 - 11) Air Detector Installed
 - 12) No Casters
 - 13) No Leveling Feet
 - 14) Glacier white
 - b. All Server cabinets to have 24 patch panel installed. See Specification 271500 PDU
 - c. PDU Power Strips:
 - 1) Server Cabinet QTY (4) Chatsworth Vertical eConnect Switched Pro PDUs (Part # P6-1F0C3) Input Nema L6-30P; Output (18) C13s and (6) C19s.

2. Grounding Bus Bar:
 - a. Provide Rack-Mounted Ground Bar. See Specification 270526

G. Standard Wall Mount Cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.
 - a. Chatsworth (Cube-IT) 12U/19U/26U 11890-x24/36/48 screw/round hole or approve
 - b. PDU Power strip:
 - c. Provided Vertical wire management
2. Grounding Bus Bar:
 - a. Provide Rack-Mounted Ground Bar. See Specification 270526

H. Co-location Cabinet – three compartment: Chatsworth Part #TS1034205 Rev B

1. Dimensions - 600MM W X 800MM D (650MM useable due to 150mm D cable raceway)
2. Provide Rack-Mounted Ground Bar. See Specification 270526
3. 12-24 Tapped sliding rails / 2-pair
4. Single perforated metal front doors (with beam) per compartment
5. Single perforated metal rear door per compartment; swing handle latches, with hasp lock
6. Standard top panel
7. Glacier white finish

I. Co-location Cabinet – two compartment: Chatsworth Part #TS1034203 Rev B

1. Dimensions - 750MM W X 800MM D (650MM useable due to 150mm D cable raceway)
2. Provide Rack-Mounted Ground Bar. See Specification 270526
3. 12-24 Tapped sliding rails / 2-pair
4. Single perforated metal front doors (with beam) per compartment
5. Single perforated metal rear door per compartment; swing handle latches, with hasp lock
6. Standard top panel
7. Glacier white finish

2.4 WALL BACKBOARDS

- A. All walls in telecommunication rooms (MDF/IDF's, Tenant etc.) will be covered with ¾ inch plywood installed in 4 x 8 sheets.
- B. Plywood shall be A/C grade or better void-free with A grade side facing out.
- C. Plywood shall be fire-rated and treated on all sides with at least 2 coats of fire-resistant light-colored paint. Do not paint the fire-rated stamp on the plywood, leave that area exposed.
- D. Plywood to be installed 6 inches above finished floor or raised deck.

2.5 IDENTIFIERS, LABELS AND LABELING SYSTEM

- A. All Identification and Labeling shall follow Specification: 270553–Identification and Labeling of Communication Infrastructure. **Any deviation from the specification must be approved by HAS IT prior to installation.**

2.6 Energy Efficient Lighting for IDFs

A. General

1. The work covered here consists of the furnishing of all necessary labor, supervision, materials, accessories, parts, equipment, and services to provide and install a complete lighting system.
2. Lights shall be LED and controlled by an occupancy sensor so lights are turned off when the room is not occupied.

2.7 Energy Efficient Lighting for MDFs Computer rooms

- A. Manufacturer: Columbia Lighting or submitted and owner-approved equivalent.

B. General

1. The work covered here consists of the furnishing of all necessary labor, supervision, materials, accessories, parts, equipment, and services to provide and install a complete lighting system.
2. System must be cabled to the HAS network so it can be remotely managed.
3. System must be configured with installed occupancy sensors, to facilitate the lights being turned off when the room is not occupied.

C. Lighting System

1. Columbia Lighting (division of Hubbell Lighting) fixture RLA22.
2. At least one fixture must provide emergency lighting in case of a power outage.
3. All UTP cabling must follow section 271500 and all other HAS standards.

PART 3 – EXAMINATION

3.1 VERIFY FOR MINIMUM CRITERIA

- A. Verify the following:

1. Minimum size of MDF is 1000 sqft.
2. Minimum size for IDF is 250 sqft.
3. HAS does not share MDF/IDF space with any other tenant and must be separated by a physical barrier be it a fence or wall. All tenants communication systems cabling and equipment shall be installed in the HAS controlled tenant space, as defined in the third item in this section. This shall apply to all tenants that do not have a dedicated MDF or IDF space for their individual telecommunications systems.

4. Conduit, raceways, and boxes are properly installed in accordance with BISCII recommended practices, ANSI/TIA/EIA 569B standards, and the City of Houston Intercontinental Airport Premises Distribution System Design Standards.
5. Conduit is minimum 1 -inch diameter.
6. Main grounding system is properly installed and tested.
7. The MDF is equipped with a smoke detector connected to the building alarm fire panel.
8. Portable fire extinguishers are provided and maintained within 75 feet travel distance from any part of the occupied space within the MDF per local code requirements. The size of the extinguisher shall be a minimum rating of 2-A:10-B:C
9. Ceiling protrusions have been placed to assure a minimum clear height of 8 feet 6 inches to provide space over the equipment frames for cables and suspended racks.
10. The doors are a minimum of 3 feet wide by 6 feet, 7 inches tall. If it is anticipated that large equipment will be delivered to the MDF, a double door 6 feet wide by 7 feet, 5 inches tall is recommended. The doors shall be keyed separately from other facility keys. Preferred method for keying communication room is badge access, limited to only IT personnel and related vendors. Doors shall open outward and be lockable. Access shall allow for future equipment changes. Door shall be fire rated for a minimum of one hour, or more as required by local code requirements.
11. Signage is consistent with Houston Airport System
12. The floor is sealed concrete or tile to minimize dust and static electricity. Carpet is strictly prohibited.
13. Floor loading capacity in the MDF is designed for a minimum distributed load rating of 100 lbf/ft² and a minimum concentrated load rating of at least 2000 lbf.
14. All HVAC systems that provide environmental conditioning (24 hours per day, 365 days per year) and UPS shall be connected to a motor generator for those cases of extend power outages.
15. The air handling system for MDF/IDF equipment rooms is designed to provide positive air flow and cooling even during times when the main building systems are shut down. This may require separate air handlers and/or small stand-alone cooling systems that are thermostatically controlled in this space.
16. Heating, ventilation, and air conditioning sensors and control equipment are located in the MDF/IDF.
17. The room temperature is between 64°F and 75°F, with a relative humidity between 30% and 55%.
18. Designer to provide heat load analysis for all equipment cabinets. Designer must use 100% name plate specifications to perform the heat load analysis. Note: Heat load with xx% diversity load factor is not recognized by HAS Technology.
19. The MDF/IDF is protected from contaminates and pollutants that could affect operation and material integrity of the installed equipment. When contaminates are present in concentrations greater than indicated in ANSI/TIA/EIA 569-A, Table 8.2-2, vapor barriers, positive room pressure or absolute filters shall be provided.
20. Positive air pressure differential is maintained with respect to surrounding areas.
21. Lighting to provide a minimum equivalent of 50 foot-candles when measured three feet above finished floor. The light fixtures shall be mounted a minimum of 8 feet, 6 inches above the finished floor. The light switches are located near the entrance of the MDF/IDF. Power for the lighting is from the same circuits as power for the telecommunications equipment. Emergency lighting has properly been placed that an absence of light will not hamper emergency exit. Lights must be energy efficient LED lights control by approved room lighting system utilizing UTP cabling.

22. The MDF/IDF cabinets are equipped with a minimum of two dedicated electrical circuits appropriately sized for equipment to be installed. Separate duplex 120V AC convenience outlets (for tools, test sets, etc.) shall also be installed at 18 inches above the finished floor at 6-foot intervals around perimeter walls. The outlets shall be on non-switched circuits and they shall be identified and labeled.
23. The MDF/IDF is provided with an electrical ground on a 4-inch or larger busbar as defined by NEC Article 250-71(b). The busbar shall be mounted 6 feet, 6 inches above the finished floor if ladder racking is included in the design. If ladder racking is not part of the design, the busbar shall be located near, but not behind, the riser sleeves between floors. This grounding bar is connected to a main building ground electrode, reference ANSI/EIA/TIA-607. (Refer to Specification 270526)
24. Connection between the MDF and IDF will be connected with both unshielded twisted pair Category 6 cable, when distance is less than 90 meters and fiber optics cable if the distance is beyond 90 meters. Fiber optics cable should include single-mode and multi-mode. The type of cable, actual count and termination of the fiber will be determined at the planning stage, taking into consideration the amount of network traffic between closets, the distance between the communications rooms and the difficulty of running other cables at future dates.
25. The MDF/IDF is equipped with a single Room wide Eaton Uninterruptible Power Supply that supports all active electronics for a minimum of 30 minutes. Eaton UPS will be connected to an emergency power such as motor generators for those cases of extend power outages. Designer to size for 50% growth.
26. All walls of MDF/IDF are lined with Trade Size 3/4-inch AC-grade plywood, 8 feet high. Plywood will be mounted vertically starting 6 inches above finished floor and shall be securely fastened to the wall-framing members. Plywood to be fire treated and painted with two coats fire-retardant paint. Do not paint the fire-rated stamp on the plywood, leave that area exposed.
27. Additional equipment such as fire alarm panels and/or building monitoring devices are not be housed in the MDF/IDF. Separate space for these services can be provided as part of the electrical room or in a separate space.
28. These rooms shall be on separate fire protection loops, and a "dry" fire protection system such as FM-200 or Inergen for MDF and pre-action for IDF's shall be used. However, an acceptable alternative for intermediate special systems rooms is a "dry" pipe sprinkler system, or no fire protection if enclosed by fire rated walls.
29. Access to the MDF/IDF shall be directly from hallways, not through offices, janitorial or mechanical rooms.
30. The MDF/IDF is located as close as possible to the center of the area served and preferably in the core area.
31. The MDF/IDF is located in any place that may not be subject to water or steam infiltration, humidity from nearby water or stream, heat, and any other corrosive atmospheric or environmental conditions.
32. The MDF/IDF is not located near electrical power supply transformers, motors, generators, x-ray equipment, radio transmitters, induction heating devices, and other potential sources of electromagnetic interference.
33. The MDF/IDF does not share space in or be located near or below electrical closets, boiler rooms, washrooms, janitorial closets, and storage rooms.
34. All new BDF, MDF, and/or Computer room spaces shall use Panduit fiber runner pathway to manage fiber optic patch cords between cabinets.
35. If any of these items are not provided, contact the HAS/IT representative.

3.2 INSTALLATION

- A. Install work following drawings, manufacturer's instructions, and approved submittal data.
- B. All installation shall be done in conformance with TIA/EIA 569B and BICSI installation guidelines. Failure to follow the appropriate guidelines will require the Contractor to provide, in a timely fashion, the additional material and labor necessary to properly rectify the situation.
- C. The contractor shall adhere to the installation schedule of the general contractor and should attend all construction meetings scheduled by the general contractor.
- D. As a general practice for rack mounted equipment, the contractor shall run power cables, control cables, and high-level cables on the left side of an equipment rack as viewed from the rear. The contractor shall run other cables on the right side of an equipment rack as viewed from the rear. For equipment mounted in drawers or on slides, provide the interconnecting cables with a service loop of not less than three feet and ensure that the cable is long enough to allow full extension of drawer or slide.
- E. All racks and cabinets shall be floor mountable by design and permanently fixed to the floor with bolt-down kits. Manufacturer's procedures for floor mounting should be followed. Multiple racks and cabinets shall be connected together directly or indirectly via horizontal cable management hardware as indicated by drawings.
- F. A minimum of 2 feet shall be left at the end of the row of equipment bays. A minimum of 5 feet between walls and equipment bays will allow space for wall mounted copper cable terminations and the required 36" distance from equipment for workspace.

3.3 CONTRACTOR'S FIELD QUALITY CONTROL

- A. The contractor shall be responsible for performing field inspections to ensure that all communications are installed in accordance with the contract drawings, specifications, and City of Houston requirements prior to the performance of field inspections by the City.
- B. Should there be any discrepancies or a question of intent, refer the matter to the City for a decision before ordering any equipment, materials or before starting any related work.
- C. The City shall perform field inspections and note all discrepancies that must be corrected prior to system acceptance.

END OF SECTION

Appendix A

This list below is intended as a minimum checklist. CM should ensure that the contractor's schedule has built in these components and the necessary buffer period – and associated access restrictions to the communications equipment rooms -- for HAS IT and tenant IT to prepare.

1. All communication rooms that will service the area to be opened must be completed. That means a final walkthrough of these areas has been completed. It is not necessary that the entire project achieve substantial completion, but IT cannot install equipment and begin work until the following minimum criteria is met:
 - a. Space is built out and clean – free from dust/residues.
 - b. Electrical w/UPS as required.
 - c. All racks/cabinets installed and mounted. Padlocks eyes have been installed.
 - d. Grounding bus bar installed and properly tied to main grounding bus bar in MDF
 - e. HVAC functioning properly and is adequately filtering dust. Humidity is controlled.
 - f. Door access control is installed (card reader) -or- an approved temporary provision. Card reader access with a blank core installed in all MDF/BDF/IDF doors.
 - g. Lighting is installed and operational.
 - h. Cable trays/ladder racks installed and ready to use.
 - i. Permanent or temporary signage identifying permanent room number.

<p>2. All cabling necessary to operate the areas to be opened is completed.</p> <ol style="list-style-type: none"> a. Backbone cabling (copper and fiber) from the applicable communication room(s) is installed, tested, labeled, and approved by the inspector and communications design consultant. b. Horizontal cabling for all areas to be occupied is installed, tested, labeled, and approved by the inspector and communications design consultant. c. Copper cross connects and/or fiber jumpers have been installed per the owner/tenant requirements. d. Cable records and redline drawings for installed cables are submitted and approved PRIOR to putting any active circuits on the new cables. Cable records reflect all installed cables **and** any cross connects or jumper assignments installed by the contractor. e. All iPatch Panels are programmed and operational. f. All jumpers and patch cords specified by the contract are transmitted to the owner for use. g. NOTE: cable labels and permanent room numbers need to match. CM needs to be sure to get design team, airport, IT, and CM / contractor reps together to review permanent room numbers prior to contractor installing cable labels.
<p>3. Move-in buffer period needs to be minimum 6 weeks for HAS-IT to install/extend services within the area to be occupied prior to occupation of the facility or spaces. Additional time may be necessary if Tenant IT organization is involved, or if contractor has other systems that must be configured/tested which require HAS-IT resources (i.e. cabling or data network connections). This is frequently the case for PA System, television, radio, Fire Alarm, pay telephone, EFSO (Electronic Fuel Shutoff), access control & CCTV, etc.</p>
<p>4. Once HAS-IT accepts a communications equipment room and begins to install/configure equipment in preparation for hosting live applications, this room becomes a restricted area with access to be controlled by HAS-IT. Contractors must be substantially complete with systems <u>inside</u> the communications equipment room so that access is generally not required. Minor punch list and scheduled testing with escort can be arranged, but access will be very limited.</p>
<p>5. Other IT-related systems that must be operational, tested, and accepted or approved temporary provisions.</p> <ol style="list-style-type: none"> a. PA System b. MATV and/or CNN TV (where applicable) c. Fire Alarm d. MUFIDS e. Pay Telephones (where applicable) f. EFSO (where applicable) g. Access Control & CCTV (note: must be PROGRAMMED, and approved acceptance test walk through by HAS) h. Crash phone (where applicable) i. Radio system enhancements (where applicable) j. Data Network switch installed and configured.

Appendix B

IDF Number:		Date:		
Grounding & Bonding:		YES	NO	COMMENTS
	TGB properly installed			
	Proper grounding conductor installed (6AWG min.)			
	Cable trays properly bonded			
	Equipment Racks, Armored Cables & Cabinets properly bonded			
	Conduit properly bonded			
	Cabling properly bonded			
	Splice Cases properly bonded			
Horizontal Cabling:		YES	NO	COMMENTS
	Routing			
	Cables properly supported			
	Pull tensions properly recorded			
	Sheath damage			
	Bend radius observed			
	Pair twist meets spec			
	Proper termination scheme			
	Cable/jack part number meets spec			
	Plenum vs. PVC			
	Properly dressed in tray			
	Properly dressed in cable management			
	Cables bundled properly			
	Appropriate clearances observed (power)			
	Minimum amount of cable exposed at termination			

Backbone Cabling:		YES	NO	COMMENTS
	Fiber strain relief properly applied			
	Routing			
	Cables properly supported			
	Pull tensions properly recorded			
	Sheath damage			
	Bend radius observed			
	Properly dressed in tray			
	Fiber installed in inner duct			
	Properly dressed in termination shelf			
	Any splice cases properly supported			
Room Layout:		YES	NO	COMMENTS
	Room laid out according to project drawings			
	Proper clearances maintained			
	Is the room clean & neat in appearance			
	Liquid carrying pipes within the room			
Pathways:		YES	NO	COMMENTS
	Conduit properly routed & supported			
	Cable Tray properly routed & supported			
	Inner Duct used to route fiber and properly supported			
Labeling:		YES	NO	COMMENTS
	Grounding conductor			
	End-to-End labeling			
	Pair Count on Splice Case			
	Horizontal Cabling			
	Fiber Optic Cabling			

Other :		YES	NO	COMMENTS
	Appropriate fire stop material in place			
	Cabling test results submitted with proper information			
	Climate controlled environment (Temp. & Humidity)			
	Is the room access controlled			
Copper Cabling:				
	Total Pairs (Riser)			
	Pair Counts			
	Termination Type (66, 110, Protectors.)			
	Termination Location			
Fiber Optic Cabling:				
Multimode:				
	Total Strands			
	Termination Type (LC, SC)			
	Termination Location			
Single Mode				
	Total Strands			
	Termination Type (LC, SC)			
	Termination Location			

End of Appendix

SECTION 27 15 00
HORIZONTAL MEDIA INFRASTRUCTURE

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide a Structured Cabling System (SCS) for the purpose of supporting voice, data and video communications at various locations within the Houston Airport System. The Houston Airport System (HAS) has established Systimax as the standard for cabling infrastructure installations.
- B. Related Work:
 - 1. Section 27 05 53: Identification and Labeling of Communication Infrastructure
 - 2. Section 27 05 28: Interior Communication Pathways
 - 3. Section 271300: Backbone/Riser Media Infrastructure
 - 4. Section 270528: Interior Communication Pathways
 - 5. Section 270543: Exterior Communication Pathways
 - 6. Section 270526: Telecommunications Grounding and Bonding
 - 7. Section 272100 Data Communication Network Equipment
 - 8. Section 272200: PC, Laptop and Server Equipment

1.2 SUBMITTALS

- A. Qualifications: Demonstrate compliance with requirements of Paragraph 1.5, A below.
- B. Manufacturers' data, including part numbers, cut sheets and detailed descriptions, for all proposed equipment.
- C. Cable inventory data shall be submitted for all fiber, copper, and coaxial cabling and termination equipment. Reference Specification 27 05 53 for the Inside and Outside plant spread sheets. Information shall be provided on a CD.
- D. Shop Drawings to be submitted and approved before implementation is started. Shop Drawings to be submitted in accordance with Specification 01 34 00.
- E. Record Drawings: Furnish CAD drawings, following format in Section 01 34 00, of completed work including cable numbers. Refer to Specification 27 05 53 for labeling conventions. Contractor's on-site Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) supervisor shall review, approve and stamp all shop drawings, coordination drawings and record drawings.
- F. Include spares list to be approved by HAS IT Project Manager for approval.
- G. Cable Testing and Reports.

1. Submit Testing Plan prior to beginning cable testing.
 2. Submit certified test reports of Contractor-performed tests in accordance with paragraph 3.04. of this document.
 3. Electronic and hardcopy versions of test reports shall be submitted together and clearly identified with cable identification. Test results must be in both PDF and original raw format of approved tester.
 4. Test reports shall be reviewed, approved and with a stamped cover letter by the Contractor's on-site RCDD.
- H. Product data for all termination and test equipment to be used by Contractor to perform work.
1. Equipment shall be calibrated with traceability to National Institute of Standards and Technology (NIST) requirements.
 2. Contractor shall include copy of calibration and certification that equipment calibration meets NIST standards and has been calibrated at least once in the previous calendar year.
 3. Test equipment data shall be reviewed, approved and stamped by the Contractor's on-site RCDD prior to submitting.
 4. Refer to 3.4. in this document for test equipment requirements.
- I. Submit Technology Implementation Plan in accordance with 1.7 below.
- J. Submit Cable Pulling Plan, as follows:
1. Indicate the installed backbone conduit layout in schematic format, including junction boxes and distances between junction boxes.
 2. Indicate contents of each conduit.
 3. Indicate the cable pulling calculations, conduit fill ratios and actual cable runs and tensions.
 4. Cable Pulling Plan shall be reviewed, approved and stamped by the Contractor's on-site RCDD prior to submittal.
 5. Installation of cabling shall not commence prior to approval of the pulling plan and calculations by the Architect/Engineer.
- K. Submit installation plan indicating:
1. Equipment and personnel
 2. Materials and staging area
 3. Start and completion dates
 4. Locations, including floor, room and building
 5. Installation plan shall be reviewed, approved and stamped by the Contractor's on-site RCDD prior to submitting.

1.3 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate

supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

- C. Maintain temperature of between 64 degrees Fahrenheit and 75 degrees Fahrenheit and between 30 and 55 percent humidity in areas of active electronic system work.

1.4 REFERENCES

- A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
- B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect two weeks prior to the date of the Bidding Documents unless the document is shown dated.
- C. Conflicts.
 - 1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
 - 2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.
- D. References.
 - 1. ANSI/TIA/EIA-568-D, Commercial Building Telecommunications Wiring Standards
 - 2. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
 - 3. ANSI/TIA/EIA 607-B -Commercial Building Grounding and Bonding Requirements
 - 4. International Standards Organization/International Electromechanical Commission (ISO/IEC) DIS11801, January 6, 1994
 - 5. Underwriters Laboratories (UL) Cable Certification and Follow Up Program
 - 6. National Electrical Manufacturers Association (NEMA)
 - 7. American Society for Testing Materials (ASTM)
 - 8. National Electric Code (NEC) Latest Issue
 - 9. National Electrical Safety Code (NESC) Latest Issue
 - 10. Institute of Electrical and Electronic Engineers (IEEE)
 - 11. UL Testing Bulletin
 - 12. American National Standards Institute (ANSI) X3T9.5 Requirements for UTP at 100 Mbps
 - 13. SYSTIMAX Structured Cabling Systems, Performance Specifications, Latest Issue
 - 14. SYSTIMAX Structured Cabling Systems, Components Guide, Latest Issue
 - 15. BICSI Telecommunications Distribution Methods Manual (TDMM) Latest Issue
 - 16. Rural Utilities Service (RUS) Section 1755

1.5 QUALITY ASSURANCE

- A. Submit written proof that the following experience requirements are being met.

1. Contractor Qualifications
 - a. The contractor shall be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
 - b. Must be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC methods, standards and codes.
 - c. All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation. Resumes of the entire team shall be provided along with documentation of completed training courses.
 - d. The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.
 - e. The contractor who is installing the cabling infrastructure shall be a certified and currently registered Commscope/Systimax Premier Partner capable of issuing a numbered registration certificate for the entire cable system.
 - f. The contractor who is installing the cabling infrastructure shall have the following Systimax iPatch/imVision certifications:
 - 1) SP/ND3360 - SYSTIMAX SCS 360 Solutions
 - 2) SP/ND3321 - SYSTIMAX SCS Design & Engineering
 - 3) SP/ND3361 - SYSTIMAX SCS Installation and Maintenance
 - 4) GL5555 - SYSTIMAX SCS Certified imVision Support Specialist
 - 5) SP/ND5500 - SYSTIMAX SCS iPATCH Design & Engineering
 - 6) SP/ND5510 - SYSTIMAX SCS Certified iPATCH Support Specialist (CISS)
 - g. Cable splicing personnel shall have a minimum of five years splicing experience and shall have completed a minimum of five major splicing projects.
 2. Manufacturer's hardware experience: All components shall be produced by manufacturers who have been regularly engaged in the production of telecommunications cabling components of the types to be installed in this project for a period of five years.
- B. Materials and equipment: Equipment shall be rated for continuous operation under the ambient environmental temperature, humidity, and vibration conditions encountered at the installed location. The equipment shall meet the following requirements:
1. Interior controlled environment: 60 to 100 degrees F dry bulb and 20 to 90 percent relative humidity, non-condensing.
 2. Interior uncontrolled environment: 0 to 130 degrees F dry bulb and 10 to 95 percent relative humidity, non-condensing.
 3. Exterior environments: Minus 30 degrees to 130 degrees F dry bulb, and 10 to 100 percent relative humidity, condensing.
 4. Hazardous environment: All system components located in areas where fire or explosion hazards may exist because of flammable gas or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings, shall be rated and installed according to Chapter 5 of the NFPA 70 and as shown.
- C. Standard products:

1. Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of telecommunications cabling products and shall be the manufacturer's latest standard design in satisfactory use for at least one year prior to bid opening.
2. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

1.6 CONTRACTOR'S DUTIES

- A. Contractor's RCDD shall provide all calculations and analysis to support design and engineering decisions as specified in the Submittals section.
- B. Provide and pay for all labor, supervision, tools, equipment, test equipment, tests and services/programming to provide and install a complete inside and outside plant fiber and copper infrastructure system. Pay all required sales, gross receipts, and other taxes.
- C. Secure and pay for plan check fees, permits, fees, and licenses necessary for the execution of Work as applicable for the project.
- D. Give required notices.
- E. Comply with all codes, ordinances, regulations, and other legal requirements of public authorities that bear on performance of Work.

1.7 PROCUREMENT

- A. Procure equipment specified in this document as dictated by the timeline in Appendix A "Technology Implementation Schedule" in order to ensure that the technology is acquired in a timely fashion, but not outdated by the installation date.
- B. Submit a copy of Appendix A "Technology Implementation Schedule" as a part of the equipment submittals required elsewhere in this document. Complete the columns headed "Quantity", "Purchasing Lead Time", "Start Date or Dependent", and "Installation Duration".
- C. The "Procurement Lead Time" shall be expressed in days or weeks and shall include time required for the contractor's personnel to order and receive the material. Substantiation may be required.
- D. "Start Date or Dependent" and "Installation Duration" should be an accurate estimate based upon known facts in the project. Substantiation may be required.
- E. The Contractor shall not purchase any materials requiring submittals until the owner approves the product submittal and the Technology Implementation Schedule for that material.
- F. The Contractor shall not purchase any materials requiring submittals until the date established by the owner as the Purchasing Authorized Date. The Purchasing Authorized Date will be reflected in the "Purch Auth" column of Appendix A as a part of the Submittal Review process.

1.8 MAINTENANCE AND SUPPORT

- A. System Assurance: The System Assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that use the ANSI/TIA/EIA 568 or ISO/IEC IS 11801 component and link/channel specifications for cabling, for a twenty-year period.
- B. System Certification: Upon successful completion of the installation and subsequent inspection, the customer shall be provided with a numbered certificate, from the manufacturing company, registering the installation.
- C. Support Availability: The Contractor shall commit to make available local support for the product and system during the Warranty period.

1.9 EXTENDED WARRANTY

- A. The Extended Product Warranty shall meet all manufactures specification to ensure against product defects, that all approved cabling components exceed the specifications of ANSI/TIA/EIA 568 and ISO/IEC IS 11801, exceed the attenuation and NEXT requirements of ANSI/TIA/EIA 568 and ISO/IEC IS 11801 for cabling links/channels, that the installation will exceed the loss and bandwidth requirements of ANSI/TIA/EIA 568 and ISO/IEC IS 11801 for fiber links/channels, for a twenty year period. The warranty shall apply to all passive SCS components.
- B. The Extended Product Warranty and the System Assurance shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

1.10 DELIVERY AND STORAGE

- A. Equipment shall be delivered in original packages with labels intact and identification clearly marked.
- B. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.
- C. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior to system acceptance shall be replaced at no cost to the City.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include but are not limited to SYSTIMAX SCS and other manufacturers as referenced in this document. However, substitutions for Systimax products are not permitted.

2.2 GENERAL

- A. Provide all cabling, terminating hardware, adapters, and cross-connecting hardware necessary to interconnect all system equipment including equipment located in the Main Distribution Facility (MDF) and the Intermediate Distribution Facilities (IDFs).

2.3 COPPER CABLE GENERAL REQUIREMENTS

- A. Manufacturer Qualifications: ISO 9001 Certified and included in the Underwriters Laboratories LAN Certification and Follow-up Program.

2.4 COPPER HORIZONTAL CABLING

- A. Manufacturer: SYSTIMAX SCS XL7– XX71.
- B. All horizontal cabling shall meet or exceed the ANSI/EIA/TIA-568 Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components.
- C. Cables shall be marked as UL verified with a minimum of Category 6 rating.
- D. All horizontal cabling shall be color-coded as follows to differentiate between tenant and owner cabling. All voice circuits will be terminated on patch panels. All horizontal cabling will terminate on patch panels. All tenant and specialty circuits will be cross connected to multi-pair cabling as required.
 - 1. Green – HAS Data. (This applies to all HAS devices needing data cabling)
 - a. IP Cameras
 - b. Wireless Access Points (APs) – (Requires two data cables for 802.11ac)
 - c. Access Control Panels
 - d. IP Phones
 - e. Etc.
 - 2. Yellow – Tenant Data
 - 3. Red – Special circuits, including Automated External Defibrillation (AED) Circuits
- E. High performance (71 Series) Category 6 UTP, 4 Pair cabling shall be utilized to provide the signal medium from the individual workstation location to the IDF(s) unless denoted otherwise on the drawings. This cabling shall be installed in accordance with the contract drawings and shall adhere to the specifications listed below:
 - 1. 4 pair UTP
 - 2. 23 AWG Solid Bare Copper
 - 3. Cable jacket shall comply with NEC Article 800 for use as a plenum cable and shall be UL and c (UL) Listed Type CMP.
 - 4. Cable shall terminate on 8 pin modular jack at each outlet.

- F. The high-performance Category 6 UTP cable shall be of the traditional round design with mylar separator tape between pairs 2/3 and 1/4. The cable shall support Voice, Analog Baseband Video/Audio, Fax, Modem, Switched-56, T-1, ISDN, RS-232, RS-422, RS-485, 10BASE-T Ethernet, Token Ring, 100Mbps TP-PMD, 100BASE-T Ethernet, 155 Mbps ATM, AES/EBU Digital Audio, 270 Mbps Digital Video, 622 Mbps 64-CAP ATM and emerging high-bandwidth applications, including 1 Gbps Ethernet, gigabit ATM, as well as all 77 channels (550 Mhz , single swept margin) of analog broadband video.
- G. The high-performance Category 6 cables shall meet or exceed the electrical characteristics set by the manufacture’s specifications.
- H. The high-performance Category 6 cable shall be specified to 550 MHz and shall meet the guaranteed swept margin as set by the manufacture.
- I. Systimax part numbers for Plenum-rated Horizontal Cabling are as follows:

Product Number	Color	COM code	Qty per Unit
2071004EYL	Yellow	700210123	W1000
2071004EGR	Green	700210164	W1000
2071004ERD	Red	700210263	W1000

2.5 VIDEO COAXIAL CABLE (MATV)

- A. Manufacturer: CommScope or approved equivalent.
- B. The shielded, plenum RG-11 cable shall be used where the horizontal run is greater than 350 feet or specified in the Contract Drawings.
 - 1. Shall consist of a 14-AWG solid-copper conductor. The cable shall be UL and (UL) Listed for Fire Safety and ISO 9001 Certified.
 - 2. CommScope part number – 2287K Plenumax
 - 3. Must use compression type connectors from IDEAL part number:
 - a. IDEAL F connector - #89-011
 - 4. The copper cable shall meet or exceed the electrical specifications set by the manufacture.
- C. The Quad shielded, plenum RG-6 cable shall be used as horizontal where specified in the Contract Drawings.
 - 1. Shall consist of an 18-AWG solid-copper conductor. The cable shall be UL and (UL) Listed for Fire Safety and ISO 9001 Certified.
 - 2. CommScope part number – 2227V Plenumax
 - 3. Must use compression type connectors from IDEAL part number:
 - a. IDEAL F connector - #89-056
 - b. IDEAL BNC connector - #89-057(security camera install only)
 - 4. The copper cable shall meet or exceed the electrical specifications set by the manufacture.

2.6 SECURITY CABLES

- A. Manufacturer: CommScope or approved equivalent.
- B. RG-6(for analog cameras) cable shall be used as horizontal where specified in the Contract Drawings. This cable supplies both video and power media.
 - 1. Shall consist of an 18-AWG solid-copper conductor. The cable shall be UL and (UL) Listed for Fire Safety and ISO 9001 Certified.
 - 2. CommScope part number – 5654
 - 3. Must use compression type connectors from IDEAL part number:
 - a. IDEAL F connector - #89-056
 - b. IDEAL BNC connector - #89-057(security camera install only)
 - 4. The copper cable shall meet or exceed the electrical specifications set by the manufacture.
- C. RG-6(for analog cameras) cable shall be used as horizontal OUTDOOR use where specified in the Contract Drawings.
 - 1. Shall consist of an 18-AWG solid-copper conductor. The cable shall be UL and (UL) Listed for Fire Safety and ISO 9001 Certified.
 - 2. CommScope part number – 5720
 - 3. Must use compression type connectors from IDEAL part number:
 - a. IDEAL F connector - #89-056
 - b. IDEAL BNC connector - #89-057(security camera install only)
 - 4. The copper cable shall meet or exceed the electrical specifications set by the manufacture.
- D. Composite Cables: Cable between controlled portals and IFPs shall consist of multiple conductor bundles affixed together via a central spline. The conductor bundles shall consist of the following:
 - 1. 4C, 18 AWG 16/30 STR, shielded
 - 2. 3P, 22 AWG 7/30 STR, shielded
 - 3. 2C, 22A AWG 7/30 STR, shielded
 - 4. 4C, 22 AWG 7/30 STR, shielded
 - 5. The composite access control cable shall be Honey Well Genesis 3295 or approved equivalent.
- E. 4 CONDUCTOR CABLE (for use with dry contact devices including door position switches, duress alarm switches, etc.)
 - 1. 4 stranded (7 x28) tinned copper conductors
 - 2. Nominal O.D.: .217”
 - 3. Belden 9444 or approved equivalent

2.7 FIBER PATCH CORDS

- A. Manufacturer: SYSTIMAX Solutions ONLY. If required see specification 271300.

2.8 COPPER HARDWARE TERMINATION STANDARDS - Real Time Infrastructure Management - Intelligent Patch Panel System

- A. All horizontal data cables to terminate on iPatch panel. If a rack manager does not exist in the cabinet one must be added to manage the horizontal infrastructure.
- B. Systimax Solution iPatch Intelligent Fiber Optic Patching System as follows:

Product Number	Description
Fiber Shelves (19-inch rack-mountable) and accessories	
760209940	HD-1U - 1U sliding fiber shelf (holds four modules)
760148502	360-LP-STACK-SPT
760109470	12-LC-LS-AQ-Pigtails
760109488	12-LC-MM-BG-Pigtails
760109496	12-LC-SM-BL-Pigtails
760109504	12-LCA-SM-GR-Pigtails
760114975	24" Ribbon Cable
Copper Patch Panels - Cat 6	
760201137	360-iP-1100-E-GS3-1U-24 - 360 iPatch/imVision(enabled) 24 port panel
760201111	360-iP-1100-E-GS3-2U-48 - 360 iPatch/imVision(enabled) 48 port panel
760152561	360-IPR-1100-E-GS3-1U-24 - 360 iPatch/imVision(ready) 24 port panel
760152579	360-IPR-1100-E-GS3-2U-48 - 360 iPatch/imVision(ready) 48 port panel
Copper Patch Panels - Cat 6A	
760201145	360-iP-1100-E-GS6-1U-24 - 360 iPatch/imVision(enabled) 24 port panel
760201129	360-iP-1100-E-GS6-2U-48 - 360 iPatch/imVision(enabled) 48 port panel
imVision Rack manager	
760161380	360-imV-CNTRLR - 360 imVision Panel Manager (1 per rack / cabinet)

- C. Modular Patch Cords
 1. Manufacturer: Systimax SCS-GS8E
 2. Provide Category 6, Modular Patch Cords for each installed port designated as “Data” in the Drawings.
 3. All cords shall conform to the requirements of ANSI/TIA/EIA 568 Commercial Building Telecommunications Cabling Standard, Horizontal Cabling Section, and be part of the UL[®] LAN Certification and Follow-up Program. Cords shall be equipped with an 8-pin modular connector on each end and shall conform to the length(s) specified on the detailed

drawing. All Category 6 cordage shall be round, and consist of 23-AWG copper, stranded conductors, tightly twisted into individual pairs and shall meet or exceed the electrical specifications set by the manufacture.

4. UTP Patch cord lengths will be deployed as follows:

Length	Location/Application
3 ft	MDF, IDF, Computer Room, and Lab
5 ft	MDF, IDF, Computer Room, and Lab
7 ft	MDF, IDF, Computer Room, and Lab
9 ft	MDF, IDF, Computer Room, Office, Cubicle, or Lab
15 ft	Office, Cubicle, or Lab

5. Copper patch cord part numbers are as follows:

Product Number	Length	Material ID
GS8E-3ft	3FT	CPC3312-03F003
GS8E-5ft	5FT	CPC3312-03F005
GS8E-7ft	7FT	CPC3312-03F007
GS8E-9ft	9FT	CPC3312-03F009
GS8E-15ft	15FT	CPC3312-03F015

NOTE: 15 ft. UTP patch cords shall be used at the workstation only.

D. Hybrid RJ45 to 110 Patch Cords.

1. Manufacturer: Systimax 119P2PS
2. As required provide Category 6, Hybrid Patch Cords for each assigned data/voice port on the patch panel. Cords shall RJ45 connector on one end and 110GS on the other end. Cords shall be provided in appropriate lengths to accommodate all tenant voice or specialty ports as shown in detailed drawings. All Category 6 cordage shall be round, and consist of 24-AWG copper, stranded conductors, tightly twisted into individual pair and shall meet or exceed the Category 5e specifications.
3. Hybrid patch cords shall conform to the TIA 568B wiring scheme.
4. Hybrid patch cords shall be provided for each installed port designated as “Tenant Voice or Specialty jack” in the drawings.
5. Hybrid patch cord single pair part numbers are as follows (last 3 digits designates length):

Length	Material ID
8FT	CPC8662-03F-008
10FT	CPC8662-03F-010

6. Hybrid patch cord 2 pair part numbers are as follows (last 3 digits designates length):

Length	Material ID
8FT	CPC8352-03F-008
10FT	CPC8352-03F-010

7. Hybrid patch cord 4 pair part numbers are as follows (last 3 digits designates length):

Length	Material ID
--------	-------------

8FT	CPC8312-03F-008
10FT	CPC8312-03F-010

E. Outlets

1. Manufacturer: Systemax
2. Systemax MGS400 Modular GigaSpeed Information Outlets - 8 position/8 conductor non-keyed modular outlets for applications up to 1 Gbps and ANSI/TIA/EIA 568 compliant for Category 6 transmission requirements and be part of the UL[®] LAN Certification and Follow-up Program.
3. Outlets shall meet or exceed the following electrical and mechanical specifications set by the manufacturer.
4. Standard installations shall utilize orange outlets for data. Dust Cover/Blanks shall match faceplate cover.
5. All IMO's (Interactive Media Outlet) shall have at a minimum 4-data ports at each location unless otherwise specified by the contract documents.
6. Systemax MGS400 Modular GigaSpeed Information Outlets part numbers are as follows:

Product Numbering	# per pack	Color	COM code
MGS400-112	1	Orange	700 206 683

7. Systemax M-Series Modular Faceplates designed for use with M-Series Modular Information Outlets:

Product Numbering	# of ports	# per pack	Color	COM code
M10L-262	1	1	White	108 258 427
M10LW-262	1 (wall)	1	White	108 258 468
M12L-262	2	1	White	108 168 469
M14L-262	4	1	White	108 168 543

8. Systemax M-Series Modular Surface Mount Box designed for use with one to four M-Series Modular Information Outlets. May be mounted on a flat surface with screws, Box color shall match wall/furniture surface color:

Product Numbering	# of ports	# per pack	Color	COM code
M104SMB-262	4	1	White	107 952 459
M104SMB-270	4	1	Gray	107 952 467

2.9 IDENTIFIERS, LABELS AND LABELING SYSTEM

- A. All Identification and Labeling shall follow Specification: 270553–Identification and Labeling of Communication Infrastructure. **Any deviation from the specification must be approved by HAS IT prior to installation.**

2.10 CABLE MANAGEMENT

- A. Horizontal Manager
- B. Manufacturer: CPI – 30130-719
- C. Fiber patch cords
- D. Manufacturer: Panduit – Fiber runner (Applies to all new or expand existing BDF/MDF/Computer room build outs)

2.11 SPECIAL APPLICATIONS SHIELDED TWISTED PAIR SOLUTION

- A. Shielded Cable
 - 1. CommScope Shielded Cable, F/UTP Plenum Rated Category 6A, Black Jacket, 1000ft Length

Product Numbering	# per pack	Color	COM code
2291B BK 4/23 R1000	1000ft	Black	760171025

- B. Shielded Outlets
 - 1. CommScope Shielded Outlet, Category 6A, F/UTP

Product Numbering	# per pack	Color	COM code
HGS620	1	Silver (F/UTP)	760152801

* If the HGS620 information outlet is to be used at WAO, the depth of any backboxes must be increased.

- C. Shielded Patch Panels
 - 1. CommScope Shielded Panel, 1U, 24 Port, F/UTP Flat. imVision / iPatch system preinstalled, ships with 24 shielded outlets

Product Numbering	# per pack	Color	COM code
360-iP-MFTP-E-HD6B-1U-24	1	Silver	760201178

- D. High Density M-Series Adapter
 - 1. Systemax High Density M-Series Adapter - White

Product Numbering	# per pack	Color	COM code
HGS-A-MS-WHITE	1	White	760154187

- E. Shielded Patch Cords
 - 1. CommScope Shielded Patch Cords, F/UTP, Black Jacket, RJ45-RJ45, 7ft

Product Numbering	# per pack	Color	COM code
G10FP-BK-7FT	1	Black	CPCGGJ2-01F007

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify raceways, boxes, hand holes and maintenance holes are properly installed following Sections 27 05 28, and 27 05 43.
- B. All communication media must be installed in conduit or cable tray unless an alternate method has been approved by HAS/IT.
- C. Verify horizontal conduit is minimum 1-inch diameter.
- D. Verify backboards are properly installed.
- E. Verify telecommunications grounding system is properly installed and tested following Section 27 05 26.
- F. Verify liquid-carrying pipes are not installed in or above any IDF/MDF that has active electronic equipment. Do not proceed with installation in affected areas until removed.

3.2 PREPARATION

- A. Environmental controlled communication rooms shall maintain temperature of between 64 degrees Fahrenheit and 78 degrees F and between 30 and 55 percent humidity in areas of active electronic system work.
- B. Cable Splicing: Exact cable routing, splice enclosure locations, distances, elevations, work space and purpose of splice will be governed by actual field conditions. Contractor shall perform field surveys prior to submitting layout drawings.
- C. Contractor's on-site RCDD supervisor shall review, approve and stamp all shop drawings, coordination drawings and record drawings.

3.3 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data. The number of cables per run, outlet configuration and other pertinent data are included on the drawings.
- B. All installation shall be done in conformance with ANSI/TIA/EIA 568 standards, BICSI methods, Industry standards and SYSTIMAX SCS installation guidelines. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the

appropriate guidelines shall require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

- C. The SCS installation shall comply with all applicable national and local codes pertaining to low voltage cable system installations.
- D. The contractor shall adhere to the installation schedule of the general contractor and shall attend all construction meetings scheduled by the general contractor.
- E. Upon structural completion of the communications room(s) and prior to the installation of any communications equipment or supporting devices inside the room, the HAS IT Representative shall consult the Communications Designer in order to:
 - 1. Perform construction administration activities to compare as-built configuration to the design.
 - 2. Observe all “not-to-design” compliance issues and issue corrective advisement of actions.
 - 3. Upon completion of 1 and 2 above, the Communications Designer shall mark with masking tape the general layout of the equipment placement.
- F. All communications conduits shall be identified with color coded orange tape marked “Communications” every 50 feet. Tag conduit termination points (to include J-box locations) with the origination, destination and device name (if applicable) location.
- G. Vertical Cabinet Installation
 - 1. All Cabinets shall be properly positioned, leveled, ganged, anchored, grounded and powered.
 - 2. All Cabinets shall be populated as noted in drawings with termination hardware, equipment, proper patch cord lengths, and power outlets.
 - 3. Install and anchor all vertical equipment cabinets to floor following the Drawings and manufacturer’s instructions.
 - 4. All cabinets shall be properly ganged in each bay as shown in the Drawings.
 - 5. All cabinet doors shall be configured as shown in the Drawings.
 - 6. All cabinets shall be properly labeled per specification 270553.
 - 7. After final acceptance of the cabinets, coordinate with Owner to replace key/lock with silver barrel on front and back doors.
- H. The contractor shall perform all required cross connections of the horizontal cable runs to the backbone cable system. The equipment connections to the data systems shall be performed by the vendors installing and/or maintaining those systems.
- I. The contractor is responsible for providing a CD with all the cable/patch panel information in the same format that will be accepted for download in HAS’s iPatch/imVision database 1 month before any patching is completed.
- J. The contractor is responsible and must perform the following task associated with the iPatch system:
 - 1. Connect iPatch/imVision Network Manger to designated port on HAS network switch.

2. Inter-connect iPatch/imVision Network Manager to rack managers if applicable.
 3. Confirm that all iPatch/imVision patch panels are on line.
 4. Configure network settings for iPatch Network Manager with IP address, Mask and Gateway.
 5. Resolve patching conflicts associated with “Confirm” message on the iPatch Network Manager Display.
 6. Resolve conflicts associated with “Alarms” on iPatch/imVision Network Manager.
 7. Provide fiber cut sheet depicting fiber port to port or port to equipment connectivity.
 8. Provide an excel file compatible with iPatch/imVision Bulk Import tool. The file will be used to build rooms, faceplates and jacks in iPatch/imVision database.
 9. Label all new devices including the iPatch/imVision Network Manager according to HAS labeling specs.
 10. Label all components according to HAS labeling specs.
 11. Provide floor plans depicting rooms lay out and outlet locations.
 12. Confirm iPatch/imVision ports are pointing toward the proper end device (iPatch/imVision to equipment or iPatch/imVision to iPatch/imVision connection).
 13. Data cabling contractor is to provide and install an iPatch/imVision 48 port copper patch panel for all new network switches/blades that are related to the project. Provide solid conductor patch cables with RJ-45 on one end and terminate the other end on the patch panel. Patch port 1 of the patch panel to port 1 on the switch until all ports on the switch are connected to the patch panel matching the port numbers.
- K. The contractor shall provide service loops (slack) for cables terminating in the IDFs. A 6-foot service loop shall be provided above the access ceiling or cable trays unless specified otherwise. This allows for future changes or expansion without installing new cables.
- L. The installation contractor shall be responsible for coordination, testing and problem resolution with the system vendors.
- M. City inspector or their designated representative shall randomly perform unannounced, on-site reviews during the installation. In addition, this person shall perform a final inspection and a complete review of the test results before the installation is accepted.
- N. Upon completion of the installation, Contractor shall prepare as-built documentation of the entire SCS. This documentation shall include:
1. As-Built Drawings
 - a. All drawings shall be provided on disk in a form compatible with AutoCAD Version 14. A complete set of project plans will be provided by the Contractor on CD.
 - b. A complete diagram of all terminations in the IDFs.
 - c. A complete diagram of all copper, fiber, and coax riser cable.
 - d. A complete diagram of all copper, fiber, and coax inter-building cable.
 - e. Floor plans showing exact cable routings with each outlet clearly marked with cable number.
 - f. A complete diagram of all cable tray, conduits and conduit sleeves.
 2. Documentation

- a. All cable inventory data documentation shall be submitted in designated as specified in specification 270553
 - b. Documentation on horizontal cable shall include cable number and length of cable.
 - c. Complete cross connect documentation is required. This information will include detailed documentation of all four pairs of each horizontal cable and every pair of all copper riser and inter-building cable and every fiber of fiber optic cable.
3. As-built Drawings and Documentation shall be reviewed, approved and stamped by Contractor's on-site RCDD.

3.4 POST-INSTALLATION TESTING AND CERTIFICATION

A. Contractor Requirements

1. Contractor shall provide sufficient skilled labor to complete testing within a reasonable test period.
2. Contractor shall have a minimum of three years of experience installing and testing structured cabling systems. All installers assigned by the Contractor to the installation shall be certified by the factory to install and test the provided products.
3. Contractor is responsible for supplying all of the required test equipment used to conduct acceptance tests.
4. Contractor is responsible for submitting acceptance documentation as defined in 3.4, D below. No cabling installation is considered complete until test results have been completed, submitted and approved as defined in 3.4, D below.
5. Contractor to ensure that the database information for iPatch meets the HAS requirements.

B. Test Procedure

1. HAS IT Representative reserves the right to be present during any or all testing. Notify HAS IT Representative at least 48 hours prior to beginning test procedures.
2. Testing shall be of the Permanent Link. However, Contractor shall warrant performance based on Channel performance and provide patch cords that meet channel performance.
3. All cabling not tested strictly in accordance with these procedures shall be re-tested at no additional cost to the Owner.
4. Testing of all copper and fiber wiring shall be performed prior to system(s) cutover.
5. 100% of the installed cabling shall be tested. All tests shall pass acceptance criteria defined in 3.5 below.
6. Cable testing shall be performed by a fully charged tester, and the charging unit shall be disconnected during testing.
7. Any pairs not meeting the requirements of the standard shall be brought into compliance by the contractor at no charge to the City. Complete end-to-end test results shall be submitted to the City.

C. Standards Compliance and Test Requirements

1. Copper Cabling shall meet the indicated performance specifications:
 - a. Category 6 Horizontal Cabling shall be tested to the manufactures specification for Category 6 Cabling and SYSTIMAX SCS GigaSpeed System.

D. Cable Test Documentation

1. Test reports shall be submitted in hardcopy and electronic format and certified by the contractor's RCDD to be a complete and accurate record of cabling installed. Hand-written test reports are not acceptable.
2. Hardcopy reports are to be submitted in labeled three-ring binders with an attached affidavit verifying passing execution of all tests. Hardcopy summary reports shall contain the following information on each row of the report: circuit ID, test specification used, cable length, date of test, and pass/fail result.
3. Electronic reports shall be submitted on CD in PDF format. Electronic reports shall be accompanied by a Certificate signed by an authorized representative of the Contractor warranting the truth and accuracy of the electronic report. Certificate shall reference traceable circuit numbers that match the electronic record.
4. Hardcopy and electronic reports for each cable route shall be submitted together in one submittal. The submittal description shall include the type of test performed, type of cable, and cable ID (including originating and terminating room numbers) of cable tested. Partial or unclear documentation will be returned without reviewing.
5. Test reports shall include the following information for each cabling element tested:
 - a. Wiremap results that indicate that 100% of the cabling has been tested for shorts, opens, miswires, splits, polarity reversals, transpositions, presence of AC voltage and end-to-end connectivity.
 - b. For Category 6 cabling: Attenuation, NEXT, PSNEXT, Return Loss, ELFEXT, and PSELFEXT data that indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combinations and in both directions when required by the appropriate standards. Any individual test that fails the relevant performance specification shall be marked as a FAIL. Test shall also include mutual capacitance and characteristic impedance.
 - c. Length (in feet), propagation delay, and delay skew relative to the relevant limit. Any individual test that fails the relevant performance specification shall be marked as a FAIL.
 - d. Cable manufacturer, cable model number/type, and NVP
 - e. Tester manufacturer, model, serial number, hardware version, and software version
 - f. Circuit ID number and project name
 - g. Autotest specification used
 - h. Overall pass/fail indication
 - i. Date of test
6. Test reports shall be submitted within seven business days of testing.

E. Test Equipment

1. Test equipment used under this contract shall be from manufacturers that have a minimum of 5 years of experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.

- a. Category 6 – At minimum a Level III tester or submitted and owner-approved equivalent.
 - b. Refer to spec section 27 13 00 for fiber testing procedures.
2. All test tools of a given type shall be from the same manufacturer and have compatible electronic results output.
 3. Test adapter cables shall be approved by the manufacturer of the test equipment. Adapters from other sources are not acceptable.
 4. Baseline accuracy of the test equipment shall exceed TIA Level III, as indicated by independent laboratory testing.
 5. Test equipment shall be capable of certifying Category 6 links.
 6. Test equipment shall have a dynamic range of at least 100 dB to minimize measurement uncertainty.
 7. Test equipment shall be capable of storing full frequency sweep data for all tests and printing color graphical reports for all swept measurements.
 8. Test equipment shall include S-Band time domain diagnostics for NEXT and return loss (TDNXT and TDRL) for accurate and efficient troubleshooting.
 9. Test equipment shall be capable of running individual NEXT, return loss, etc. measurements in addition to autotests. Individual tests increase productivity when diagnosing faults.
 10. Test equipment shall include a library of cable types, sorted by major manufacturer.
 11. Test equipment shall store at least 250 Category 6 autotests (in full graphic format) in internal memory, with the option for additional storage card via expansion slot.
 12. Test equipment shall be able to internally group autotests and cables in project folders for good records management.
 13. Test equipment shall include DSP technology for support of advanced measurements.
 14. Test equipment shall make swept frequency measurements in compliance with TIA standards.
 15. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurement.

3.5 ACCEPTANCE

- A. Once all work has been completed, test documentation has been submitted and approved, and HAS IT Representative is satisfied that all work is in accordance with contract documents, the HAS IT Representative will notify Contractor in writing of formal acceptance of the system.
- B. Acceptance Requirements
 1. Contractor's RCDD shall warrant in writing that 100% of the installation meets the requirements specified under 3.4. "Standards Compliance & Test Requirements" above.
 2. HAS IT Representative reserves the right to conduct, using Contractor equipment and labor, a random re-test of up to five percent of the cable plant to confirm documented results. Random re-testing, if performed, shall be at the expense of the City, using standard labor rates. Any failing cabling shall be re-tested and restored to a passing condition at no cost to the City. In the event more than two percent of the cable plant fails during re-test, the entire cable plant shall be re-tested and restored to a passing condition at no additional cost to the Owner.

3. HAS IT Representative may agree to allow certain cabling runs to exceed standardized performance criteria (e.g. length). In this event, such runs shall be explicitly identified and excluded from requirements to pass standardized tests.
4. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100% PASS rating, and submittal and approval of full documentation as described in 3.4.
5. See Appendix A & B. Acceptance requirements are not limited to these sheets

3.6 DEMOLITION

- A. The contractor shall be responsible for maintaining all communications service to areas of the building scheduled to remain in service during the period of renovation.
- B. Notify HAS Information Technology (IT) department 30 days prior to the start of demolition work taking place in existing communications rooms. Coordinate removal of equipment and cabling within existing communications rooms with HAS IT.
- C. Where removal is indicated in Drawings, remove communications cable from termination point back to originating communications room, MDF or tenant communications room. Coordinate removal at terminating blocks and panels with HAS IT. Coordinate removal of cross-connects and patch cables with HAS IT.
- D. Ensure systems and circuits are no longer active before removing and prior to the demolition of existing communications rooms. If active circuits exist at time of scheduled demolition, coordinate with HAS IT Representative to reroute or deactivate circuit(s).
- E. Demolition and removal of cabling shall not impact the operation of active systems.
- F. Unless otherwise noted, discard all removed cable, patch cables and cross-connects. Except where re-routing of cable is specified in Drawings or by Designer, do not reuse cable.
- G. Remove all loose unterminated cabling to source found above ceiling, under floor or in wall.
- H. Demo all abandoned cable in accordance with NEC 800.25.

3.7 CLEANING

- A. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed unless designated for storage.

APPENDIX A

MDF/IDF Check List

This list is intended as a minimum checklist. CM should ensure that the contractor’s schedule has built in these components and the necessary buffer period – and associated access restrictions to the communications equipment rooms -- for HAS IT and tenant IT to prepare.

1. All communication rooms that will service the area to be opened must be completed. That means a final walkthrough of these areas has been completed. It is not necessary that the entire project achieve substantial completion, but IT cannot install equipment and begin work until the following minimum criteria is met:
 - a. Space is built out and clean – free from dust/residues.
 - b. Electrical w/UPS as required.
 - c. All racks/cabinets installed and mounted. Padlocks eyes have been installed.
 - d. Grounding bus bar installed and properly tied to main grounding bus bar in MDF
 - e. HVAC functioning properly and is adequately filtering dust. Humidity is controlled.
 - f. Door access control is installed (card reader) -or- an approved temporary provision. Simple key access is not permissible.
 - g. Lighting is installed and operational.
 - h. Cable trays/ladder racks installed and ready to use.
 - i. Permanent or temporary signage identifying permanent room number.

All cabling necessary to operate the areas to be opened is completed.
 Backbone cabling (copper and fiber) from the applicable communication room(s) is installed, tested, labeled, and approved by the inspector and communications design consultant.
 Horizontal cabling for all areas to be occupied is installed, tested, labeled, and approved by the inspector and communications design consultant.
 Copper cross connects and/or fiber jumpers have been installed per the owner/tenant requirements.
 Cable records and redline drawings for installed cables are submitted and approved PRIOR to putting any active circuits on the new cables. Cable records reflect all installed cables **and** any cross connects, or jumper assignments installed by the contractor.
 All iPatch Panels are programmed and operational.
 All jumpers and patch cords specified by the contract are transmitted to the owner for use.
 NOTE: cable labels and permanent room numbers need to match. CM needs to be sure to get design team, airport, IT, and CM / contractor reps together to review permanent room numbers prior to contractor installing cable labels.

3. Move-in buffer period needs to be minimum **6 weeks** for HAS-IT to install/extend services within the area to be occupied prior to occupation of the facility or spaces. Additional time may be necessary if Tenant IT organization is involved, or if contractor has other systems that must be configured/tested which require HAS-IT resources (i.e. cabling or data network connections). This is frequently the case for PA System, tele- vision, radio, Fire Alarm, pay telephone, EFSO (Electronic Fuel Shutoff), access control & CCTV, etc.

4. Once HAS-IT accepts a communications equipment room and begins to install/configure equipment in preparation for hosting live applications, this room becomes a restricted area with access to be controlled by HAS-IT. Contractors must be substantially complete with systems inside the communications equipment room so that access is generally not required. Minor punch list and scheduled testing with escort can be arranged, but access will be very limited.

Other IT-related systems that must be operational, tested, and accepted or approved temporary provisions.

PA System

MATV and/or CNN TV (where applicable)

Fire Alarm

MUFIDS

Pay Telephones (where applicable)

EFSO (where applicable)

Access Control & CCTV (note: must be PROGRAMMED, and approved acceptance test walk through by HAS)

Crash phone (where applicable)

Radio system enhancements (where applicable)

Data Network switch installed and configured.

APPENDIX B

IDF Number:	Date:		
Grounding & Bonding:	YES	NO	COMMENTS
TGB properly installed			
Proper grounding conductor installed (6AWG min.)			
Cable trays properly bonded			
Equipment Racks, Armored Cables & Cabinets properly bonded			
Conduit properly bonded			
Cabling properly bonded			
Splice Cases properly bonded			
Horizontal Cabling:	YES	NO	COMMENTS
Routing			
Cables properly supported			
Pull tensions properly recorded			
Sheath damage			
Bend radius observed			
Pair twist meets spec			
Proper termination scheme			
Cable/jack part number meets spec			
Plenum vs. PVC			
Properly dressed in tray			
Properly dressed in cable management			
Cables bundled properly			
Appropriate clearances observed (power)			
Minimum amount of cable exposed at termination			
Backbone Cabling:	YES	NO	COMMENTS
Fiber strain relief properly applied			
Routing			
Cables properly supported			
Pull tensions properly recorded			
Sheath damage			
Bend radius observed			
Properly dressed in tray			
Fiber installed in inner duct			
Properly dressed in termination shelf			
Any splice cases properly supported			

Room Layout:		YES	NO	COMMENTS
	Room laid out according to project drawings			
	Proper clearances maintained			
	Is the room clean & neat in appearance			
	Liquid carrying pipes within the room			
Pathways:		YES	NO	COMMENTS
	Conduit properly routed & supported			
	Cable Tray properly routed & supported			
	Inner Duct used to route fiber and properly supported			
Labeling:		YES	NO	COMMENTS
	Grounding conductor			
	End-to-End labeling			
	Pair Count on Splice Case			
	Horizontal Cabling			
	Fiber Optic Cabling			
Other:		YES	NO	COMMENTS
	Appropriate fire stop material in place			
	Cabling test results submitted with proper information			
	Climate controlled environment (Temp. & Humidity)			
	Is the room access controlled			
Copper Cabling:				
	Total Pairs (Riser)			
	Pair Counts			
	Termination Type (66, 110, Protectors.)			
	Termination Location			
Fiber Optic Cabling:				
Multimode:				
	Total Strands			
	Termination Type (LC, SC)			
	Termination Location			
Single Mode:				

Total Strands	
Termination Type (LC, SC)	
Termination Location	

END OF SECTION 27 15 00

SECTION 27 22 00
PC, LAPTOP, AND SERVERS EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide the Data Communication Hardware components and interfaces to be implemented and utilized in the Houston Airport System network to support present and future communications systems requirements.

1.2 REFERENCES

- A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
- B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Related Work:

1. Section 270553: Identification and Labeling of Communication Infrastructure
2. Section 271100 Communication Cabinets and Equipment Rooms
3. Section 271300: Backbone and Riser Media Infrastructure
4. Section 271500: Horizontal Media Infrastructure
5. Section 270528: Interior Communication Pathways
6. Section 270543: Exterior Communication Pathways
7. Section 270526: Telecommunications Grounding and Bonding
8. Section 272100: Data Communication Network Equipment

D. Conflicts.

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.
2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

E. References:

1. National Electrical Manufacturers Association (NEMA)
2. American Society for Testing Materials (ASTM)
3. National Electric Code (NEC)
4. Institute of Electrical and Electronic Engineers (IEEE)
5. UL Testing Bulletin
6. American National Standards Institute (ANSI) X3T9.5 Requirements for UTP at 100 Mbps

1.3 DEFINITIONS

- A. *ANSI* – American National Standards Institute
- B. *ATM* – Asynchronous Transfer Mode
- C. *EIA* – Electronics Industries Alliance
- D. *Gbps* – Gigabits per second
- E. *IEEE* – Institute of Electrical and Electronic Engineers
- F. *ISO* – International Organization for Standardization
- G. *Mbps* – Megabits Per Second
- H. *Multi-path* – The possible multiple routes of a single source of RF energy due to reflection, refraction, or diffraction.
- I. *NEC* – National Electrical Code
- J. *NEMA* – National Electrical Manufacturing Association
- K. *SNMP* – Simple Network Management Protocol
- L. *TIA* – Telecommunications Industry Association
- M. *TR* – Telecommunications Room
- N. *UL* – Underwriter’s Laboratories
- O. *VoIP* – Voice over Internet Protocol

1.4 DESIGN AND PERFORMANCE STANDARDS

- A. Standards supported should include, but be not limited to, IEEE 802.3, IEEE 802.3u, 100BaseTX, 1000BaseT, 1000BaseTX, 1000BaseFX, Ethernet MIB (RFC 1643), SNMP MIB II (RFC 1213).

1.5 SUBMITTALS

- A. Qualifications: Demonstrate compliance with requirements of Paragraph 1.07.A below.
- B. Submit Technical Implementation Plan in accordance with 2.06 below.
- C. Submit manufacturer’s technical data for each product provided.
- D. Submit technical and operations manuals. Manuals shall describe function, operation, and programmable parameters for each device to be installed. Manuals shall include required

maintenance to be performed.

1. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed. Manuals shall include required maintenance to be performed.
 2. Manuals shall be suitable for the training of future personnel by the City, and for use as a reference by currently employed personnel in performing work assignments.
- E. As-built documentation. Notes shall be kept during initial installation and shall be made a permanent part of the installation manual pages as required.
- F. For each active device installed, provide a printed configuration including a printout of the device as displayed on the network management system. Printed configuration parameters for each port on the device shall accompany the written report.
- G. Other information in support of the design, fabrication, and installation of the LAN system.
- H. An implementation schedule listing dates for Data Network Equipment installations for approval by the City Engineer. The dates of LAN equipment installations shall be in accordance with dates for installation of the various special systems and users. It is incumbent upon the Data Network Equipment implementers to include the dates for special system and user installs into the schedule.
- I. Include spares list to be approved by HAS IT Project Manager for approval.

1.6 CONTRACTOR'S DUTIES

- A. Perform all work, coordination, systems integration, engineering design, and testing, and shall provide all products required in order to ensure a fully operative system and proper installation of equipment. System operability and proper installation shall be verified via completion of the acceptance test plan.
- B. Coordinate all installation activities and details with the Houston Airport Systems' Information Technology (HAS IT) Representative. The HAS IT Representative shall be responsible for approving the final configuration of all equipment supplied as part of this specification.
- C. Provide all system documentation and submittals.
- D. Provide warranty and maintenance support as specified.
- E. Provide all calculations and/or analysis to support design and engineering decisions as specified in Submittals.
- F. Provide and pay for all labor, materials, and equipment. Pay required sales, gross receipts, and other taxes.
- G. Secure and pay for plan check fees, permits, licenses, and all additional fees necessary for execution of Work as applicable for the project.
- H. Give required notices.

- I. Comply with all codes, ordinances, regulations, and other legal requirements of public authorities that bear on performance of Work.

1.7 QUALITY ASSURANCE

A. Contractor Qualifications:

1. The contractor must be certified by the manufacturer of the products to be installed adhere to the engineering, installation and testing procedures, and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
2. All members of the installation team must be certified by the manufacturer(s) as having completed the necessary training to complete their part of the installation.
3. Contractor shall provide five references for projects of approved equivalent scope, type and complexity of work completed within the last five years.

- B. Equipment and materials supplied shall be a standard product of manufacturers regularly engaged in the manufacture and installation of information backbone technologies and shall be the manufacturer's latest standard design. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components. Electrically powered equipment shall be UL approved. Electronic equipment shall meet the requirements of CFR 47 Part 15.

- C. All hardware, software, firmware, and/or operating system requirements given are the minimum requirements. The Contractor's product shall meet or exceed these requirements. The product selected shall meet the operational, functional, and performance requirements specified herein. Additionally, due to the rapid advancement and antiquation of technology related products, the supplied product shall be the "contemporary technical equivalent" of that specified. "Contemporary technical equivalent" shall be based on a comparison of technology at the time of publication of specification to the technology at the time of the first product submittal. Final product approval is at the sole discretion of the City.

1.8 MAINTENANCE AND SUPPORT

- A. Provide the manufacturer's standard maintenance and support services for all hardware and software associated with this system at no additional charge for a period of not less than three years. It will be the responsibility of the HAS IT Representative to provide the operational maintenance and support of the installed system. Coordination through the City Engineer and the HAS IT Representative shall be required by the installation contractor to ensure that all documentation for the manufacturer's maintenance and support programs are in place.
- B. All lead technicians performing installation shall have a minimum of two years experience on the proposed system and be manufacturer certified on all hardware/software applications.

1.9 EXTENDED WARRANTY

- A. Provide the manufacturer's warranty for all equipment installed at no additional charge for a period of not less than three years. The warranty shall ensure that the installed equipment will conform to its description and any applicable specifications, and shall be of good quality for the known purpose for which it is intended. The warranty shall allow for replacement or repair

at the discretion of the City Engineer and shall include all upgrades for firmware and/or operating systems.

B. Software License

1. Required software licenses shall be identified and supplied by the Contractor. Licenses shall be "Site Licenses" which shall cover all equipment installed now or in the future.
2. All software licenses and warranties shall be registered in the name of Houston Airport System.

1.10 PROCUREMENT

- A. Procure equipment specified in this document as dictated by the timeline in Appendix B in order to make sure that the technology is acquired in a timely fashion, but not outdated by the installation date.
- B. Submit a copy of Appendix B "Technology Implementation Schedule" as a part of the equipment submittals required elsewhere in this document. The Contractor shall complete the columns headed "Quantity", "Procurement Lead Time", "Start Date or Dependent", and "Installation Duration".
- C. The "Procurement Lead Time" shall be expressed in days or weeks, and shall include time required for the contractor's personnel to order and receive the material. Substantiation may be required.
- D. "Start Date or Dependent" and "Installation Duration" should be an accurate estimate based upon known facts in the project. Substantiation may be required.
- E. The Contractor shall not purchase any materials requiring submittals until the HAS IT approves the submittal for that material and the Technology Implementation Schedule.
- F. The Contractor shall not purchase any materials requiring submittals until the date established by the HAS IT as the Purchasing Authorized Date. The Purchasing Authorized Date will be reflected in the "Purch Auth" column of Appendix B as a part of the Submittal Review process.
- G. All products shall be purchased within 6 months of installation as to ensure contemporary technical equivalency.
- H. The Contractor shall not purchase any operating system or software without HAS IT approval to insure it meets current HAS IT standards.

PART 2 - PRODUCTS

2.1 EQUIPMENT MANUFACTURERS

- A. Servers: Unless otherwise specified, furnish products manufactured by Dell. Substitutions for specified Dell components are NOT permitted.

- B. Desktop, Laptop computers: Unless otherwise specified, furnish products manufactured by Dell. Substitutions for specified Dell components are NOT permitted.
- C. Network printers: Unless otherwise specified, furnish products manufactured by HP. Substitutions for specified HP components are NOT permitted.
- D. Uninterruptible Power Supply (UPS): Eaton or submitted and approved equivalent.
- E. Cabinets/Racks and cabling infrastructure: Reference Specification 271100 and 271300.

2.2 GENERAL DATA NETWORK HARDWARE REQUIREMENTS

- A. All the data network hardware shall utilize HAS infrastructure located throughout the premises areas as provided in Section 271300.
- B. All data network hardware shall support full-duplex connectivity on links of minimum 1000Base-TX.
- C. All network equipment shall be Virtual Local Area Network (VLAN) compatible based on both port and MAC addresses. VLAN assignments shall be configurable from a centralized administrative console.
- D. All active data network hardware devices shall include all software as required for interconnectivity. All active devices shall have fully functional software platform as specified by the contract documents.

2.3 DATA NETWORK HARDWARE REQUIREMENTS

- A. HAS uses virtual server environment with chassis-based servers. Any server or storage requirements on a project need to be discussed with HAS IT to determine the computing and storage requirements and HAS IT will define the hardware requirements based on the project needs. HAS uses Dell chassis servers with Dell EMC Isilon storage. All hardware must have a 5-year warranty with 24 hour onsite coverage with a 4 hour response time as part of the purchase. The project will cover the installation and coordination with HAS IT as part of the purchase of the required equipment.
- B. Desktop PC, printer, scanners, and other related items shall follow current HAS standards (see link below):
 - 1. <https://connect.houstonairports.us/technology/Pages/ITSpecs.aspx>
 - 2. Laptop
 - a. Intel Core i5 – 6440HQ
 - b. 15.6" FHD 1920 x1080
 - c. 8.0 GB, DDR4
 - d. Monitor Stand Dock 452-BCII
 - e. HD - 256 GB SSD
 - f. Dell Backpack
 - g. TPM Enabled

3. Desktop
 - a. Intel Core i5 – 6440HQ
 - b. 15.6" FHD 1920 x1080
 - c. 8.0 GB, DDR4
 - d. HD - 256 GB SSD
 - e. TPM Enabled

4. Monitor
 - a. 24" LED-backlit LCD monitor - 24" 1920 x1080
 - b. Aspect Ratio - 16:09
 - c. Contrast Ratio – 1000:1
 - d. Input Connectors
 - 1 HDMI port
 - 1 DP(in) port
 - 1 DP(out) port
 - 1 USB Type-C port
 - 2 USB 2.0 downstream ports (rear)
 - 2 USB 3.0 downstream ports (side)

- C. Fiber and Copper Patch Cords – Adequately sized fiber and copper patch cords shall be provided for each installed device under Section 271300, "Communications Media Infrastructure."

2.4 TOUCH SCREEN COMPUTER HARDWARE

A. APPLE IPAD

1. 8th Generation IPAD
 - a. A12 Bionic Chip with Neural Engine
 - b. 10.2" Retina Display
 - c. Owner Specified Mount
 - d. 64 GB SSD

2.5 LED VIDEO WALL

A. NEC 5624-001 VIDEO WALL BUNDLE

1. All components listed are required for each Video Wall
 - a. UN5522S - 55" Ultra-Narrow Bezel Professional Grade Display
 - b. ONSTEMN-3Y-15 - UN552S Onsite Warranty Upgrade
 - c. DS-VW775 - Peerless Supreme Video Wall Mount
 - d. DS-VWRS090 – 55" Spacer for Video Wall Mount
 - e. 52108 – 3m USB Extender Cable

2. These components are required for proper installation and calibration of the

LED walls

- a. KT-LFD-CC2 – Display Wall Calibrator Software
- b. KT-RC3 IR/Remote Kit

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install components in accordance with contract drawings, manufacturer's instructions and approved submittal data.
- B. System installation and construction methods shall conform to the requirements of the Federal Communications Commission.
- C. The Contractor shall install all system components including furnished equipment, and appurtenances in accordance with the manufacturer's instructions, and adjustments required for a complete and operable system.
- D. Grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.
- E. The HAS IT Representative shall perform final configuration of the network equipment. This includes, but is not limited to: software configuration, IP addressing etc. Installation contractor shall ensure that the proper documentation is provided to assist in the final system configuration.

3.2 PRODUCT HANDLING

- A. The Contractor shall be responsible for any and all loss or damage in the shipment and delivery of all material until transfer of title to the City.

3.3 HARDWARE INSTALLATION

- A. The Contractor shall obtain written permission from the City Engineer before proceeding with any work which requires cutting into or through any part of the building structures such as, but not limited to, girders, beams, concrete, carpeted or tiled floors, partitions or ceilings. The Contractor shall also consult with the City Engineer before cutting into or through any part of the building structures where fireproofing or moisture proofing could be impaired.
- B. The Contractor shall take all steps necessary to ensure that all public areas remain clear or are properly marked during installation or maintenance.
- C. The Contractor shall also develop a Cable Plant interconnectivity chart showing all fiber and copper patch panels for each piece of equipment associated with the installation.
- D. The contractor shall place materials only in those locations that have been previously approved. The City Engineer shall approve any other locations, in writing.

3.4 SYSTEM STARTUP

- A. The Contractor shall not apply power to the system until after:
 - 1. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
 - 2. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
 - 3. System wiring has been tested and verified as correctly connected as indicated.
 - 4. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
 - 5. The City Engineer and the HAS IT Representative have approved the installation.

- B. Satisfaction of the above requirements shall not relieve the contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of contractor's deficient work/defective equipment.

3.5 ACCEPTANCE TESTING

- A. The contractor shall develop and execute an onsite acceptance-testing program.

- B. The plan shall address all requirements identified in this specification and test all contractor supplied cabling and hardware components. The plan shall follow accepted industry testing practices and have a method of independent verification described.

- C. Any specified item that does not satisfy the requirements of this specification shall be replaced, upgraded, or added by the contractor as necessary to correct the noted deficiencies. After correction of a noted deficiency, re-testing shall be performed to verify the effectiveness of the corrective action.

END OF SECTION 27 22 00

APPENDIX A

Hardware Schedule (EXAMPLE)

Item	Qty
ROOM 11611	
Server	3
Standard Laptop	6
ROOM 11715	
High-End Workstation	1
Standard desktop	2
ROOM 11908	
Standard desktop	10
Color Printer	1
ROOM 12015	
Standard desktop	1
Black/White Printer	2
ROOM 11812	
High-End Laptop	2
Standard laptop	4
ROOM 12606	
Black/White Printer	1
Color Printer	1
MDF	
High-End Workstation	2
Server	5

APPENDIX B

TECHNOLOGY IMPLEMENTATION SCHEDULE (EXAMPLE)

	(from Designer)		(Contractor Submittal)				(Submittal Response)		
	Product Description	Spec. Ref.	Qty.	Procurement Lead Time	Start Date or Dependent	Installation Duration	Submittal Approved	Purch. Auth.	Remarks
1	Standard Desktop	2.03B							
2	Server	2.03.A							
3	Standard Laptop	2.04.D							
4	High-End Work Station	2.04.C							
5	Black/White Printer	2.04.F							
6	High-End Laptop	2.04.E							
7	Color printer	2.04.G							