



CITY OF HOUSTON
HOUSTON AIRPORT SYSTEM
INVITATION TO BID (ITB)
SOLICITATION NO.: H27-ELBC-2022-002
P735 HAS EXIT LANE BREACH CONTROL AT IAH AND HOU

Date Issued: September 10, 2021

Pre-Bid Conference: September 23 at 10:00 A.M., (local time)
Video Conference via MS Teams Link:
<https://bit.ly/3D4lans>

Questions Deadline: September 30, 2021 @ 3:00 P.M., (local time)

Solicitation Due Date: November 4, 2021 @ 10:30 A.M., (local time)

Solicitation Contact Person: Alfredo Oracion
Sr. Procurement Specialist, Supply Chain Management
alfredo.oracion@houstontx.gov
281-230-8009

Project Summary: This project will provide the Houston Airport System automated control of unauthorized movement of people and objects from the non-sterile to sterile area of the airport. Exit lane breach control units will be functional twenty-four (24) hours a day, seven (7) days per week, and will be capable of operation in proximity to other electronic equipment without creating or being subject to signal interference.

NIGP Code: 98166

M/WBE Goal: 11% (MBE: 9%; WBE: 2%)

DS
CA

DocuSigned by:
Jerry Adams
0DD350139A6F4C8...
Jerry Adams
Chief Procurement Officer

9/9/2021 | 10:50 CDT

Date



City of Houston - Department of Aviation – Infrastructure Division

PROJECT MANUAL

**HAS Exit Lane Breach Control
IAH and HOU**

**PROJECT No.: 735
CIP# A-0628**

Divisions 00

August 2021

PGAL
3131 Briarpark Drive, Suite 200
Houston, TX 77042
713-622-1444

Document 00010

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NOTE: Capitalized Specification Sections are included in:
<https://edocs.publicworks.houstontx.gov/engineering-and-construction/specifications.html>;
and are incorporated in Project Manuals by reference as if copied verbatim. Documents listed "for filing" are to be provided by Bidder and are not included in this Project Manual unless indicated for example only. The Document numbers and titles hold places for actual documents to be submitted by Contractor during Bid, post-bid, or construction phase of the Project. Specification Sections marked with an asterisk (*) are amended by a supplemental specification, printed on blue paper and placed in front of the Specification it amends. Documents in the 200, 300 and 400 series of Division 00, except for Document 00410B – Bid Form, Part B, are not part of the Contract.

Doc.
No. **Document Title**

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| A035 | DOOR DETAILS | TY000 | INDEX, SYMBOLS & NOTES |
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| ADG202 | IAH TERMINAL C SIGNAGE DEMO PLAN | TY502 | TELECOM DETAILS |
| AG202 | IAH TERMINAL C SIGNAGE PLAN | | |

HOU:

| Sheet No. | Drawing Title | Sheet No. | Drawing Title |
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| AG200 | HOU TERMINAL SIGNAGE PLAN | | |
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END OF DOCUMENT

Document 00041

LIST OF PRE-QUALIFIED ASBESTOS/LEAD ABATEMENT, MOLD & SOIL
REMEDICATION, DEMOLITION AND PETROLEUM STORAGE TANK REMOVAL
CONTRACTORS

1.0 DOCUMENT INCLUDES

- A. Authorization
- B. List of Authorized Contractors.

2.0 RELATED DOCUMENTS

- A. Section 13280 – Hazardous Materials Remediation
- B. Section 13281&13282 – Abatement of Asbestos/Lead Containing Materials

3.0 AUTHORIZATION

- A. The list of Contractors Pre-qualified for Asbestos/Lead Abatement, Mold & Soil Remediation, Demolition & Petroleum Storage Tank Removal (“List”) was authorized on March 21, 2012, by City of Houston Council Motion No. 12-0180.
- B. Only those firms on the List can be utilized by Bidder in subcontracting for asbestos & lead abatement, mold & soil remediation, demolition & petroleum storage tank removal included in the Work.
- C. The List is administered by General Services Department. All inquiries should be directed to Gabriel Mussio (832-393-8079).

4.0 LIST OF AUTHORIZED CONTRACTORS

- A. As of the date specified in paragraph 3.0.A., all contractors listed in paragraph 4.0.B were licensed in the State of Texas for the type of work. Authorized Contractors must maintain their license to be on the list.
- B. Authorized Contractors:
 - 1. AAR Incorporated, 6640 Signat Drive, Houston, Texas 77041
 - 2. A & M Environmental, LLC, 6536 Supply Row, Houston, Texas 77011
 - 3. ARC Abatement Inc., 6827 Signat Drive, Houston, Texas 77041
 - 4. AIA General Contractors, Inc., 18331 Running Vine Lane, Spring, Texas 77379

5. Arrow Services, Inc., 10202 Airline Drive, Suite A, Houston, Texas 77037
6. Basic Environmental Group, LLC., 1839 Key Biscayne Court, Houston, Texas 77065
7. Cherry Environmental Services, Inc., 4501 Cherry Lane, Santa Fe, Texas 77517
8. Clark-Tech Environmental Systems, Inc., 1515 Globe Street, Houston, Texas 77034
9. CRG Environmental Services, LLC., 2504 Avenue I, Rosenberg, Texas 77471
10. DNB Enterprises, Inc., 12969 West Hardy, Houston, Texas 77037
11. Dunphey Petroleum Services, Inc., 3505 Daphne, Houston, Texas 77021
12. EC Government Services, 5850 San Felipe, Suite 400, Houston, Texas 77057
13. Effective Environmental, Inc., 9950 Chemical Road, Pasadena, Texas 77507
14. GenTech Construction Company, LLC., 2211 West 34th Street, Houston, Texas 77018
15. Hazard Assessment Leaders, Inc., dba HAL, Inc., 5311 Petty Street, Houston, Texas 77007
16. Inland Environmental, Ltd., PO Box 6751, Kingwood, Texas 77325
17. J.T.B. Services, Inc., 9026 Lambright, Houston, Texas 77075
18. NCM, 16421 Aldine Westfield Road, Houston, Texas 77032
19. Pfp Abatement Group, LLC., 3823 Shadow Trail Drive, Houston, Texas 77084
20. PEMCO, Inc., PO Box 2009, Pearland, Texas 77588-2009
21. RNDI Companies, Inc., 2255 Ridge Road, Suite 216, Rockwell, Texas 75807
22. Separation Systems Consultants, Inc., 17041 El Camino Real, Suite 200 Houston, Texas 77058

23. Texas Environmental Control, Inc., 4623 Steffani Lane, Houston, Texas 77041
24. Weston Solutions, Inc., 5599 San Felipe, Suite 700, Houston, Texas 77056
25. 1 Priority Environmental Services, Inc., 2573 Gravel Drive, Fort Worth, Texas 76118

END OF DOCUMENT

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Document 00200

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

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.

the Bidder, associated with preparation of its Bid and compliance with Post-bid Procedures.

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.

- 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.

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.

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.

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

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 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.

stated in Document 00410A, Bid Form,
Part A.

- B. The Bid remains open to acceptance
and is irrevocable for the period of time

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:

- C. 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.

D. Delete “Anti-Boycott of Israel” and replace it with “Zero Tolerance Policy for Human Trafficking and Related Activities.”

E. Compliance with Certain State Law Requirements (ADDED)

- 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.

- 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.
- 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.
- 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.

G. Resolving Protests (ADDED)

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

4.0 – BID DOCUMENTS: Add the following Paragraphs to this Section:

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:
(Note: The Bid Documents furnished to the plan rooms for examination can be in electronic format, in hard copies, or in any other formats pertaining to each City Contracting Division's discretion.)
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

8.0 SUBSTITUTION OF PRODUCTS:

- A. Where Bid Documents specify a specific Product with provision for consideration of substitutions (or equal), requests for pre-bid 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.
 - 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.]

9.0 – PREPARATION OF BIDS: Add the following Paragraph I to this Paragraph:

MANDATORY

Insert the following Paragraph and associated table for all Projects.

- 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 |

10.0 – BID SUBMISSION: Add the following Paragraph A.1 to this Section:

A. Add the following 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., (Local Time) on November 4, 2021.

E. Add the following Paragraph “E.” to Section 10:

E. Bidders shall submit Document 00470 Bidder’s MWSBE Participation Plan (or 00470D Bidder’s DBE Participation Plan if FAA funded project) with the bid. If the MWSBE goal is not met, the Document 00471 Pre-bid Good Faith Efforts, and Document 00472 Bidder’s MWSBE Goal Deviation Request form shall also be included in the submission with the bid (If the DBE goal is not met, following Section 2.A.12. of Document 00806).

11.0 – BID SECURITY: Add the following Paragraph 1. to Section 11.0.A.:

1. Bidder shall submit a Security Deposit in the form of:
 - a.) Certified Check;
 - b.) 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.

15.0 – PREBID MEETING: Add the following Paragraph A.1 to this Section:

A. Add the following Paragraph A.1:

1. A Prebid Meeting will be held at Houston Airport System via a virtual conference through MS Teams link address: <https://bit.ly/3D4lans> at 10:00 a.m. (local time), Thursday, September 23, 2021.
2. Pre-bid Meeting Questions will be due from bidders at 3:00 p.m. (local time), Thursday, September 30, 2021.
3. A Site Visit at IAH, Terminal C, Level 1, will begin at 1:00 p.m. HOU site visit will follow at 3:00 p.m. (local time), Level 2, Information Booth. The meeting and site visit are the only opportunity for bidders to see the site prior to Bid Due Date.

16.0 – OPENING OF BIDS: Replace Section B with the following:

- B. Place and date of Bid opening may be changed in accordance with Section 15-45(c) of the City Code.

END OF DOCUMENT

Document 00220

REQUEST FOR BID INFORMATION

PROJECT: HAS Exit Lane Breach Control IAH and HOU

PROJECT No.: PN 735

TO: Al Oracion, Sr. Procurement Specialist, HAS-SCM

Phone No. (281)230-8009

Fax No.

Email Addr. alfredo.oracion@houstontx.gov

(Type or Print question legibly; use back if more space is needed)

This request relates to _____ and/or _____
Drawing / Detail No. Specification Section No.

Attachments to this request: _____

Signature

Date

(Type or Print Name)

(Type or Print Company Name)

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: HAS Exit Lane Breach Control IAH and HOU

Project No.: PN 735

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 00457 – Conflicts of Interest Questionnaire (CIQ)
 - Document 00460 – Pay or Play Acknowledgement Form (POP 1-A)
 - Document 00461 – Hire Houston First Affidavit
 - Document 00470 – Bidder's MWSBE Participation Plan
 - Document 00471 – Bidder's Record of Good Faith Efforts
 - Document 00472 – Bidder's Goal Deviation Request
 - 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 300 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 |
|--------------------------------------|-----------|-----------------------|-----------------|--------------------|-----------------------------------|------------------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| <u>TOTAL BASE UNIT PRICES</u> | | | | | | \$ N/A |

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 |
|---------------------------------------|-----------|------------------------|-----------------|--------------------|-----------------------------------|------------------|
| | | N/A | | | | |
| | | | | | | |
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| | | | | | | |
| <u>TOTAL EXTRA UNIT PRICES</u> | | | | | | \$ _____ |

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CASH ALLOWANCE TABLE:

| Item No. | Spec Ref. | Cash Allowance Short Title | Cash Allowance in figures (1) |
|-------------------------------------|-----------|----------------------------|-------------------------------|
| [1] | | Owner's allowance | \$10,000 |
| [2] | | Building Permit | \$10,000 |
| | | | |
| | | | |
| | | | |
| <u>TOTAL CASH ALLOWANCES</u> | | | \$20,000 |

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 |
|--------------------------------|-----------|-----------------------|-----------------|--------------------|-----------------------------------|--------------------------------------|
| | | N/A | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| <u>TOTAL ALTERNATES</u> | | | | | | \$ _____ |

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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:

By: _____

Name:
Title:

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 |
|-----------------------------|-------------|

Printed name

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 if you are the successful bidder/proposer, and ensure the same on behalf of subcontracts 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

Note: For more information contact your POP Liaison or the POP Contract Administrator. All contact information can be found on www.houstontx.gov →Departments→Office of Business Opportunity→Pay or Play.



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:

4. Business Address(for use in determining HHF eligibility): _____
Street City State Zip Code

5. Mailing Address(If different from Business Address): _____
Street City State Zip Code

6. Business Phone Number: _____ Business Fax Number: _____

7. Business E-Mail: _____ Business Website: _____

8. Federal Tax ID Number: _____ COH Vendor Registration ID Number: _____

9. Describe the primary activities of your firm: _____

10. In accordance with the aforementioned definition for "headquartered", is your company's headquarters or corporate office located in one of the following eight counties?

YES NO

If yes, check all that apply.

- | | |
|------------------------------------|-------------------------------------|
| <input type="checkbox"/> Harris | <input type="checkbox"/> Galveston |
| <input type="checkbox"/> Brazoria | <input type="checkbox"/> Liberty |
| <input type="checkbox"/> Chambers | <input type="checkbox"/> Montgomery |
| <input type="checkbox"/> Fort Bend | <input type="checkbox"/> Waller |

How many employees are based within the county or counties you selected? _____

If you answered "no" to question 10, please answer questions 11, 12 and 13.

11. What is the number of employees that are based within the following eight counties? _____

- | | |
|--|---|
| <ul style="list-style-type: none">• Harris• Brazoria• Chambers• Fort Bend | <ul style="list-style-type: none">• Galveston• Liberty• Montgomery• Waller |
|--|---|

12. List all company locations inside city limits and in the 8 county local area as well as addresses, primary activities and number of employees at each location.

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

| 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

BIDDER'S MWSBE PARTICIPATION PLAN

The Bidder or Proposer shall submit this completed form with the bid, to demonstrate the Bidder/Proposer's plan to meet the contract-specific MWSBE goal(s) ("contract goal(s)"). If the Bidder or Proposer cannot meet the contract goal(s), the Bidder/Proposer has the burden to demonstrate "Good Faith Efforts", which shall include correctly and accurately preparing and submitting this form, a Record of Good Faith Efforts (Document 00471), a Request for Deviation from the Goal (Document 00472), and providing supporting documentation evidencing their "Good Faith Efforts", as required by the City of Houston's Good Faith Efforts Policy (Document 00808). The City will review the Participation Plan and Good Faith Efforts at the time of bid opening. Visit <http://www.houstontx.gov/obo> for more information.

| | | | |
|---------------------------|------------|------------|--|
| City Contract Goal | MBE | WBE | <ul style="list-style-type: none"> • MBE and WBE Goals are two separate Contract Goals. • Any excess of one Goal cannot be applied to meet another Goal. • An SBE can be applied to the MBE and/or WBE Goal, but not to exceed 4%. • Only up to 50% of the Bidder's Participation plan may be met using Suppliers. |
|---------------------------|------------|------------|--|

| NAICS Code (6 digit) | Description of Work (Plan Sheet #, Unit Price #, Scope of Work #, as applicable) | % of Total Bid Price (2 decimal places, Example: 5.00 %) | Services or Supplier | Cert. Type for Goal: MBE, WBE, or SBE | Certified Firm Name Firm Address Contact Name Phone No. and E-Mail |
|----------------------|--|--|----------------------|--|---|
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |

| | | | |
|--|------------|------------|------------|
| Bidder's Participation Plan Total | MBE | WBE | SBE |
| | | | |

Signature for Company: _____ *

Printed Name: _____

Company Name: _____

Phone #: _____

Date: _____

*I understand that supplying inaccurate information may violate Texas Penal Code Section 37.10 and lead to City sanctions.

DOCUMENT 00470

CONTINUATION PAGE

| NAICS Code (6 digit) | Description of Work (Plan Sheet #, Unit Price #, Scope of Work #, as applicable) | % of Total Bid Price (2 decimal places, Example: 5.00 %) | Services or Supplier | Cert. Type for Goal MBE, WBE, or SBE | Certified Firm Name Firm Address Contact Name Phone No. and E-Mail |
|----------------------|--|--|----------------------|--|---|
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
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| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |
| | | | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | |

Signature for Company: _____ * Date: _____

Print Name/Company Name: _____ Phone: _____

*I understand that supplying inaccurate information may violate Texas Penal Code Section 37.10 and lead to City sanctions.

Document 00471
PRE-BID GOOD FAITH EFFORTS

Bidder Name: _____ **Project Name:** HAS Exit Lane Breach Control IAH and HOU

A Bidder or Proposer that may be unable to complete or follow a Participation Plan (Document 00470) to meet the Contract Goal in the Supplemental Conditions (Document 00800), must submit this completed form, Goal Deviation Request Form (Document 00472), providing supporting documentation evidencing their "Good Faith Efforts", as required by the City of Houston's Good Faith Efforts Policy (see Document 00808).

The Bidder or Prime Contractor has the burden to demonstrate "Good Faith Efforts" to meet the MWSBE goal, which includes correctly and accurately preparing and submitting this form and other efforts described in the City's Good Faith Efforts Policy (Document 00808). The Office of Business Opportunity will review Good Faith Efforts and Participation Plan after selection of an apparent low bidder.

UNLESS THE BIDDER'S/PROPOSER'S PARTICIPATION PLAN MEETS THE CONTRACT GOAL, FAILURE TO SUBMIT THIS FORM MAY RESULT IN THE BID BEING FOUND NON-RESPONSIVE.

| NAICS Code | Plan Item No. | MWSBE Type for Goal | Certified Firm Name Address, Phone No., and E-Mail | Certified Firm Contact Person | Methods of Contact | Prime Contact Dates | Certified Firm Response | Results of Contact (why suitable or not suitable for work) |
|------------|---------------|--|--|-------------------------------|---|---------------------|-------------------------|--|
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |

Authorized Signature: _____

Date: _____

Phone: _____

Print Name: _____

Email Address: _____

Company Name: _____

CONTINUATION PAGE

| NAICS Code | Plan Item No. | MWSBE Type for Goal | Certified Firm Name Address, Phone No., and E-Mail | Certified Firm Contact Person | Method of Contact | Prime Contact Dates | Certified Firm Response | Results of Contact (why suitable or not suitable for work) |
|------------|---------------|--|--|-------------------------------|---|---------------------|-------------------------|--|
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | MBE <input type="checkbox"/> WBE <input type="checkbox"/> SBE <input type="checkbox"/> | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |

Authorized Signature: _____

Date: _____

Phone: _____

Print Name: _____

Email Address: _____

Company Name: _____

Document 00472
BIDDER'S MWSBE GOAL DEVIATION REQUEST

Company Name: _____

Project Name: HAS Exit Lane Breach Control IAH and HOU

| | | | |
|---|------------|------------|--------------|
| Department Approved Contract Goals | MBE | WBE | Total |
| | % | % | % |

| | | | | |
|---|------------|------------|------------------------------------|--------------|
| Bidder's Proposed Participation Plan | MBE | WBE | SBE (Max 4% for Credit) | Total |
| | % | % | % | % |

Justification: Please provide the reason the Bidder is unable to meet the Contract Goal in Document 00800.

Good Faith Efforts: Please list any efforts not listed in the Bidder's Pre-Bid Good Faith Effort (Document 00471) and provide supporting documentation evidencing "Good Faith Efforts", as required by the City of Houston's Good Faith Efforts Policy (Document 808).

Date: _____
Email: _____
Phone Number: _____

Company Name: _____
Company Representative: _____
Title: _____

| | |
|--|------------------|
| FOR OFFICIAL USE ONLY: Approved [] | Not Approved [] |
| OBO Representative _____ | Date: _____ |
| _____ | Title: _____ |

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 Al Oracion, 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)*

- [X] Document 00572 – Contractor’s Goal Deviation Request (*Only submit if you could not meet MWBE participation goals from the 00570*)
- [X] Document 00600 - List of Proposed Subcontractors and Suppliers
- [X] Document 00601 - Drug Policy Compliance Agreement
- [X] Document 00602 - Contractor's Drug-free Workplace Policy (*Contractor creates this document.*)
- [X] Document 00604 - History of OSHA Actions and List of On-the-job Injuries
- [X] 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.*)
- [X] 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)
- [X] Document 00610 - Performance Bond (100% of total amount of bid)
- [X] Document 00611 - Statutory Payment Bond (100% of total amount of bid)
- [X] 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)
- [X] Document 00620 - Affidavit of Insurance
- [X] 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 00623 - Contractor's Act of Assurance (SRF Form ED-103)
- [] Document 00626 - SRF Affirmative Steps Solicitation Report
- [] Document 00627 - SRF Prime Contractor Affirmative Steps Certification and Goals
- [] Document 00629 - Affidavit for FAA Form 7460-1
- [X] Document 00630 – Agreement to comply with POP Program
- [X] Document 00631 - City of Houston Pay or Play Program – List of Participating Subcontractors
- [X] Document 00632 – EEO Certification by Material Suppliers, Professional Service Providers
- [X] Document 00636 – Certificate of Interested Parties FORM 1295
- [X] 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:
 - [X] EEO-3, Certification by Bidder Regarding Equal Employment Opportunity
 - [X] 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.)*
 - [X] EEO-7, Company's Equal Employment Opportunity Compliance Program
 - [X] 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, Al Oracion, 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 issue a Notice to Proceed letter to Contractor, which establishes Date of Commencement of the Work.

END OF DOCUMENT

Document 00501

RESOLUTION OF CONTRACTOR

_____ (“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: HAS Exit Lane Breach Control IAH and HOU

Project Location: IAH and HOU

Project No: PN 735

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:

Devon Tiner, P.E., PMP – 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: 281-233-1942

Email Address: Devon.Tiner@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:

[_____], P.E. (or his or her successor)

Phone Number: _____

E-mail Address: _____

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 300 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 \$ [Original Contract Price], which includes Alternates, if any, accepted below.

3.2 The City accepts Alternates as follows:

**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 No. 1, dated [_____]]

Addendum No. 2, dated [_____]

Addendum No. 3, dated [_____]

- 7.1.7 Other documents:

| <u>Document No.</u> | <u>Title</u> |
|---------------------|--|
| [X] 00410B | Bid Form – Part B |
| [X] 00470 | Pre-bid MWSBE Participation Plan |
| [] 00470D | Pre-bid DBE Participation Plan for Project Funded by AIP Grant |
| [X] 00471 | Pre-bid Good Faith Efforts |
| [X] 00472 | Pre-bid Goal Deviation Request |
| [X] 00501 | Resolution of Corporation (if a corporation) |
| [X] 00570 | Post-bid MWSBE Participation Plan |
| [X] 00571 | Post-bid Good Faith Efforts |
| [X] 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

**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

Date Countersigned:

ATTEST/SEAL:

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 00570

CONTRACTOR'S REVISED MWSBE PARTICIPATION PLAN

As soon as the Contractor becomes aware that the Contractor may not abide by the most current approved Plan, the Contractor shall submit this completed form with a Record of Post-Bid Good Faith Efforts (Document 00571), a Request for Plan Deviation (Document 00572), and any other document evidencing "Good Faith Efforts", as required by the Good Faith Efforts Policy (Document 00808). The City will review this Revised Participation Plan and may approve this Revised Plan if the Contractor has made Good Faith Efforts. For more information, visit <http://www.houstontx.gov/obo>.

| Original Participation Plan Percentage | MBE | WBE | SBE | Revised Participation Plan Percentage | MBE | WBE | SBE |
|--|-----|-----|-----|---------------------------------------|-----|-----|-----|
| | | | | | | | |

| NAICS Code (6 digit) | Description of Work (Plan Sheet #, Unit Price #, Scope of Work #, as applicable) | % of Total Bid Price (2 decimal places) | Cert. Type for Goal (MBE, WBE, SBE) | Certified Firm Name Firm Address Contact Name Phone No. and E-Mail (if available) |
|----------------------|--|---|-------------------------------------|--|
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Signature for Company: _____ * Date: _____
 Print Name: _____ Phone: _____

*I understand that supplying inaccurate information may violate Texas Penal Code Section 37.10 and lead to City sanctions.

Document 00570

CONTINUATION PAGE

| NAICS Code (6 digit) | Plan Item Number (if applicable)/ Description of Work | % of Total Bid Price (2 decimal places) | Cert. Type for Goal (MBE, WBE, SBE) | Certified Firm Name Firm Address Contact Name Phone No. and E-Mail (if available) |
|----------------------|--|---|-------------------------------------|--|
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Signature for Company: _____*
Print Name: _____

Date: _____
Phone: _____

*I understand that supplying inaccurate information may violate Texas Penal Code Section 37.10 and lead to City sanctions.

Document 00571

RECORD OF POST-AWARD GOOD FAITH EFFORTS

Contractor Name: _____

Project Name: HAS Exit Lane Breach Control IAH and HOU

A Contractor that may be unable to follow an agreed Participation Plan (Document 00470 or 00570) must submit this completed form, a Plan Deviation Request Form (Document 00572), and any other documentation of "Good Faith Efforts" (see Document 00808) that the OBO Representative may require. The Contractor shall submit one completed Document 00571 (Part A) for each Certified Firm that is no longer performing part or all of its work duties under the Approved Plan. The Contractor has the burden to demonstrate "Good Faith Efforts" to meet the MWSBE goal, which includes correctly and accurately preparing and submitting this form and other efforts described in the Good Faith Efforts Policy (Document 00808). The Office of Business Opportunity may review Participation Plan and Good Faith Efforts from time to time and may request that the Contractor submit this form and other information.

UNLESS THE CONTRACTOR MEETS THE GOALS IN THE AGREED PARTICIPATION PLAN, FAILURE TO SUBMIT THIS FORM MAY RESULT IN A DEFAULT OF THE CONTRACT.

PART A (REASON FOR NON-USE OF CERTIFIED FIRM IN AGREED PLAN)

| NAICS Code | Plan Item No. | MWSBE Type for Goal | Certified Firm Name, Address, Phone No. and E-mail | Plan Goal & Actual Use (in % of total) | Method of Contact | Reason for Non-Use (why the Contractor was not able to use the Certified Firm in accordance with the Agreed Plan) |
|------------|---------------|---------------------|--|--|---|---|
| | | | | Plan %: _____ Actual %: _____ | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | |

PART B (REASON FOR NONUSE OF REPLACEMENT CERTIFIED FIRMS—IF APPLICABLE)

| NAICS Code | Plan Item No. | MWSBE Type for Goal | Certified Firm Name Address, Phone No. and E-Mail | Certified Firm Contact Person | Method of Contact | Prime Contact Date | Certified Firm Response | Results of Contact (why Certified Firm was unsuitable or unusable) |
|------------|---------------|---------------------|---|-------------------------------|---|--------------------|-------------------------|--|
| | | | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |

Authorized Signature: _____

Date: _____

Phone: _____

Print Name: _____

Email Address: _____

Document 00571

PART B CONTINUATION (REASON FOR NONUSE OF REPLACEMENT CERTIFIED FIRMS)

| NAICS Code | Plan Item No. | MWSB E Type for Goal | Certified Firm Name Address, Phone No. and E-Mail | Certified Firm Contact Person | Method of Contact | Prime Contact Date | Certified Firm Response | Results of Contact (why Certified Firm was unsuitable or unusable) |
|------------|---------------|----------------------|---|-------------------------------|---|--------------------|-------------------------|--|
| | | | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
| | | | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |
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| | | | | | Phone <input type="checkbox"/> E-mail <input type="checkbox"/> Fax <input type="checkbox"/> | | | |

Authorized Signature: _____

Date: _____

Phone: _____

Print Name: _____

Email Address: _____

Document 00572

CONTRACTOR'S REQUEST FOR PLAN DEVIATION

Contractor Name: _____

Project Name: HAS Exit Lane Breach Control IAH and HOU

| | | | | |
|--|------------|------------|------------|--------------|
| Approved Participation Plan Percentages | MBE | WBE | SBE | Total |
| | % | % | % | % |

| | | | | |
|--|------------|------------|------------|--------------|
| Contractor's Requested Participation Plan | MBE | WBE | SBE | Total |
| | % | % | % | % |

Justification: Please provide the reason the Contractor is unable to meet the MWSBE goal in the Approved Plan.

Good Faith Efforts: Please list any efforts not listed in Contractor's Record of Good Faith Effort (Document 00571).

Please attach additional pages if the space for Justification or Good Faith Efforts is insufficient.

Date: _____

*Contractor: _____

E-mail: _____

*By: _____

Phone Number: _____

Title: _____

*I understand that the approval of this deviation request does not constitute a final decision by OBO that Contractor has used Good Faith Efforts in meeting the Contracting Goal.

FOR OFFICIAL USE ONLY: Approved Not Approved

OBO Representative

Date:

Title:

Document 00600

LIST OF PROPOSED SUBCONTRACTORS AND SUPPLIERS

PROJECT NAME: HAS Exit Lane Breach Control IAH and HOU TOTAL DBE AWARD: \$ _____
 ORIG. CONTRACT PRICE: \$ _____ TOTAL MWSBE AWARD: \$ _____
 PROJECT NO.: PN 735 TOTAL HUB AWARD: \$ _____
 DATE OF REPORT: _____ TOTAL PDDBE AWARD: \$ _____

| NAICS (6 digits) | SUBCONTRACTOR OR SUPPLIER (INCLUDE "MWSBE", "PDBE", "DBE", OR "HUB" DESIGNATION) ² | ADDRESS | SCOPE OF WORK ³ |
|---------------------|--|---------|-------------------------------|
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- NOTES:**
1. RETURN FOR ALL PROJECTS AS REQUIRED IN DOCUMENT 00800 – SUPPLEMENTARY CONDITIONS. RETURN WITHIN THE SPECIFIED NUMBER OF DAYS AFTER RECEIPT OF NOTICE OF INTENT TO AWARD
 2. DESIGNATE FIRMS CERTIFIED BY THE CITY OFFICE OF BUSINESS OPPORTUNITY ON THIS FORM.
 3. DESCRIBE THE WORK TO BE PERFORMED, FOR WHICH THE FIRM IS CERTIFIED, SUCH AS "PAVING", "ELECTRICAL", ETC.
 4. **CONTRACTOR SHALL EXECUTE CONTRACTS WITH APPROVED SUBCONTRACTORS AND SUPPLIERS WITHIN 30 DAYS AFTER THE DATE OF THE NOTICE TO PROCEED. COPIES OF CONTRACTS WITH DESIGNATED FIRMS MUST BE SENT TO THE OFFICE OF BUSINESS OPPORTUNITY.**

SIGNATURE: _____

COMPANY NAME: _____

NAME: _____
(Type or Print)

TITLE: _____

Document 00600

Continuation Page

PROJECT NAME: HAS Exit Lane Breach Control IAH and HOU
DATE OF REPORT: _____
PROJECT NO.: PN 735

| NAICS (6 digits) | SUBCONTRACTOR OR SUPPLIER (INCLUDE "MWSBE", "PDBE", "DBE", OR "HUB" DESIGNATION) ² | ADDRESS | SCOPE OF WORK ³ |
|---------------------|--|---------|-------------------------------|
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SIGNATURE: _____

COMPANY NAME: _____

NAME: _____
(Type or Print)

TITLE: _____

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

(Attachment A)
00601-1
02-01-2004

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 00609

List of Nonroad Diesel Equipment

Provide a list of nonroad diesel equipment that will be used in the performance of work on this Project as defined under this Contract or on a project-specific location that supports only the Project and is within one mile of the Project ("Project Site").

This list shall include the following information:

- An assigned Contractor-unique identification number, which shall be prominently placed on the exterior of individual pieces of Equipment;
- The dates each piece of Equipment is anticipated to arrive and depart the Project Site, and an indication of whether the Equipment will be used in performance of Project work;
- For each piece of Equipment: the make, description, model number, identification number, and model year;
- For each engine: the make, model, identification number, model year, horsepower rating, test group (family code); and
- Certification by either EPA, CARB or TCEQ, and the Tier 1, 2 or 3 emission standard claimed.

END OF DOCUMENT

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.

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



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| | |
|----------|---|
| PRODUCER | <small>CONTACT NAME:</small> |
| | <small>PHONE (A/C, No., Ext):</small> <small>FAX (A/C, No.):</small> |
| | <small>E-MAIL ADDRESS:</small> |
| | <small>INSURER(S) AFFORDING COVERAGE</small> |
| | <small>NAIC #</small> |
| | <small>INSURER A:</small> |
| INSURED | <small>INSURER B:</small> |
| | <small>INSURER C:</small> |
| | <small>INSURER D:</small> |
| | <small>INSURER E:</small> |
| | <small>INSURER F:</small> |

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSR | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS |
|----------|--|-----------|----------|---------------|-------------------------|-------------------------|---|
| | GENERAL LIABILITY | | | | | | EACH OCCURRENCE \$ |
| | <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY | | | | | | DAMAGE TO RENTED PREMISES (Ea occurrence) \$ |
| | <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR | | | | | | MED EXP (Any one person) \$ |
| | | | | | | | PERSONAL & ADV INJURY \$ |
| | | | | | | | GENERAL AGGREGATE \$ |
| | GEN'L AGGREGATE LIMIT APPLIES PER: | | | | | | PRODUCTS - COMP/OP AGG \$ |
| | <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC | | | | | | \$ |
| | AUTOMOBILE LIABILITY | | | | | | COMBINED SINGLE LIMIT (Ea accident) \$ |
| | <input type="checkbox"/> ANY AUTO | | | | | | BODILY INJURY (Per person) \$ |
| | <input type="checkbox"/> ALL OWNED AUTOS | | | | | | BODILY INJURY (Per accident) \$ |
| | <input type="checkbox"/> HIRED AUTOS | | | | | | PROPERTY DAMAGE (Per accident) \$ |
| | | | | | | | \$ |
| | <input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> OCCUR | | | | | | EACH OCCURRENCE \$ |
| | <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE | | | | | | AGGREGATE \$ |
| | DED RETENTIONS | | | | | | \$ |
| | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY | | | | | | <input type="checkbox"/> WC STATU- TORY LIMITS <input type="checkbox"/> OTH- ER |
| | ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? (Mandatory in NH) | | | | | | E.L. EACH ACCIDENT \$ |
| | If yes, describe under DESCRIPTION OF OPERATIONS below | | | | | | E.L. DISEASE - EA EMPLOYEE \$ |
| | | | | | | | E.L. DISEASE - POLICY LIMIT \$ |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

| | |
|--|---|
| <p>CERTIFICATE HOLDER</p> | <p>CANCELLATION</p> <p>SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.</p> <p>AUTHORIZED REPRESENTATIVE</p> |
|--|---|



**City of Houston
Certification of Compliance with
Pay or Play Program**



Contractor Name: _____ \$ _____
(Contractor/Subcontractor) *(Amount of Contract)*

Contractor Address: _____

Project No.: PN 435

Project Name: HAS Exit Lane Breach Control IAH and HOU

POP Liaison Name: _____

In accordance with the City of Houston Pay or Play Program authorized by Ordinance 2007-534 and Executive Order 1-7, Contractor/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 or to PLAY for all covered employees. The Contractor/Subcontractor may also Pay on behalf of some covered employees and Play on behalf of other covered employees.

The Contractor/Subcontractor will comply with all provisions of the Pay or Play Program and will furnish all information and reports requested to determine compliance with program requirements of the Pay or Play Program (See Executive Order 1-7 for the terms of the Pay or Play program) The criteria of the program is as follows:

The Contractor/Subcontractor agrees 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.

Otherwise the Contractor/Subcontractor agrees to **“Play”** by providing health benefits to each covered employee. The health benefits must meet the following criteria:

1. The employer will contribute no less than \$150 per employee per month toward the total premium cost for single coverage only; and
2. The employee contribution, if any amount, will be no greater than 50% of the total premium cost and no more than \$150 per month.
3. Pursuant to E.O. 1-7 section 4.04 a contractor is deemed to have complied with respect to a covered employee who is not provided health benefits if the employee refuses the benefits and the employee’s contribution to the premium is no more than \$40 per month.

| | | | |
|--------------------------------------|-----|------|------|
| Please select whether you choose to: | Pay | Play | Both |
| | | | |

The Contractor/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 the compliance of covered employees of covered subcontractors and only forms that are accurate and complete will be accepted.

| *Estimated Number of: | Prime Contractor | Sub-Contractor |
|-----------------------------|------------------|----------------|
| Total Employees on City Job | | |
| Covered Employees | | |
| Non-Covered Employees | | |
| Exempt Employees | | |

***Required**

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

 Contractor (*Signature*) _____
Date

 Name and Title (*Print or type*)

City of Houston
Pay or Play Program
List of Subcontractors



Prime Contractor: _____
Project Number/Description: _____

POP Contact Person: _____
Address: _____

Email: _____
Phone: _____

Note: Include ALL subcontractors (use additional form if necessary)

| Subcontractor Name | Supplier Y/N? | Amount of Subcontract | Check One | | | | Contact Person | Phone | Email Address | Mailing Address |
|--------------------|---------------|-----------------------|-----------|------|---------------------|-----|----------------|-------|---------------|-----------------|
| | | | Pay | Play | Both (Pay and Play) | N/A | | | | |
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*If the above information is found to be submitted fraudulently with the intent to bypass or deceive the purpose of the Pay or Play Program the contractor will be held liable for all compliance requirements from the inception of the contract. All subcontracts that surpass the \$200,000.00 threshold will be responsible for Pay or Play compliance from the inception of the contract.

Affidavit

I hereby solemnly affirm, certify and confirm that the total sub-contract value stated above is the final value of the contract (*) including all material costs, fuel, payroll, taxes, fees, profit sharing, labor or any payments in relation to the contracted work and no separate payment or contract has been made for the sub-contract under contract no. _____. The above sub-contract value includes all the costs related to work under the contract. The contractor and sub-contractor(s) agree to inform The Mayor's Office of Business Opportunity of any related cost(s) added to the contracted work and re-submit POP-3 with the current value of the sub-contract. I understand that compliance with "Pay or Play" program is mandatory and nothing has been hidden to circumvent the program requirements.

Contractor Authorized Representative & Title _____ Date _____
Name & Signature

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

Document 00632

EEO 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.: HAS Exit Lane Breach Control IAH and HOU PN 735

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 |
| | | | |
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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 30, 2021 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 II.

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

1.1.16 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.

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

1.1.18 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.

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

1.1.20 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.

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

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

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

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

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

1.1.26 Major Unit Price Work: An individual Unit Price item,

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

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

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

1.1.27 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.

1.1.28 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.

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

1.1.30 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.

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

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

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

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

1.1.35 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).

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

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

1.1.38 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.

1.1.39 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.

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

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

1.1.42 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.

1.1.43 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.

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

1.1.45 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.

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

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

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

1.1.49 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.

1.1.50 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.

1.1.51 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.

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

1.1.53 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.

1.1.54 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. 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) may not delegate or subcontract more than 50 percent of work under this subcontract to any other subcontractor without the express written consent of the City's OBO Director (the "Director").

3.5.3.2.2 (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.

3.5.3.2.3 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.

3.5.4 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
 - 3.6.2.2.2 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,
- 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

| | <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 |

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.

request for the data by City Engineer shall constitute waiver of a Claim.

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

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 *ANTI-BOYCOTT OF ISRAEL*

13.13.1 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.

13.14 *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 to the City its termination Claim, in forms required by City Engineer. The Claim will be submitted 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

The following Paragraphs amend and supplement the March 30, 2021 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 reorder the remaining definitions accordingly. Please insert the amended definition of "Specifications".*

1.1.9.1 The firm of _____ TBD _____ has been employed by the City as Construction Manager for the Work.

1.1.23 *Good Faith Efforts.* Steps taken to achieve an MBE, WBE, SBE, or PDDBE 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 PDDBE 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 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. 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.*

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 9 percent,

3.5.3.1.1.2 the WBE goal is 2 percent, and

3.5.3.1.1.3 the PDBE goal is n/a 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 \$50.00 per hour actual costs per inspector for inspection services.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 References to Unit Prices in individual Specification sections are not applicable to the Contract. Include payment for portions of the Work required by these sections in the Stipulated Price for the Contract.

MANDATORY

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> |
|--|-----------------------------------|
| Project less than \$2.5 M | \$800 |
| Project \$2.5 M to \$7.5 M | \$1200 |
| Non-facility Projects Greater than \$7.5 M | \$1500 |
| Facility Projects greater than \$7.5 M | \$2000 |

9.4 **APPLICATIONS FOR PAYMENT, STIPULATED PRICE WORK:**
Insert the following Paragraph 9.4.3.

9.4.3 The City of Houston's standard payment term is to pay 30 days after receipt of invoice or receipt of goods or services, whichever is later, according to the requirements of the Texas Prompt Payment Act (Texas Government Code, Chapter 2251). However, the City will pay in less than 30 days in return for an early payment discount from vendor as follows:

- 9.4.3.1 Payment Time - 10 Days: 2% Discount
- 9.4.3.2 Payment Time - 20 Days: 1% Discount

If the City fails to make a payment according to the early payment schedule above, but does make the payment within the time specified by the Prompt Payment Act, the City shall not receive the discount, but shall pay no other penalty. When the payment date falls on a Saturday, Sunday, or official holiday when City offices are closed and City business is not expected to be conducted, payment may be made on the following business day.

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 \$1,200 per day.

9.12.1.1.2.1. Retention of documents.

Contractor shall retain and preserve all non-identical copies of all documents, reports, research, analytical or other data, records or other information of any kind or character (including documents, records, or other information in electronic form including, but not limited to e-mails) in its or its sub-contractors' or agents' possession or control, or that come into its or its sub-contractors' or agents' possession or control, and that relate in any manner to this contract, or the performance of any work described in this contract (the "Information"). This retention requirement shall apply regardless of any contrary corporate or institutional policy or procedure or legal requirement. Contractor, Contractor's sub-contractors and agents shall retain and shall not destroy any of the Information until such time as Contractor has received written approval from the City Attorney of the City of Houston that the Information or any part of the Information may be destroyed. Contractor shall, within 30 days after receipt of a written request by the City, deliver the Information to the City. Contractor shall instruct and require its agents and sub-contractors performing any

part of the work described in this contract to comply with the requirements of this paragraph.

9.12.1.1.2.2. Notification of events that may cause delay.

If any event occurs that may delay performance by Contractor, or Contractor's agents or sub-contractors of any work or obligation of any kind under this contract, Contractor shall provide notice in accordance with the Notice Provisions of this contract to the City within two (2) business days of the date Contractor or Contractor's agents or sub-contractors first knew that the event might cause a delay. Contractor shall provide a written explanation and description of the reasons for the delay, the anticipated duration of the delay, all actions taken or to be taken to prevent or minimize the delay, and a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay. **TIME IS OF THE ESSENCE** in the performance of the requirements of this paragraph and of any work to be performed by the Contractor in this contract.

9.12.1.2.3. Liability for stipulated penalties

The Consent Decree provides that the United States of America, the United States Environmental Protection Agency and the State of Texas may assess stipulated penalties against the City upon the occurrence of certain events. To the extent that Contractor or Contractor's agents or sub-contractors cause or contribute to, in whole or in part, the assessment of any stipulated penalty against the City, Contractor agrees that it shall pay to the City the full amount of any stipulated penalty assessed against and paid by the City that is caused or contributed to in whole or in part by any action, failure to act, or failure to act within the time required by any provision of this contract. Contractor shall also pay to the City all costs, attorney fees, expert witness fees and all other fees and expenses incurred by the City in connection with the assessment or payment of any such stipulated penalties, or in contesting the assessment or payment of any such stipulated penalties. In addition to any and all other remedies to which the City may be entitled at law or in equity, Contractor expressly authorizes the City to withhold all amounts assessed and paid as stipulated penalties, and all associated costs, fees, or expenses from any amount unpaid to Contractor under the terms of this contract, or from any retainage provided in the contract.

Without limiting anything set forth elsewhere in this construction contract regarding liquidated damages, Contractor acknowledges that damages are an intended factor in the calculation of the amount of the liquidated damages under this construction contract.

9.12.1 payable by Contractor or Surety for each and every day of delay beyond the time stipulated in Summary of Work Paragraph 1.08.B are as follows:

- 9.12.1.2.1 **Repair Items:** If Contractor does not complete replacement, improvement and/or new installations on existing service lines and any associated work of all work orders within twelve (12) days from the date the work orders were issued, the City of Houston may, at its discretion, collect \$400.00 (four hundred dollars) in liquidated damages per day for each repair not

completed within twelve (12) days.

9.12.1.2.2 **Restoration Items:** If Contractor does not complete the repairing, resurfacing and/or sodding of concrete, asphalt and/or lawn areas and any associated work disturbed by construction within six (6) days after the repair items are completed, the City of Houston may, at its discretion, collect \$400.00 (four hundred dollars) in liquidated damages per day for each restoration not completed within six (6) days.

ARTICLE 11 - INSURANCE AND BONDS

11.2 *INSURANCE TO BE PROVIDED BY CONTRACTOR:*

**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. |
| .7 Excess Coverage | \$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><u>X</u> (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> | |

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

11.5 *MAINTENANCE BONDS: Insert the following Paragraph 11.5.2.*

11.5.2 One-year Surface Correction Bond: Contractor shall provide, on the City standard form, an additional One-Year Bond in an amount equal to four percent of the Original Contract Price or cost of repair. Bond shall provide for Contractor's correction, replacement, or restoration of backfill or subsurface and surface work not in accordance with the Contract, within one year from the date the One-Year Maintenance Bond has expired.

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.

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: IAH (PN 735A) & HOU (PN 735B) _____

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.

- 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 \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.
- (2) Contractors receiving federally-assisted construction contract awards exceeding \$10,000 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 \$10,000 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 \$10,000 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.

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.

**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 | 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 | | TABLE B 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 | |
|--------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------------|---|
| | | | | | | | | | | | | | | | | | | | | M | F |
| On-The-Job Trainee | | | | | | | | | | | | | | | | | | | | 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 | | | | | |

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: HAS Exit Lane Breach Control

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 \$10,000 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 \$10,000 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.
 - (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 \$10,000 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 \$10,000 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 \$10,000 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.

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.

**CERTIFICATION BY PROPOSED SUBCONTRACTOR REGARDING
EQUAL EMPLOYMENT OPPORTUNITY**

Name of Prime Contractor _____ Project CIP & OA Number _____

Address _____

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.

SUBCONTRACTOR'S CERTIFICATION

Subcontractor's Name: _____

Address: _____

E-Mail Address: _____

IRS Employer Identification Number: _____

Job Description: _____
(Work performed by your company for this project)

1. Participation in a previous contract or subcontract.
 - a. Subcontractor 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. Subcontractor 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.

- 2. Dollar amount of proposed subcontract: \$ _____
- 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 \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.
- (2) Contractors receiving subcontract awards exceeding \$10,000 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 \$10,000 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

\$10,000 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.

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.

**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

| | | | | | | | | | | | | | | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-------------------|---|
| On-The-Job Trainee | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | OJT TOTALS 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 | | | | | |

Certification by Proposed Material Suppliers, Lessors, and Professional Service
Providers Regarding Equal reemployment Opportunity

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

Company Address: _____

Company Telephone Number: _____ Fax: _____

Goods or Service to be provided: _____

Web Page/URL Address: _____

Company Tax Identification Number: _____

Project No: IAH (PN 735A) & HOU (PN 735B)

Project Name: HAS Exit Lane Breach Control

In accordance with the City of Houston Ordinance 78-1538, 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 (hereinafter " Supplier") with contracts in the amount of \$10,000.00 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 Affirmative Action and Contract Compliance.

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 Offices. Compliance reports filed at such times as directed shall contain information including, but not limited to, the practice, policies, program, and employment policies.

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

COMPANY OFFICER (Signature)

Date

NAME AND TITLE (Print or type)

E-Mail Address

END OF DOCUMENT

Document 00808

**REQUIREMENTS FOR THE CITY OF HOUSTON PROGRAM FOR
MINORITY, WOMEN, AND SMALL BUSINESS ENTERPRISES (MWSBE) AND
PERSONS WITH DISABILITIES ENTERPRISES (PDBE)**

CONSTRUCTION CONTRACTS

I. GENERAL

A. CITY AUTHORITIES

1. The "OBO Director" is the City of Houston's Office of Business Opportunity Director, or his or her designee for the Houston Airport System is..

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

2. The "Contracting Department" for this Project is the City of Houston Department specified in Document 00520 – Agreement.
3. The "Project Manager" for this Project is specified in Document 00550, Contract Approval Notification.

II. REOCCURRING REPORTS THAT MUST BE SUBMITTED DURING THE COURSE OF THE CONTRACT:

A. MWSBE MONTHLY REPORT PROCESS

The Contractor shall complete the MWSBE Monthly Utilization Report in the Contract Compliance and Monitoring System (available at <https://houston.mwdbe.com/>).

- B.** The Contractor shall comply with further, applicable instructions regarding reporting and compliance as provided in Sections III.E and III.I below.

III. BUSINESS ENTERPRISE PROGRAM REQUIREMENTS:

A. PURPOSE

This Document facilitates implementation of City of Houston, Tex. Code of Ordinances Chapter 15, Article V, § 15-81 *et seq.*, relating to MWSBE contract participation, and Code of Ordinances Chapter 15, Article VI, § 15-90 *et seq.*, relating to PDBE contract participation (collectively, the “Business Enterprise Program or “MWSBE”). City of Houston, Tex. Ordinance 2013-0428, May 8, 2013.

B. POLICY

It is the policy of the City to encourage the full participation of Minority and Women-owned Business Enterprises, Small Business Enterprises, and Persons with Disabilities Business Enterprises in all phases of its procurement activities and to afford them a full and fair opportunity to compete for City contracts at all levels.

C. POLICY ELEMENTS

1. The Contractor agrees to ensure that MWSBE firms have a full and fair opportunity to participate in the performance of City contracts. In this regard the Contractor shall make all reasonable Good Faith Efforts to meet the Contract Goals for this Contract.
2. The Contractor and any Subcontractor shall not discriminate on the basis of race, color, religion, national origin, or sex in the performance of City contracts.
3. Contractor's performance in meeting the Participation Plan Percentage will be monitored during the construction phase of the Contract by the Office of Business Opportunity (“OBO”) and the Contracting Department (the “Department”).

D. PERCENTAGE GOALS

The MWSBE goals and PDBE goals, if any, for the Work are specified in Document 00800 – Supplementary Conditions Goals.

E. CONTRACTOR RESPONSIBILITIES

1. **Prior to Award:**
The Bidder shall submit MWSBE documents in accordance with the requirements of Document 00410 – Bid Form Part A.

- a. In accordance with the Code of Ordinances and the OBO Good Faith Efforts Policy (Attachment A), the Department shall approve an Apparent Low Bidder's MWSBE Participation Plan, Document 00470 (the "Bidder's Plan" or "Plan"), within three business days of the Bid Opening only if the Department representative determines that Bidder's Plan meets the advertised Contract Goal and is administratively complete.
- b. If the Department cannot approve the Bidder's Plan, it shall forward the Plan to OBO, who shall review the Bidder's Plan, and if applicable, the Bidder's Document 00471 (Record of Good Faith Efforts) and Document 00472 (Pre-Award Deviation Request) and determine whether the Bidder has made Good Faith Efforts to meet the Contract Goals within 10 business days of the Bid Opening.
- c. If OBO determines that the Bidder has failed to provide a valid participation plan or make Good Faith Efforts or if the Bidder fails to provide documents and associated information required by this Document 00808 or reasonably requested in writing by OBO, OBO may declare the Bidder to be non-responsible.
- d. If OBO determines that the Bidder has made Good Faith Efforts, OBO may approve the Bidder's Contract Goal Deviation request. Thereafter, the Bidder/Contractor shall be bound by the Plan, as approved or modified by OBO.
- e. The Contractor shall:
 - (1) ensure that all MWSBE firms listed in the Plan are certified by the Office of Business Opportunity prior to bid date. Qualified, non-certified firms may obtain priority consideration for certification if no more than two firms are certified with the same capability as the non-certified firm.
 - (2) execute written contracts with all certified Subcontractors and Suppliers. All such contracts must be executed and sent to OBO 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 Document 00700, General Conditions; and
 - (3) designate an MWSBE liaison officer who will administer the Contractor's MWSBE program and who shall document and maintain records of Good Faith Efforts to subcontract with MWSBE Subcontractors and Suppliers.

2. After Award:

- a. The Contractor shall submit MWSBE Monthly Utilization Reports, as requested in Article II above.
- b. The Contractor shall complete and submit to OBO a deviation

- request if the Contractor reasonably believes that it will not achieve the Business Enterprise Program Participation Plan Percentage documented in the Plan. The Contractors shall also submit to OBO, with a copy to the Contracting Department, a Record of Post-Award Good Faith Efforts (Document 00571) for each Certified Firm that the Contractor does not use in accordance with the Approved Plan before the Contractor uses another firm to perform the work.
- c. The Contractor shall conform to the Plan unless OBO approves a deviation request. OBO shall approve or reject a request for deviation within five business days of receipt of the request.
 - d. OBO shall approve a deviation request if:
 - (1) for a reason beyond the Contractor's control, the Contractor is unable to use the certified MWSBE firm in the Plan to perform the specified work. In such cases, the Contractor shall use and document Good Faith Efforts to find a similarly qualified, certified MWSBE firm to perform such specified work; or
 - (2) the Contractor reasonably believes that, due to a change of scope, execution of the work in accordance with the directions from the Contracting Department is unlikely to meet the terms of the Plan. In such cases, the Contractor shall use and document Good Faith efforts to achieve a reasonable amount of MWSBE participation on the remaining work on the Contract.
 - (3) OBO shall not unreasonably withhold approval of a deviation request.
 - e. After the Date of Substantial Completion, OBO shall evaluate the Contractor's Good Faith Efforts towards meeting the Plan, as it may be amended.
 - f. If the Contractor fails to conform to the Plan and fails to submit a Post-Award Deviation Request or provide documents and associated information required by the Good Faith Efforts Policy or reasonably requested in writing by OBO, OBO may impose sanctions in accordance with Article VI of this Document 00808.

F. ELIGIBILITY OF MWSBE FIRMS FOR SUBCONTRACTING

- 1. To ensure that the City's Business Enterprise Program benefits only those firms that are owned and controlled by a minority person(s), a woman (women), a person(s) with a disability, or a small business enterprise, the Office of Business Opportunity will certify the eligibility of MWSBE and PDBE Contractors, Subcontractors, and Suppliers. Contact the OBO Certification Division at 832-393-0600 for information regarding certification.

2. Firms must be certified by OBO at the time of bid in order to be counted towards meeting MWSBE goals. OBO maintains a Certified Minority, Women and Small Business Enterprises and Persons with Disabilities Business Enterprises Directory on the City's website. This Directory also lists federally-designated Disadvantaged Business Enterprises (DBEs).

G. DETERMINATION OF MWSBE PARTICIPATION

MWSBE participation shall be counted toward meeting the Contract Goals in response to the following:

1. Contractor may count toward its Contract Goals only those MWSBE Subcontractors/ Suppliers performing a Commercially Useful Function.
 - a. **COMMERCIALLY USEFUL FUNCTION** means a discrete task or group of tasks, the responsibility for performance of which shall be discharged by the MWSBE firm by using its own forces or by actively supervising on-site the execution of the tasks by another entity for whose work the MWSBE firm is responsible. In determining whether a certified firm is performing a commercially useful function, factors including but not limited to the following shall be considered: (1) whether the firm has the skill and expertise to perform the work for which it is being utilized and possesses all necessary licenses; (2) whether the firm is in the business of performing, managing, or supervising the work for which it has been certified and is being utilized; and (3) whether it is performing a real and actual service that is a distinct and verifiable element of the work called for in a contract. Without limiting the generality of the foregoing, a MWSBE will not be considered to be performing a commercially useful function, if it subcontracts more than 50 percent of a contract being counted toward the applicable Contract Goals, unless such subcontracting in excess of 50 percent has been expressly approved by OBO either pre-bid or post award.
 - b. OBO shall approve a Plan Deviation Request if the Contractor demonstrates that the industry standard for the type of work involved is to subcontract over 50 percent of the work.
2. Once a firm is certified as a MWSBE firm, the total dollar value of the subcontract awarded to the MWSBE firm is counted toward the Contract Goals, counting only the work in which the MWSBE has performed a Commercially Useful Function. The use of one MWSBE certified firm to meet multiple goals (e.g. MBE, WBE, SBE goals) on a contract is prohibited, unless expressly approved by OBO. Safety and Participation

goals do not count as a single goal concerning MWSBE/DBE requirements.

3. Native-American-owned firms that are certified as MBEs cannot be used to meet MBE contract goals. Native-Americans firms can only be used as SBEs in fulfillment of contracts goals, with any limitations expressly stated in Document 0800.
4. The dollar value of the work performed by a certified Prime Contractor may not be counted toward the MWSBE goal unless the certified Prime Contractor is a part of a joint venture. When the Contractor or Subcontractor is in a joint venture with one or more MWSBE firms, OBO shall determine the percent of participation resulting from such joint venture to be counted toward the Contract Goals. The City may count towards the Contractor's MWSBE contract goal that portion of the total value of the contract amount paid to an MWSBE joint venturer equal to the distinct, clearly defined portion of the contract work performed by the MWSBE.
4. A MWSBE Supplier's participation will be counted towards the MWSBE goals if all of the following criteria are met. The MWSBE Supplier must:
 - a. negotiate price;
 - b. determine quality and quantity;
 - c. order the materials;
 - d. show that the invoice is in the certified firm's name;
 - e. pay for the material itself;
 - f. control delivery; and
 - g. be certified to provide the supplies in the appropriate NAICS code.

If the listed criteria above are not met, only the entire amount of fees or commissions charged for assistance in the procurement of the supplies and materials, or fees or transportation charges for the delivery of supplies or materials required on a job site will be counted towards the MWSBE goal. To be counted, proof must be provided of the fees paid and the fees must be reasonable and not excessive as compared with fees customarily allowed for similar services. MWSBE Supplier participation may account for no more than 50% of the MWSBE participation plan.

5. The OBO Policy and Procedures Manual, as amended from time to time, shall apply to the Contract for other determinations regarding counting MWSBE participation not explicitly provided for in the Contract.

H. CONTRACTOR COMPLIANCE

To ensure compliance with MWSBE requirements, OBO and the Department

will monitor Contractor's efforts regarding MWSBE Subcontractors/Suppliers during the performance of this Contract. This may be accomplished through the following: job site visits; reviewing of records and reports; and interviews of randomly selected personnel.

I. RECORDS AND REPORTS

1. In accordance with II.A of this Document, the Contractor shall submit an initial report outlining MWSBE participation 40 days after the Notice to Proceed date, and on or before the 15th day of each month thereafter until all MWSBE subcontracting or material supply activity is completed. Each report shall cover the preceding month's activity. The Contractor shall use the MWSBE Contract Compliance and Monitoring System (B2G Now) to meet this requirement.
2. Contractor shall maintain the following records for review upon request by OBO or the Department:
 - a. Copies of executed Subcontractor agreements and purchase orders;
 - b. Documentation of payments and other transactions with MWSBE Subcontractors/ Suppliers; and
 - c. Appropriate explanations of any changes or replacements of MWSBE Subcontractors/Suppliers. All replacement MWSBE Subcontractors/Suppliers must be certified by OBO.
 - d. Any other records required by OBO or Contracting Department.
3. If a Participation Plan Percentage is not being met, the monthly report shall include a narrative description of the progress being made in MWSBE participation. If sufficient MWSBE Subcontractors or Suppliers to meet the Participation Plan Percentage are being utilized, they should be identified by name and the dollar amount paid to date for work performed or materials furnished by each MWSBE during the monthly period. Reports are required when no activity has occurred in a monthly period.
4. Contractor shall retain all such records for a period of four years following completion of the Work and shall be available at reasonable times and places for inspection by authorized representatives of the City including the City Controller.

IV. SANCTIONS:

A. SUSPENSION PERIOD AND WAIVER

Pursuant to Section 15-86 of the Code of Ordinances, OBO is authorized to

suspend any Contractor who has failed to make Good Faith Efforts for a period of up to, but not to exceed, five years.

B. GUIDELINES FOR IMPOSITION OF SANCTIONS

1. General:

- a.** OBO shall not impose any sanction except upon evidence of specific conduct on the part of a MWSBE or Contractor that is inconsistent with, or in direct contravention of, specific applicable requirements for Good Faith Efforts.
- b.** Imposition and enforcement of suspensions shall be consistent with applicable state law.

2. Severity of Sanctions:

- a.** In determining the length of any suspension, OBO shall consider the following factors:
 - (1)** Whether the failure to comply with applicable requirements involved intentional conduct or, alternatively, may be reasonably concluded to have resulted from a misunderstanding on the part of the Contractor or MWSBE of the duties imposed on them by Article V of Chapter 15 of the Code of Ordinances and these procedures;
 - (2)** The number of specific incidences of failure by Contractor or MWSBE to comply;
 - (3)** Whether the Contractor or MWSBE has been previously suspended;
 - (4)** Whether the Contractor or MWSBE has failed or refused to provide OBO with any information requested by OBO's Director or required to be submitted to OBO's Director pursuant to law or these procedures;
 - (5)** Whether the Contractor or MWSBE has materially misrepresented any applicable facts in any filing or communication to OBO; and
 - (6)** Whether any subsequent restructuring of the subject business or other action has been undertaken to cure the deficiencies in meeting applicable requirements.
- b.** Suspensions may be for any length of time not to exceed five years. Suspensions in excess of one year shall be reserved for cases involving intentional or fraudulent misrepresentation or concealment of material facts, multiple acts in contravention of applicable requirements, cases where the Contractor or MWSBE has been previously suspended, or other similarly egregious conduct.

C. APPEALS

A decision to implement a suspension may be taken after notice and an opportunity for an informal conciliation conference with OBO and a hearing by the Contract Compliance Commission. Commission members shall not have participated in the actions or investigations giving rise to the suspension hearing.

D. NOTICE

1. Prior to imposing any suspension, OBO shall deliver written notice to the Contractor or MWSBE setting forth the grounds for the proposed suspension and setting a date, time, and place to appear for an informal conciliation conference with OBO, in addition to information regarding the appearance before the Contract Compliance Commission for a hearing on the matter.
2. Any notice required or permitted to be given hereunder to any Contractor or MWSBE may be given either by personal delivery or by certified United States mail, postage prepaid, return receipt requested, addressed to their most recent address as specified in the records of the Office of Business Opportunity or in the Contract if no address is on file with the Office of Business Opportunity.

E. HEARING PROCEDURES

Proceedings before the Contract Compliance Commission shall be conducted in accordance with Section 15-23 of the Code of Ordinances. If the Commission, in a written decision, finds that a suspension is supported by the evidence presented, the Commission shall submit its recommendation to the Mayor and City Council.

ATTACHMENT A

City of Houston
Office of Business Opportunity
Good Faith Efforts Policy

General Policy.

Good Faith Efforts are steps taken to achieve an Contract Goal or other requirements which, by their scope, intensity and usefulness demonstrates the bidder's responsiveness to fulfill the business opportunity objective prior to the award of a contract, as well as the contractor's responsibility to put forth measures to meet or exceed the Contract Goal throughout the duration of the contract.

Good Faith Efforts are required to be made and demonstrated by an apparent successful bidder on goal oriented contracts or proposer on a regulated contract prior to award of a contract. Good Faith Efforts are required on professional services and construction contracts and on procurement of goods and non-professional service contracts with goals. If a bidder, when submitting a participation plan at the time of bid or proposal submission, anticipates it cannot or will not meet the Contract Goal prior to the award, the bidder must demonstrate to Office of Business Opportunity ("OBO") it has made Good Faith Efforts to meet the Contract Goal, to be eligible for the contract award.

Good Faith Efforts shall be evaluated on a case-by-case basis in making a determination whether a bidder or contractor is in compliance with this policy. The efforts employed by a bidder or contractor should be those that one could reasonably expect a bidder or contractor to take if the bidder were actively and aggressively attempting to obtain MWSBE participation sufficient to meet the Contract Goal. Efforts taken that are mere formalities or other perfunctory acts shall not be considered Good Faith Efforts to meet Contract Goals.

The factors provided herein are representative of the types of actions OBO will consider in determining whether the bidder or contractor made Good Faith Efforts to obtain MWSBE participation to meet the Contract Goal. The factors prescribed below are not intended to be a mandatory checklist, nor is it intended to be exhaustive or exclusive. OBO may consider other factors or types of efforts that may be relevant in appropriate cases.

If a contractor fails to submit Good Faith Efforts documentation as provided in this Policy, it waives the right to appeal OBO decisions related to this Policy. OBO will review all the efforts made by the contractor, including the quality and quantity of those efforts.

Pre-Award.

A bidder must submit a participation plan (Document 00470) to OBO at the time the bidder submits the bid. If the participation by certified MWSBE subcontractors documented on the participation plan (“participation”) is less than the Contract Goal, a bidder should submit a Record of Good Faith Efforts (Document 00471) with the bid. A bidder should also submit a request for a deviation (Document 00472) if the bidder, having used Good Faith Efforts, reasonably believes that it cannot meet the Contract Goal or a commercially useful deviation.

In making a determination that the bidder has made a good faith effort to meet the Contract Goals, OBO shall consider specific documentation¹ concerning the steps taken to obtain MWSBE participation, with a consideration of, by way of illustration and not limitation, whether the bidder demonstrated a genuine effort to comply with the following factors:

1. Attended any pre-bid or pre-proposal meetings scheduled by the City Department;
2. Followed up with MWSBEs that attended the pre-bid or pre-proposal meetings to discuss subcontracting and supplier opportunities and contacted MWSBEs listed in the City’s online directory;
3. Conducted outreach with minority and women focused organizations and associations far in advance of solicitation due date (no less than 10 business days);
4. Identified and designated portions of the work to be performed by MWSBEs to increase the likelihood of meeting the Contract Goals (including where appropriate breaking down the contract into reasonably sized subcontracts to ensure participation);
5. Advertised subcontracting opportunities in news media focused towards minority and women persons far in advance of solicitation due date;
6. Provided MWSBEs with a point of contact that was knowledgeable about the project and possessed decision-making authority to answer questions from interested MWSBEs;
7. Provided a reasonable number of MWSBEs certified with timely written notices via email, mail, and/or fax and/or with documented contact regarding the subcontracting/supplier opportunities. A “reasonable number of MWSBEs” shall be based on the number of MWSBEs available in the directory;

¹ A list of common supporting documentation that may allow Contractors to support their good faith efforts can be found on the Office of Business Opportunity website at www.houstontx.gov/obo.

8. Solicited the MWSBEs within a reasonable amount of time (no less than seven business days) before bid submission, as well as followed up with the MWSBEs solicited to determine if they were interested in submitting a bid or proposal or participating on a team.
9. Provided interested MWSBEs certified to perform the solicited work with prompt access to the plans, specifications, scope of work and requirements of the contract;
10. Negotiated in good faith with interested MWSBEs, and not rejecting MWSBEs as unqualified without sound reasons based on a thorough investigation of their capabilities;
11. Entered into a formal contract, or signing enforceable letters of intent with MWSBEs;
12. Provided an explanation to any MWSBE whose bid or price quotation is rejected, unless another MWSBE is accepted for the same work, as follows:
 - a. Where price competitiveness is not the reason for rejection, a written rejection notice including the reason for rejection will be sent to the rejected MWSBE firm;
 - b. Where price competitiveness is the reason for rejection, a meeting must be held with the price-rejected MWSBE, if requested, to discuss the rejection;
13. Made efforts to assist interested MWSBEs in obtaining bonding, lines of credit, insurance required for the contract, and documenting MWSBE denied by bona fide surety agents;
14. Ensured that the conditions and requirements for subcontracts are commensurate with industry standards and would not cause an economic hardship on MWSBEs, such as unnecessary insurance or coupling bid bonds with retainage; and
15. Incorporated efforts not attempted earlier or on previous bids that appear more likely to lead to attaining the Contract Goal. Past performance on similar contracts with similar scopes will also be taken in consideration when determining Good Faith Efforts. A bidder that continues to make same efforts without any significant change in the level of participation may not be making Good Faith Efforts.

Post-Award.

The contractor must sign the approved participation plan (Document 00470 or Document 00570) prior to starting work on the Project. A contractor should submit a request for deviation (Document 00572) from OBO if the contractor, having made Good Faith Efforts, reasonably believes that it will not achieve the Participation Plan Percentage documented in the approved participation plan. Unless OBO approves a deviation, a contractor must submit to OBO a Participation Summary (Document 00660) prior to City Council's consideration of any close-out, term extension, or change order. If participation is less than anticipated in the approved participation plan, the contractor must submit a Record of Good Faith Efforts (Document 00571) along with the Participation Summary. A contractor that fails to submit a deviation request and Good Faith Efforts documentation waives the right to appeal OBO decisions related to this Policy.

If the contractor is awarded the contract and fails to achieve the established Participation Plan Percentage, the contractor must demonstrate to OBO its efforts to meet the Participation Plan Percentage and failure to do so based on circumstances that the contractor could not reasonably control. In determining whether the contractor made Good Faith Efforts to ensure full participation and achievement of the Participation Plan Percentage, OBO shall consider the following factors:

1. Whether the contractor designated an MWSBE liaison officer to administer the Contractor's MWSBE programs and to be responsible for maintenance of records of Good Faith Efforts.
2. Whether the contractor furnished prompt MWSBE Utilization Reports in a timely and accurate manner through the online Contract Monitoring System or via hard copy.
3. Whether the contractor responded to efforts to resolve disputes with MWSBEs, and genuinely attempted to resolve these issues.
4. Whether the contractor disclosed payment discrepancies timely and within the monthly reporting period;
5. Whether the contractor complied with the participation plan, unless the contractor received a deviation from the OBO Director and whether upon approval, the contractor made Good Faith Efforts to replace a removed MWSBE with another certified firm;
6. Whether the contractor furnished prompt written responses to written inquiries from the Director or any employee of OBO regarding the MWSBE's performance or information germane to the MWSBE's certification;

7. Whether the contractor ensured that at all times during the performance of any contract or subcontract the MWSBE firm is engaging in a commercially useful function as that term is defined in Chapter 15 of the City of Houston Code of Ordinances;
8. Whether the contractor provided the OBO information, or other material, that was factually accurate and free of material misrepresentation;
9. Whether the contractor furnished prompt responses to requests for information, books and records needed to verify compliance from the department administering the Contract, the City Attorney and the City Controller;
10. Whether the contractor attended all meetings and mediation hearings as requested by the Director or his/her designee; and
11. How the contractor may be affected by change orders, with consideration given to the size of the change orders.

Change Orders.

The requirement to make Good Faith Efforts to achieve the approved Participation Plan Percentage is applicable to change orders. Contractors should make Good Faith Efforts to ensure that the Participation Plan Percentage remains substantially the same after the issuance of change orders. If a contractor cannot maintain substantially the same level of participation provided in the latest approved Participation Plan (Document 00470 or Document 00570) due to a change order, the contractor shall submit to the OBO Director and Contracting Department a Document 00571 (Post-Award Record of Good Faith Efforts) and Document 00572 (Post-Award Plan Deviation Request) in a timely manner that does not cause disruption to the project. In addition to other relevant factors, in evaluating whether Good Faith Efforts were made by the contractor to meet the Participation Plan Percentage despite change orders, the OBO Director shall consider the contractor's efforts to timely and efficiently deliver the project.

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"

Wage Determination Publication Date:

January 1, 2021

for

General Decision Number: **TX20210253 01/01/2021 TX253**

Superseded General Decision Number: TX20200253

State: Texas
Construction Type: Building
County: Harris County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date
0 01/01/2021

**CITY OF HOUSTON, TEXAS
LABOR CLASSIFICATIONS AND PREVAILING WAGE RATES FOR BUILDING CONSTRUCTION
2021**

| Worker Classification | Ratio | Base Rate | Fringe Benefit | Wage Total |
|---|---|-----------|----------------|------------|
| Acoustical Ceiling Mechanic | | \$17.27 | \$3.98 | \$21.25 |
| Asbestos Worker/ Heat & Frost Insulator (Duct, Pipe and Mechanical System Insulation) * | Ratio 1/1 – Apprentice | \$24.28 | \$14.16 | \$38.44 |
| Asbestos Abatement Worker (ceilings, walls, floors only) | Ratio 1/3 | \$14.00 | \$0.00 | \$14.00 |
| Boilermaker * | Ratio 5/1 – Apprentice | \$28.00 | \$22.35 | \$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 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 | \$44.00 | \$34.765 | \$78.765 |
| Form worker * | | \$12.77 | \$0.00 | \$12.77 |
| Floor Layer: Carpet | | \$20.00 | \$0.00 | \$20.00 |
| 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 |
| Lather * | Ratio 1/3 | \$19.73 | \$0.00 | \$19.73 |
| 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 | \$33.30 | \$12.26 | \$45.56 |
| Plasterer | Ratio 1/3 – Plasterer Tenders | \$19.92 | \$1.00 | \$20.92 |
| Roofer * | Ratio 1/3 – Apprentice | \$15.40 | \$0.00 | \$15.40 |
| Plumber * | Ratio 3/2 – Apprentice | \$36.15 | \$11.04 | \$47.19 |
| 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 | \$30.64 | \$21.68 | \$52.32 |
| 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 |

CITY OF HOUSTON
STANDARD DOCUMENT

WAGE SCALE
FOR BUILDING CONSTRUCTION

| | | | | |
|--|--|---------|--------|---------|
| Truck Driver (semi-trailer truck) | | \$12.50 | \$0.00 | \$12.50 |
| Truck Driver (water truck) | | \$12.00 | \$4.11 | \$16.11 |
| Waterproofer | | \$14.39 | \$0.00 | \$14.39 |
| Laborers: | | | | |
| Common or General | | \$11.76 | \$0.00 | \$11.76 |
| Landscape and Irrigation | | \$9.52 | \$0.00 | \$9.52 |
| Mason Tender - Brick | | \$13.47 | \$0.00 | \$13.47 |
| Mason Tender - Cement /Concrete | | \$10.48 | \$0.00 | \$10.48 |
| Pipelayer | | \$12.94 | \$0.00 | \$12.94 |
| Roof Tearoff | | \$11.28 | \$0.00 | \$11.28 |
| Operators: | | | | |
| Backhoe / excavator / trackhoe | | \$13.94 | \$0.00 | \$13.94 |
| Bobcat / skid steer / skid loader | | \$13.93 | \$0.00 | \$13.93 |
| Bulldozer | | \$22.75 | \$0.00 | \$22.75 |
| Crane | | \$34.85 | \$9.85 | \$44.70 |
| Drill | | \$16.22 | \$0.34 | \$16.56 |
| Forklift | | \$16.00 | \$0.00 | \$16.00 |
| Grader/blade | | \$13.37 | \$0.00 | \$13.37 |
| Loader | | \$13.55 | \$0.94 | \$14.49 |
| Mechanic | | \$17.52 | \$3.33 | \$20.85 |
| Paver (asphalt, aggregate, and concrete) | | \$16.03 | \$0.00 | \$16.03 |
| Roller | | \$16.00 | \$0.00 | \$16.00 |
| 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

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

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"

Wage Determination Publication Date:

January 1, 2021

for

General Decision Number: **TX20210253 01/01/2021 TX253**

Superseded General Decision Number: TX20200253

State: Texas
Construction Type: Building
County: Harris County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date
0 01/01/2021

**CITY OF HOUSTON, TEXAS
LABOR CLASSIFICATIONS AND PREVAILING WAGE RATES FOR BUILDING CONSTRUCTION
2021**

| Worker Classification | Ratio | Base Rate | Fringe Benefit | Wage Total |
|---|--|-----------|----------------|------------|
| Acoustical Ceiling Mechanic | | \$17.27 | \$3.98 | \$21.25 |
| Asbestos Worker/ Heat & Frost Insulator (Duct, Pipe and Mechanical System Insulation) * | Ratio 1/1 – Apprentice | \$24.28 | \$14.16 | \$38.44 |
| Asbestos Abatement Worker (ceilings, walls, floors only) | Ratio 1/3 | \$14.00 | \$0.00 | \$14.00 |
| Boilermaker * | Ratio 5/1 – Apprentice | \$28.00 | \$22.35 | \$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 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 | \$44.00 | \$34.765 | \$78.765 |
| Form worker * | | \$12.77 | \$0.00 | \$12.77 |
| Floor Layer: Carpet | | \$20.00 | \$0.00 | \$20.00 |
| 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 |
| Lather * | Ratio 1/3 | \$19.73 | \$0.00 | \$19.73 |
| 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 | \$33.30 | \$12.26 | \$45.56 |
| Plasterer | Ratio 1/3 – Plasterer Tenders | \$19.92 | \$1.00 | \$20.92 |
| Roofer * | Ratio 1/3 – Apprentice | \$15.40 | \$0.00 | \$15.40 |
| Plumber * | Ratio 3/2 – Apprentice | \$36.15 | \$11.04 | \$47.19 |
| 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 | \$30.64 | \$21.68 | \$52.32 |
| 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 |

CITY OF HOUSTON
STANDARD DOCUMENT

WAGE SCALE
FOR BUILDING CONSTRUCTION

| | | | | |
|--|--|---------|--------|---------|
| Truck Driver (semi-trailer truck) | | \$12.50 | \$0.00 | \$12.50 |
| Truck Driver (water truck) | | \$12.00 | \$4.11 | \$16.11 |
| Waterproofer | | \$14.39 | \$0.00 | \$14.39 |
| Laborers: | | | | |
| Common or General | | \$11.76 | \$0.00 | \$11.76 |
| Landscape and Irrigation | | \$9.52 | \$0.00 | \$9.52 |
| Mason Tender - Brick | | \$13.47 | \$0.00 | \$13.47 |
| Mason Tender - Cement /Concrete | | \$10.48 | \$0.00 | \$10.48 |
| Pipelayer | | \$12.94 | \$0.00 | \$12.94 |
| Roof Tearoff | | \$11.28 | \$0.00 | \$11.28 |
| Operators: | | | | |
| Backhoe / excavator / trackhoe | | \$13.94 | \$0.00 | \$13.94 |
| Bobcat / skid steer / skid loader | | \$13.93 | \$0.00 | \$13.93 |
| Bulldozer | | \$22.75 | \$0.00 | \$22.75 |
| Crane | | \$34.85 | \$9.85 | \$44.70 |
| Drill | | \$16.22 | \$0.34 | \$16.56 |
| Forklift | | \$16.00 | \$0.00 | \$16.00 |
| Grader/blade | | \$13.37 | \$0.00 | \$13.37 |
| Loader | | \$13.55 | \$0.94 | \$14.49 |
| Mechanic | | \$17.52 | \$3.33 | \$20.85 |
| Paver (asphalt, aggregate, and concrete) | | \$16.03 | \$0.00 | \$16.03 |
| Roller | | \$16.00 | \$0.00 | \$16.00 |
| 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 1Journeymen /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 down 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

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



City of Houston Pay or Play Program Requirements



I. Pay or Play Program Overview

A. Purpose

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 Program) 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 health care of the uninsured citizens of the Houston and Harris County area.

B. Program Elements

1. Covered contracts:

- I.) Advertised after July 1, 2007 or which is executed on or after the effective date of this Executive Order.
- II.) Contracts valued at or above \$100,000.00 (contract) and \$200,000.00 (sub-contract) including contingencies, amendments, supplemental terms and/or change orders.
- III.) Professional Service, Construction, and Service type contracts.

2. Contracts not covered:

- I.) Any contract in which the primary purpose is procurement of property, goods, supplies, and or equipment.
- II.) An inter-governmental contract, inter-governmental agreement or purchasing cooperative.

3. Covered employees: This program applies to employees of a covered contractor or subcontractor, including contract labor, who are over age 18, work at least 30 hours per week and work any amount of time under a covered city contract or subcontract.

4. Pay or Play Option:

- I.) "Pays" by contributing \$1.00 per covered employee per regular hour for work performed under the contract with the City; or
- II.) "Plays" by providing health benefits to covered employees. Health benefits must meet or exceed the following standards:
 - The employer will contribute no less than \$150 per covered employee per month toward the total premium cost.
 - The employee contribution, if any amount, will be no greater than 50% of the monthly premium cost and no more than \$150 per month.

****Note: (1)A contractor is deemed to have complied with section 5.4 of E.O. 1-7 with respect to a covered employee who is not provided health benefits if the employee refuses the benefits and the employee's contribution to the premium is no more than \$40 per month. (2) If applicable the contractor has the option to both Pay and Play.***



City of Houston Pay or Play Program Requirements



5. **Exemptions/Waivers:** The City of Houston will award a contract to a contractor that neither Pays nor Plays only if the contractor has received an approved waiver (Form POP-4 requested by City departments only).
6. **Administration:** Contractor performance in meeting Pay or Play program requirements will be managed by the contracting department. The Office of Business Opportunity (OBO) has administrative oversight of the program, including audit responsibilities (department compliance). Questions about the program should be referred to the Department POP Liaison an updated contact list is available on <http://www.houstontx.gov/obo/popforms.html> or call Gracie Orr with the Office of Business Opportunity at 832-393-0633.

II. Documentation and Reporting Requirements

A. **Document that must be signed and returned to administering department with the bid/proposal.**

- 1.) City of Houston Pay or Play Program Acknowledgment Form (Form POP-1) acknowledges bidder/proposers' knowledge of the program and its requirements, and the intention to comply.

B. **Documents that must be signed and returned to administering department within a period designated by the department's Contract Administrator, upon notification of low bidder or successful proposer status:**

- 1.) Certification of Compliance with Pay or Play Program (Form POP-2)

****Note - Contractors that opt to "play" must provide proof of coverage, including document from insurance provider, and names of covered employees.***

- 2.) List of Subcontractors (Form POP-3)

****Note- Review the affidavit statement at the bottom of this form for further important POP Compliance information.***

C. **Contractors reporting requirements:**

- 1.) Contractors that opt to Pay
Provide monthly reports to administering department, detailing names of employees, hours worked, exemptions (if any) and amount owed. (Form POP-5)
- 2.) Contractors that opt to Play
Provide periodic reports to the contract administrator showing proof of coverage (insurance premium invoice or insurance card) reporting schedule will be determined by administering department based on length of contract. (Form POP-7)



City of Houston Pay or Play Program Requirements



3.) Employee Waiver Request

Contractor may request POP program waiver by submitting the request on POP-8 if the employee is less than 18 years old, employee has other health coverage such as through spouse or parents, or Medicare/Medicaid.

****Note proof of coverage must be provided in the form of a copy of the employee's insurance card. (Remove social security numbers if applicable)***

- 4.) Contractors shall submit an initial report with the second invoice to the department. Payments based on monthly reports are due to the contracting department with submission of the following month's invoice. Payments may be made out to the City of Houston preferably via cashier check or business check.

III. Compliance and Enforcement

The Office of Business Opportunity will audit program compliance. Contractors willfully violating or misrepresenting POP program compliance will be subject to corrective and/or punitive action, including but not limited to the assessment of fines and penalties and/or debarment. The Pay or Play Program Requirements Form and all other POP Forms are available for downloading from the City of Houston's Website at <http://www.houstontx.gov/obo/popforms.html>



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: HAS Exit Lane Breach Control IAH and HOU PN 735

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 the George Bush Intercontinental Airport/ Houston and 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. The Work is summarized as fabrication and installation of TSA Security Check Point Security Exit Lane Breach Control Systems. The work consists of interior work at one (1) location at Terminal C at George Bush Intercontinental Airport (IAH) & one (1) location at Hobby Airport. The two locations shall be provided under this one contract. Drywall, acoustic and drywall ceiling, and touch-up painting and other scope related work in support of the installation shall be required in the ways and means of construction to complete the scope of work.

Scope of work requires the installer to have airport badged personnel.

Careful consideration and coordination will need to be given to obstruction of ceiling appurtenances, flight information directories, smoke detectors, cameras, monitors, lights, etc.

SUMMARY OF WORK

01110-1 ver. 09.03.19

Work shall be completed in many phases; Work zones will be established during a post-bid phasing conference. The contractor shall submit to the owner (for approval) a work plan that details how the contractor will systematically work from one zone to another. Work shall be completed at night in most conditions; work behind HAS screen walls or in non-public areas can be completed during the day.

1. Work that will be a hazard to the general public, such as at floor level, overhead and ceiling work in the terminal must be done at night between 11:00 p.m. and 5:00 a.m., as allowed by the owner.
2. 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.
3. Coordinate schedule and provide reasonable access for City's removal and reinstallation of existing loose or demountable office furniture, fixtures and equipment.

C. Notice to Proceed

Following Contract Execution, the Contractor will be given an Administrative Notice to Proceed, which will include Mobilization, Operations Coordination, Approved Submittals, Request for Information (if any), Badging, Safety Training, and other requirements as needed to prepare for the Construction Work. Administrative NTP timeframe is estimated for an amount time of 90 days. Upon completion of pre-construction preparedness, HAS will issue a Construction Notice to Proceed.

D. The Work is summarized as construction of unmanned security exit lanes at IAH and HOU.

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.
2. Coordinate schedule and provide reasonable access for City's removal and reinstallation of existing loose or demountable office furniture, fixtures and equipment.

E. Contract limit lines are shown diagrammatically on Drawings.

F. The construction budget for this construction project is \$4,000,000 for two (2) installations – subject to revision.

1.04 CITY OCCUPANCY

The City intends to occupy the entire portion of the Project by 300 calendar days after Notice to Proceed.

The City will occupy the premises and remain in operation during [the entire period of construction.

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.

B. Schedule Work to fit these requirements.

1.05 CONTRACTOR-SALVAGED PRODUCTS (CSP)

- A. Products intended for salvage and return by the Contractor to City Engineer are scheduled in Part 2 of this Section and are shown in diagrammatic form or noted on Drawings.
- B. Obtain, handle, store and protect CSP following Section 01731 - Cutting and Patching. Reinstall items designated for reuse following Section 01731.
- C. Provide written receipt or transfer of title to City Engineer.
- D. Assume CSP function properly, unless discovered to the contrary and notice given before removal. Correct damages or deficiencies occurring to CSP while in possession of Contractor, without change in Contract Sum or Time.

1.07 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.

1.08 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 PRODUCTS

2.01 SCHEDULE OF CSP

- A. Unless indicated otherwise, salvage and return to the City the following CSP existing within the contract limits:
 - 1. Signs and Equipment
- B. Return excess CSP items following Section 01770 - Contract Closeout.

PART 3 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 and similar passenger-related areas are intended for year-round uninterrupted use and access by the public and airport operations. Maintain uninterrupted traffic movement.

CONTRACTOR'S USE OF PREMISES

CONTRACTOR'S USE OF PREMISES

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, in occupied areas and other on-airport areas if storage piles do not interfere with airport operations.
- 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.
- 1.07 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, extinguisher cabinets and Automated External Defibrillators (AED), 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.

CONTRACTOR'S USE OF PREMISES

CONTRACTOR'S USE OF PREMISES

- 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.

1.08 CONTROL OF SECURITY AREA ACCESS

- A. Install barricades and enclosures to prevent uncontrolled access into security areas, following Section 01505 - Temporary Facilities. Provide locked access points. Provide duplicate keys to City Engineer.
- B. Post one gatekeeper, employed by the Contractor, at each point of access through barricades or enclosures into security areas, during times when access points are not locked. Ensure persons entering are properly badged.
- C. Provide signs following Section 01507 - Temporary Signs.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

SECTION 01210
CASH ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. City's allowances allocated to the items of work listed or as directed.
- B. See Document 00700 - General Conditions, Paragraph 3.11 for costs included and excluded from cash allowance values listed in 1.02 below.
- C. Follow Section 01255 - Modification Procedures for processing allowance expenditures. Cash Allowance sums remaining at Final Completion belong to the City, creditable by Change Order.

1.02 SCHEDULE OF CASH ALLOWANCES (TOTAL \$ VALUE)

- A. Allowance Item 1 - Building Permit: For obtaining the Building Permit from City of Houston, \$ 10,000
- B. Allowance Item 2 - Owner's contingency for miscellaneous items, \$10,000.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

CASH ALLOWANCES

01210-1 ver. 03.01.19

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.

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.

MODIFICATION PROCEDURES

- 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
- 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.

MODIFICATION PROCEDURES

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.
- 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

MODIFICATION PROCEDURES

- 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.
- 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.

MODIFICATION 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

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:

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.

MEASUREMENT AND PAYMENT

- 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.
- 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

MEASUREMENT AND PAYMENT

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.

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

PAYMENT PROCEDURES

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 base outline for listing the value of work. List Demolition by floor and drawing sector, sign fabrication including quantity of each sign type by floor and sector and installation by floor and sector. This shall apply to the Terminal and Garages.
3. Provide Schedule of Values to itemize as follows:
 - a) Cost of Terminal C scope of work
 - b) Cost of Terminal C West garage scope of work
 - c) Cost of Terminal C East garage scope of work
4. List mobilization, bonds, insurance, accepted Alternates and Cash Allowances as separate items.
5. After award, Provide Schedule of Values to itemize signs as follows:
 - a) List each sign type, list the number of signs, list cost per sign type.
 - b) Provide itemized details divided by: Term C North, Term C South, Term C Baggage, Term C Ticketing, Garages Each floor East and West.

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.

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.

PAYMENT PROCEDURES

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) 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.
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

PAYMENT PROCEDURES

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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.
- D. 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.
- 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 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.

- 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.
- 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).
- 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).
 - 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

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. **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 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. 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.

B. 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 interior views, surrounding areas, showing floors, walls, ceilings and limits of the security checkpoint work area.
2. 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

CONSTRUCTION PHOTOGRAPHS

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, 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 (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 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.

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

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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

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 AACEI 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 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 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 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:
- 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.
- 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 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) Commission/Test.
 - (8) Pull.
 - (9) Terminate.
 - (10) Perform.
 - (11) Acquire.
 - (12) Negotiate.
 - (13) Other Verbs to 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 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, 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.

- (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.

- (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:
 - 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 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 01325

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 IAH during the following periods:
 - 1. Beginning at 6:00 a.m. CST (0600 hours) on Tuesday prior to Thanksgiving Day 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.
 - 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.
- B. For purposes of on-site construction operations for interior work, work may be accomplished in one or more of the following daily schedules (shifts) and as specified elsewhere herein:
 - 1. As directed by HAS, the typical and assumed work hours for work within Terminal C shall be Night Work between the hours of 10:00 p.m. and 6:00 a.m.
 - 2. As directed by HAS, the typical and assumed work hours for work within the Garage Spaces can be during days and nights in phased work zones as outlined within the drawings.
 - 3. As directed by HAS, the typical and assumed work hours for work at the Terminal C Curbside areas shall be Night Work between the hours of 10:00 p.m. and 6:00 a.m.
 - 4. "Day (D) Shift": For work fully confined behind dust-resistant enclosures and where airborne or structure-borne noise is abatable by temporarily ceasing operations, work from 0000 hours through 2400 hours each day of the week, meaning a 24 hour shift is available whether or not all hours are used; however, deliver products and remove debris only during "N Shift."

CONSTRUCTION SEQUENCING

5. "Night (N) Shift": For work that cannot, due to dust, obstructions to operations, or noise-producing operations, be done during "D Shift", work from 2200 hours through 0600 hours each day of the week (7-hour shift, one-hour lunch break), with the following restrictions on access:
 - a. Move products into and remove debris only during "N shift" period.
 - b. Complete work of the shift and entirely evacuate the work area by 0600 of the next day, including rubbish removal, leaving enclosures or barricades cannot be left in place unless necessary for public safety within the terminal building.
- C. 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 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.

CONSTRUCTION SEQUENCING

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.

1.04 CONSTRUCTION SEQUENCE

- A. Prepare and process Contractor's construction schedule following Section 01325- Construction Schedules.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION SEQUENCE

- A. Construct the Work in multiple controlled phases as approved by HAS. The parking garages will be divided into approximately 16 work phases. Coordinate with HAS for durations and draw-down time periods to empty passengers' cars out of the phased work sequence. Refer to 01110 for sequencing of the Terminal Building.

END OF SECTION

SECTION 01330

SUBMITTAL PROCEDURES

PART I - 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.

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 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

SUBMITTAL PROCEDURES

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. All submittals to be submitted electronically.
 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. Include drawing and/or photograph
 - f. Applicable Specification section number
 2. Identify deviations from Contract documents clouding submittal drawings. Itemize and detail on separate 8-1/2 by 11-inch sheets entitled "DEVIATIONS FOR _____." When no deviations exist, submit a sheet stating no deviations exist.
 3. Have design deviations signed and sealed by an appropriate design professional, registered in the State of Texas.
 4. Sequentially number transmittal letters beginning with number one. Use original number for resubmittals with an alphabetic suffix (i.e., 2A for the first resubmittal of submittal 2, or 15C for third resubmittal of submittal 15, etc.). Show only one type of work or Product on each submittal. Mixed submittals will not be accepted.
- C. Contractor's Stamp:
1. Apply Contractor's Stamp certifying that the items have been reviewed in detail by Contractor and that they comply with Contract requirements, except as noted by requested variances.

SUBMITTAL PROCEDURES

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:

PGAL, Inc.

A/E's review is for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the contractor from compliance with the project plans and specifications or allowing departures there from. The contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing his work in a safe manner.

- No Exceptions Taken
- Note Markings
- Rejected
- Resubmit
- Confirm
- See Transmittal
- Reviewed for Architectural Conformance Only

By: Michael Lloyd Date: 9/2/2019

1.03 MANUFACTURER'S CERTIFICATES

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

1.05 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.

SUBMITTAL PROCEDURES

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)
(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.)

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

(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 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.
- 1.03 SHOP DRAWINGS

- A. Submit one PDF copy print. After Designer's review, reproduce and distribute copies required for Contractor's use.
- B. Sheet Size: 8-1/2 x 11 inches minimum; 34x22 inches maximum.
- C. If CADD is used, prepare documents readable, writable and printable using IBM PC-compatible hardware and software, based on AutoCAD (13 or later versions) or software translated thereto. Provide AutoCAD data disks following Section 01770- Contract Closeout.
- 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.
 - 8. Provide messaging Artwork
- E. Drawing to scale, and accurately represent specific products furnished.

1.04 PRODUCT DATA/MANUFACTURERS' LITERATURE

- A. Submit 4 original copies plus additional copies required for Contractor's use. Designer will retain four copies for distribution to City. Distribute remaining copies.
- B. Mark each copy to clearly identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.
- C. When available, submit "SpecData" sheets.
- D. Include manufacturers' installation instructions.
- E. For products specified only by reference standard, give manufacturer's name, product name, model or catalog number, copy of referenced standard, and manufacturer's descriptive technical literature.

1.05 CONTRACTOR-PREPARED SAMPLES

- A. Submit 4 original sets of samples plus additional copies required for Contractor's use. Designer will retain three copies for distribution to City. Distribute remaining copies.

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- B. Demonstrate functional and visual characteristics of products, complete with integral parts and attachment devices.
- C. Submit a reasonable range of manufacturers' standard colors, textures, sheens, and patterns for selection where specific requirements are not specified, where deviations are proposed, and where the nature of the product may vary in color, vein or "grain," texture, sheen and other visible characteristics.
- D. Sample characteristics are specified in individual Sections.
- E. Size, unless otherwise specified:
 - 1. Paint and Liquid Coated Products: 8-1/2 x 11 inches; tape edges of samples using gypsum board as the base or substrate.
 - 2. Flat or Sheet Products: 8-1/2 x 11 inches.
 - 3. Linear Products: 11 inches long.
 - 4. Bulk Products: Copy of container label, only where label submittal is specified.
- F. Full size or on-site samples or mock-ups may be used in the Work if approved.

1.06 CONTROL SAMPLES

- A. Certain Base Facility construction establishes performance, product, workmanship, or aesthetic quality requirements for this contract.
- B. Required control samples include:
 - 1. Paint, Vinyl Film and other decorative coatings at sight-exposed surfaces in public spaces, regardless of substrate types; for matching compatibility, color, texture, sheen and other visual and performance characteristics of analogous new work.
- C. Include control samples with submittal to which they apply.
- D. For items transmittable by mail or hand, remove one representative sample, following Section 01312- Coordination and Meetings, and nondestructively label as "Control Sample." Process following Paragraph 1.06.
- E. Obtain control samples following Section 01731- Cutting and Patching. The control sample will be returned to the Contractor.
- F. For items impractical to remove or mail, temporarily and non-destructively tag each item in place and maintain until submittal processing is complete. Request submittal evaluation to occur on-site. Include request with submittal to which it applies.
 - 1. Provide temporary facilities following Section 01505- Temporary Facilities to provide access to and protection of control samples.

2. Handle, store and protect control samples following Section 01610- Basic Product Requirements.
 - G. Maintain control samples until applicable new work is completed or until directed.
- 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 Designer's submittal review statement, which may be affixed to Contractor's submittal by stamp, label or separate sheet:

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. Samples – Provide – 8” x 10” samples of each color and material finish in quantities called for in this specification, until final approval is received.
- B. Provide a mock-up of glass walls and ceiling systems.
- C. Provide full-size mock-ups.
- D. In addition to the mock-ups listed, provide a mock-up for cameras, sensors and ceilings

1.02 QUALITY ASSURANCE

- A. Provide joinery, attachments, same generic materials, and other components to comply with requirements of final construction.
 - 1. Reduction of quality, specified in applicable Sections, for control sample mock-ups is not permitted.
- C. Mock-ups require fully operational moving components.

1.03 SITE CONDITIONS

- A. Protect from damage until directed to remove mock-ups.

1.05 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.

MOCK-UPS

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 as directed by the Architect or the Owner.
- C. Install temporary or supplementary bracing or framing following Section 01505- Temporary Facilities if necessary, with approval.
- 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.
 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. Operation of moving parts.
 2. Effectiveness of light, water, sound and air seals, as applicable.
 3. Accessibility for maintenance of concealed or semi-exposed moving parts.

MOCK-UPS

4. Uniform of joint tolerances and visible treatment within individual or "panelized" items and between separate "panelized" components, and between substrates and completed work.
 5. 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 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 | AI | Asphalt Institute 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 |

REFERENCES

- 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. 43rd St., 4 Floor
New York, NY 10036
Ph: 212-642-4900
- APA The Engineered Wood Assoc.
7011 So. 19th,
Tacoma, WA 98466
Ph: 253-565-6600
- API American Petroleum Institute
1220 L Street, N.W.
Washington, DC 20005-4070
Ph: 202-682-8000
- AREA Amer. Railway Engrg. Assoc.
8201 Corporate Dr., #1125
Landover, MD 20785
Ph: 301-459-3200
- ASTM American Soc. for Testing & Materials
100 Barr Harbor Dr.,
PO Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9585
- AWPA American Wood-Preservers' Association
PO Box 388
Selma, AL 36702-0388
Ph: 334-874-9800
- AWS American Welding Society
550 N.W. LeJeune Rd.
Miami, FL 33126
Ph: 800-443-9353
- AWWA Amer. Water Works Assoc.
6666 West Quincy Avenue
Denver, CO 80235
Ph: 303-794-7711
- BICSI Bldg. Industry Consulting Svc. Intl.
8610 Hidden River Pkwy.
Tampa, FL 33637-1000
Ph: 800-242-7405
- COH City of Houston
900 Bagby Street (Box 1562)
Houston, TX 77251-1562
Ph: 713-837-0311
- CLFMI Chain Link Fence Mfgs Inst.
10015 Old Columbia Rd., #B-215
Columbia, MD 21046
Ph: 301-596-2583
- CRSI Conc. Reinforced Steel Institute
933 N. Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200
- EJMA Expansion Joint Manufacturers Assoc.
25 N. Broadway
Tarrytown, NY 10591
Ph: 914-332-0040
- FS Federal Standardization Documents
Gen. Svcs. Admin. Specificatns. Unit (WFSIS)
7th and D Streets, S.W. #6039
Washington, DC 20407
Ph: 202-472-2205
- HAS (City of) Houston Airport System
P.O. Box 60106 (16930 JFK Blvd., 77032)
Houston, TX 77205-0106
Ph: 281-233-3000
- HOU William P. Hobby Airport (Airport Manager)
7800 Airport Blvd.
Houston, Texas 77061
Ph: 713-640-3000
- IAH George Bush Intercontinental Airport Houston
(Airport Manager)
2800 N. Terminal Road
Houston, TX 77032
Ph: 281-230-3100
- ICEA Insulated Cable Engineer Association
P.O. Box 1568
Carrollton, GA 30112
- IEEE Institute of Electrical and Electronics
Engineers
445 Hoes Lane, or P.O. Box 1331
Piscataway, NJ 08854-1331
Ph: 732-981-0060
- MIL Military Specifications (see "FS" for address)
- NACE National Association of Corrosion Engineers
440 1st St. N.W.
Washington, DC 20001
Ph: 202-393-6226
- 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
- NEMA National Electrical Manufacturers' Association
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209
Ph: 703-841-3200

REFERENCES

Ph: 847-458-4647

| | | | |
|------|---|----------|---|
| NFPA | National Fire Protection Association 1 Batterymarch Park, P.O. Box 9101 Quincy, MA 02169-7471 Ph: 617-770-3000 | SSPC | The Society for Protective Coatings 40 24 th Street, 6 th Floor Pittsburgh, PA 15222-4656 Ph: 412-281-2331 |
| OSHA | Occupational Safety Health Administration 200 Constitution Avenue, NW Washington, DC 20210 Ph: 866-487-2365 | TAC | Texas Admin. Code, Texas Water Development Board Box 13231, Capitol Station Austin, TX 78711-3231 Ph: 512-463-7926 |
| PCA | Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077-1083 Ph: 847-966-6200 | UL | Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062-2096 Ph: 877- 854-3577, 800-285-4476 |
| PCI | Prestressed Concrete Institute 201 North Wacker Drive Chicago, IL 60606 Ph: 312-786-0300 | UNI-BELL | UNI-BELL Pipe Association 2655 Villa Creek Dr., Suite 155 Dallas, TX 75234 Ph: 972-243-3902 |
| SDI | Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 | | |

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/tagouts.

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.

REFERENCES

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, 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.
 - 9. *APGS*: Automated Parking Guidance System to the list of acronyms.

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. Additional responsibilities of Contractor related to testing are specified in Section 01455- City's Acceptance Testing.

1.03. CONTRACTOR'S QUALITY ASSURANCE PROGRAM (QAP)

- 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

CONTRACTOR'S QUALITY CONTROL

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.
 - 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.

CONTRACTOR'S QUALITY CONTROL

- 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.
- 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

CONTRACTOR'S QUALITY CONTROL

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.

CONTRACTOR'S QUALITY CONTROL

- 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.
- B. Where requirements for acceptance testing appear in other Sections, without reference to this Section 01455, inspect and test that work following requirements in those Sections and this Section 01455 and Section 01457- Estimating Percentage of Product Within Specification Limits.

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

CITY'S ACCEPTANCE TESTING

transportation and handling of samples to ITL's vehicle or to ITL's on-site test facility.

- 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- Base Facility Survey) 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. Keep one copy of ITL's reports at field office for duration of the Work.
- P. 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. Coordinate inspections, sampling and testing with construction progress and Contractor's schedule specified in Section 01325- Construction Schedules.
- C. 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.
- D. Sample at frequencies following requirements of applicable Sections or as specified herein and test each sample.

CITY'S ACCEPTANCE TESTING

- E. Take quantity, linear, volume and bulk measurements as frequently as necessary to control mixing, fabrication and installation.
- F. Properly calibrate test equipment and measuring tools before use.
- G. Immediately report failed tests or measurements.
- H. Test work for proper function and performance as specified herein and in other Sections.

3.02 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 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.
 - 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. Security Plan.
 - 4. Dust Control Plan.

AIRPORT TEMPORARY CONTROLS

5. 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 December 2000, \$50.00 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 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 drainway 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.

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- 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 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.
- E. Temporary barricades and signage to close sections of the garage for phased installation.

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: 5 years experience as a 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.
 - 2. Location of each sign during each stage (Section 01326- Construction Sequencing).

PART 2- PRODUCTS

2.01 TEMPORARY SIGNS FOR ACCESS POINTS

- A. HAS will furnish the artwork for temporary directional wayfinding and closures during construction. An allowance has been provided for these signs. These signs to be printed vinyl film on prepared plywood substrate. Refer to section 01110

TEMPORARY SIGNS

- B. Posts for Exterior Signs: New 4x4 inch moisture-resistant-treated wood or 2-1/2-inch diameter by 12-foot long galvanized steel.
 - 1. Fabricate to length required for 3-foot direct-bury plus aboveground length required for proper height of signboard mounting.
 - 2. Furnish number of posts as required for proper support of signboard
- C. Signboards:
 - 1. For Exterior Signs: 3/4-inch-thick exterior grade medium density overlay (MDO) plywood, or 3/16-inch sheet aluminum. Paint background white.
 - 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.
- D. Color Coating for Signboards and Hashmarks: Flat ultraviolet inhibited acrylic polyurethane or matte vinyl, all visible surfaces.
- E. Copy and Borders: Flat color (color as scheduled) vinyl die-cut, Helvetica Medium typeface, size as shown or scheduled.
- F. Rough Hardware: For wood, galvanized steel or brass for fasteners and other hardware. For aluminum, cadmium-plated steel or stainless steel.
- G. 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. Where required by City Engineer.
 - 2. As required for phasing, public entries and closures.
- 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 stage 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:

NO ENTRANCE (6 inch)

CONSTRUCTION AREA (6 inch)

(45-degree hash marks, full width (4 inch)

This Parking Area Closed (4 inch)

TEMPORARY SIGNS

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

DOCUMENT 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 – Trench Safety System

1.03 PUBLIC SAFETY AND CONVENIENCE

- A. The Work in this Project is to be performed in coordination with on-going operations in day and night time operations. 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 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.

BASIC PRODUCT REQUIREMENTS

- 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

BASIC PRODUCT REQUIREMENTS

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 owner, designer, and installing contractor.
 - 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.

PRODUCT OPTIONS AND SUBSTITUTIONS

- 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.

PRODUCT OPTIONS AND 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 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 July 2019.
 - 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.

1.03 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.

BASE FACILITY SURVEY

- 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 reproducibles 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.

BASE FACILITY SURVEY

END OF SECTION

SECTION 01731

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Obtain CSP and control samples.
- B. Repair remaining Base Facility.
- C. Connect work to Base Facility.
- D. Remove construction required to enable required alteration or addition to Base Facility.
- E. Uncover work for inspection or reinspection of covered work by authorities having jurisdiction.
- F. Connect work not done in proper sequence.
- G. Make connections or alterations to Base Facility or to work.

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. Work of separate contractors and work by City (Section 01110 - Summary of Work).
 4. Warrantability, value, integrity, serviceability, or life expectancy of any component of the Base Facility and the Work.
 5. Integrity or serviceability of weather-exposed, moisture-resistant, or fire-resistant components or systems.
 6. Work outside indicated contract limits.

CUTTING AND PATCHING

CUTTING AND PATCHING

- 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.
 4. Submit samples of proposed new terrazzo showing finished match of chip and matrix color- and density-match and surface texture and sheen to Base Facility terrazzo.

CUTTING AND PATCHING

CUTTING AND PATCHING

- 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.

1.05 INSPECTION, HANDLING, STORAGE AND PROTECTION OF CSP AND CONTROL SAMPLES

- A. Follow Section 01610 - Basic Product Requirements and following minimum standards.
- B. After removal CSP and control samples, inspect and tag each item. Prepare a written inventory.
 - 1. Describe damage or deficiencies discovered. Process claims and obtain replacement products.

CUTTING AND PATCHING

CUTTING AND PATCHING

2. Inspect and inventory in presence of City Engineer if necessary.
- C. Store CSP following Section 01610 - Basic Product Requirements until delivery to City. Package CSP in weatherproof containers, labeled with inventory on outside of containers.
- D. Load, transport, off-load and provide other incidental labor required to place CSP inside City's facility. Notify City Engineer at least 7 days before delivery is scheduled.
- E. Provide CSP manufacturer's labor if required to properly handle, store and protect products.
- F. Obtain written receipt or transfer of title from City Engineer.

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.
- 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 099123.
 2. Gypsum Drywall: Follow Section 092900.
 4. Spray-on Fireproofing (do not submit product data) on corrugated metal deck, for UL D870, ½-inch thick, 2-hour design; "Spray-Don Type JN," no substitutions, with accessories as required for complete work.
 6. Concrete-filled Steel Deck:
 - a. Concrete: Cement ASTM C150, Type I or III; minimum 4000 psi compressive strength; 110 to 116 pcf, maximum 1-inch aggregate size and per ASTM C330; maximum allowable unit shrinkage of 0.03 percent at 28 days per ASTM C157.

CUTTING AND PATCHING

CUTTING AND PATCHING

- b. Deck: Hot-dip zinc coating ASTM A525 Class E (1.25 oz./s.f.) on sheet steel ASTM A446, Grade A; minimum 33,000 psi yield strength, maximum 20,000 psi working stress; minimum 22 gage, 2-inches deep; Granco Steel Products Co., Inland Steel Products Co., or H.H. Robertson.
 - c. Reinforcing: ASTM A615, Grade 60.
 - d. Supporting steel framing: ASTM A36.
 - e. Epoxy (do not submit product data if following products are used):
 - 1) For reinforcing steel: Rescon Technology Corp. "R606," or Sika Corp. "Sikadur 31 Hi-Mod Gel."
 - 2) For concrete-to-concrete: Rescon Technology Corp. "R649," or Sika Corp. "Sikastix 370" or "Sikadur 31 Hi-Mod Gel."
 8. Concrete Repair: Master Builders "Emaco T430" or substitution following Section 01630- Product Options and Substitutions.
- B. Where there is no specification for a required patch product, provide same products and types of construction as analogous Base Facility construction.
1. Contract Documents do not define products or standards of quality present in the Base Facility.
 2. 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.
 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.

CUTTING AND PATCHING

CUTTING AND PATCHING

- 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.
- 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.
- 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.

CUTTING AND PATCHING

CUTTING AND PATCHING

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.

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.

C. Unless otherwise indicated on the Drawings, remove Base Facility wall base (resilient, wood) from walls intended to remain.

1. Repair partitions as required to receive future resilient base.

3.05 DAMAGED SURFACES

CUTTING AND PATCHING

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- 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.

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- 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:
 - 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

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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.
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.
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.

3.08 REPAIRING FIREPROOFING

- A. Repair fireproofing to achieve UL resistances and minimum thickness specified in Part 2.
- B. Inspect substrates from which Base Facility fireproofing is removed. Repair damage and deficiencies, including primers, which prevent proper completion of new fireproofing work.
- C. Coordinate with other Sections to minimize cutting into completed fireproofing work.
- D. Proportion and mix fireproofing materials to proper consistency for spray or hand-trowel application.
- E. Cover exposed steel beams and floor decks formerly fireproofed. Feather material onto adjoining Base Facility fireproofing.
- F. Patch damaged or deficient material prior to ceiling or other work preventing accessibility.

CUTTING AND PATCHING

3.09 SALVAGING CONTROL SAMPLES AND CSP

- A. Remove Base Facility designated as CSP and control samples using methods and procedures specified herein.
 - 1. Control samples located outside contract limits are intended to remain in place.
 - 2. Remove control samples of sufficient size and proper quantity to establish standards for comparison.
- B. Inspect, handle, store, and protect control samples and CSP following this Section. Package CSP in impact- and moisture-resistant containers.
- C. Where applicable, reinstall control samples following this Section.

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.

3.14 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 099123.

3.15 TERRAZZO REPAIR

- A. Follow recommendations of National Terrazzo and Mosaic Association.
- B. Repair existing cracks as follows after sample approval:
 - 1. Remove sealer from surface adjacent to cracks using stripper or ammonia.
 - 2. Rout cracks with a power tool. Remove foreign matter and clean surfaces with water. Allow to dry.

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3. Blend resin patch material to match color of adjacent existing matrix. Add marble dust or non-fading pigment as required.
 4. Following resin manufacturer's instructions. Force mixed resin as deeply into void as possible.
 5. If cracks are large enough, insert marble chips of the same blend as adjacent existing terrazzo while patching resin is still wet.
 6. Trowel surface smooth to slightly above level of adjacent existing terrazzo.
 7. Cure following resin manufacturer's instructions.
 8. Grind surface of repaired cracks with progressively finer-grit stones to match texture and sheen of adjacent existing terrazzo.
 9. If repairs do not match existing, repeat steps 2 through 8 until match is achieved.
 10. Seal repaired areas and adjacent existing terrazzo with penetrating-type terrazzo sealer.
 11. Buff sealer to match sheen of existing adjacent sealed terrazzo.
- C. Repair existing holes as follows after sample approval:
1. Remove sealer from surface adjacent to cracks using stripper or ammonia.
 2. Remove metal or plastic conduit, bolts, studs, junction boxes or metal plates.
 3. Carefully enlarge holes as required to complete removal of foreign matter. Slightly undercut vertical wall around resulting voids. Remove foreign matter and clean surfaces with water. Allow to dry.
 4. Prepare and install 4:1 sand-cement leveling bed as required for installation of terrazzo patches. Moist cure minimum 24 hours.
 5. Fully moisten surfaces in void with water immediately before installing bonding paste. Remove standing water.
 6. Mix and install cement-rich bonding paste on moist remaining surfaces. Scrub into surfaces. Moist cure minimum 24 hours with plastic cover taped to existing terrazzo.
 7. Before bonding paste dries, prepare terrazzo topping (mixture of matrix and marble chips) and install. Trowel surface smooth to slightly above level of adjacent existing terrazzo.

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8. Seed additional marble chips into moist terrazzo topping mixture as required to match color and density of chips and matrix in adjacent existing terrazzo.
9. Consolidate terrazzo topping as required to remove air pockets and extract excess water. Trowel-finish to slightly above level of adjacent existing terrazzo.
10. Cover repaired areas with full sheet (tape joints) plastic curing membrane taped to adjacent terrazzo. Prevent excess moisture loss. Cure following topping manufacturer's instructions, minimum 72 hours.
11. After proper cure, grind new terrazzo with progressively finer-grit stones, starting with No. 40-grit, flush with adjacent surfaces and finish matching sheen of unsealed terrazzo.
12. Polish new terrazzo with No. 80-grit stone, and progressively finer-grit stones if required, to match sheen of existing adjacent unsealed terrazzo.
13. If repairs do not match existing, repeat steps 2 through 11 until match is achieved.
14. Seal repaired areas and adjacent existing terrazzo with penetrating-type terrazzo sealer.
15. Buff sealer to match sheen of existing adjacent sealed terrazzo.

3.16 TERRAZZO REPLACEMENT

- A. Follow recommendations of National Terrazzo and Mosaic Association.
- B. Replace designated existing terrazzo flooring as follows after sample approval:
 1. Remove sealer from surface adjacent to designated panels using stripper or ammonia.
 2. Remove existing terrazzo topping and existing sand-and-cement setting bed down to existing concrete slab or subfloor. Remove metal base-plate covers, metal or plastic conduit, bolts, studs, junction boxes, buried conduit and abandoned wiring. Verify abandoned wiring following Section 01726 - Base Facility Survey.
 3. Leave existing metal divider strips in place and protect from damage. If damaged, provide new divider strips matching existing metal alloy, thickness (minimum 16 gage), depth and patterns. Install new strips true and plumb.
 4. Remove foreign matter and clean surfaces with water. Allow to dry.
 5. Fully moisten surfaces in void with water immediately before installing bonding paste. Remove standing water.

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6. Mix and install cement-rich bonding paste to moist structural slab and face of divider strips. Scrub into concrete. Moist cure minimum 24 hours with plastic cover taped to existing terrazzo.
7. Mix and install 4:1 sand-cement leveling bed. Moist cure minimum 24 hours with plastic cover taped to existing terrazzo.
8. Before bonding paste dries, mix terrazzo product at ratio of two parts blended marble chips to one-part Portland cement plus minimum quantity of marble dust, adding water for proper plasticity. Provide blend of marble chips, dust, pigments and matrix as required to match existing terrazzo after finishing.
9. Seed additional marble chips into moist terrazzo topping mixture as required to match color and density of chips and matrix in adjacent existing terrazzo.
10. Consolidate terrazzo topping as required to remove air pockets and extract excess water. Trowel-finish to slightly above level of adjacent existing terrazzo.
11. Cover repaired areas with full sheet (tape joints) plastic curing membrane taped to adjacent terrazzo. Prevent excess moisture loss. Cure following topping manufacturer's instructions, minimum 72 hours.
12. After proper cure, grind new terrazzo with progressively finer-grit stones, starting with No. 40-grit, flush with adjacent surfaces and finish matching sheen of unsealed terrazzo. Fill discovered pinholes with matching matrix.
13. Polish new terrazzo with No. 80-grit stone, and progressively finer-grit stones if required, to match sheen of existing adjacent unsealed terrazzo.
14. If repairs do not match existing, repeat steps 3 through 10 until match is achieved.
15. Seal repaired areas and adjacent existing terrazzo with penetrating-type terrazzo sealer.
16. Buff sealer to match sheen of existing adjacent sealed terrazzo.

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.

CUTTING AND PATCHING

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.

PROTECTION OF EXISTING SERVICES

- 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 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.
 - (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.
 - c. Do not remove any sign without being able to replace it with a new sign in the same work shift. Coordination with HAS staff

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.

2.0 PRODUCTS (NOT USED)

3.0 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
 - D. **Unscheduled Service Interruptions to Data and Telecom Service:**
 1. Immediately notify IAH 24-Hour Emergency Dispatch Service at (281) 230-3024 [HOU 24-Hour Emergency Dispatch Service at (713) 641-4000; EFD Dispatch Service during 0800-1700, M-F, call 713-847-4234, (after hours call: 713-847-4200)]. 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

WORK AREA NOTIFICATION

I.A.H PDC
HOUSTON, TEXAS 77032

| | |
|---|-----------------------------|
| TO: Plan & Review / IAH | CONTRACTOR: |
| ATT: James Beehner & Scott Hill | |
| OFFICE NUMBER: 281-230-8909 & 281-230-8999 | DATE: |
| FAX NUMBER: 281-230-8781 | PROJECT NUMBER: |
| E-MAIL: jamesbeehner@cityofhouston.net scott.hill@cityofhouston.net | Onsite contact / phone #'s: |



| |
|----------------|
| FROM: |
| OFFICE NUMBER: |
| MOBIL NUMBER: |
| FAX NUMBER: |



| LOCATION | Description | DATE OF REQUEST | TIME OF REQUEST | COMMENTS |
|-------------------|-------------|-----------------|-----------------|----------|
| | | | | |
| | | | | |
| | | | | |
| | | Starting Date: | Ending Date: | |
| | | | | |
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| | | Starting Time: | Ending Time: | |
| | | | | |
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| Impacts to Area : | | | | |
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|-------------------------|
| Plan & Review Response: |
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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. One month "*large*" projects 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. Five (5) sets of final O & M manual with one (1) original executed warranty plus four (4) copies, in same format as preliminary O & M manual.
 - 2. Release or Waiver of Liens and consents of sureties following Documents 00700- General Conditions and 00800- Supplementary Conditions.
 - 3. Record Documents following Document 00700 and Paragraph 1.08 below.
 - a. Bind sepias or vellums with metal folding clasps (such as used for file folders) at top and bottom along binding edge. Collate into separate sets for Drawings, shop drawings, and other drawings.
 - b. Bind Project Manual, product data and similar page-type data in separate 3-ring "D" binders, contents marked on spine.
 - c. CADD diskettes in plastic file box.

PROTECTION OF EXISTING SERVICES

- d. Videotapes and photographs following Section 01321- Construction Photographs.
 - e. Other data as directed.
4. Security identification badges.
 5. 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. Format:
 1. Produce on 8-1/2 x 11-inch pages, and bind in 3-ring/D binders with durable plastic covers.
 2. Label binder covers with printed title “OPERATION AND MAINTENANCE MANUAL”, title of project, and subject matter and “Number _ of _” of binder when multiple binders are required.
 3. Separate each “Part” with substantial dividers tabbed and titled by Part number
 - C. Contents:
 1. Table of Contents for each volume, naming each Part.
 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.

PROTECTION OF EXISTING SERVICES

- 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.
 - 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.
 - 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.

PROTECTION OF EXISTING SERVICES

- 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 & 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 an area-by-area based on the schedule of values 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.
 - 3. Continue completion of the Work including Punchlist items, marking off completed items.

PROTECTION OF EXISTING SERVICES

4. Forward electronic files 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.
 - C. Keep in a secure location in the [field office (Section 01505- Temporary Facilities) at the site and timely record the Work as actually built as the Work progresses.
 1. Use one set of diazo prints of Drawings made from reproducible and one set of Project Manual furnished under Section 01110- Summary of Work. Use one set of submittal data, video and photographic data, and other record data as required by Contractor to support and supplement records made on Drawings and Project Manual.
 2. Legibly note variations from Contract Documents on Drawings, Project Manual and submittal data, whichever most clearly shows the change.

PROTECTION OF EXISTING SERVICES

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.
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.

PROTECTION OF EXISTING SERVICES

- 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 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. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Dimensions and details of field changes.
 - 5. Changes made by Modifications.
 - 6. Details not on original Drawings.

PROJECT RECORD DOCUMENTS

7. 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 01 33 31 SUBMITTAL PROCEDURES FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Preparation and submission of shop drawings and product data.

1.2 MANUFACTURERS

- A. Listed manufacturers will be acceptable as long as specified requirements are met.
- B. Manufacturers who are not listed as "acceptable manufacturers" bear the burden of proof to A/E that their products comply with the specifications.
- C. Provide power distribution and control equipment of the same manufacturer (i.e., switchboards, panelboards, transformers, motor control centers).
- D. Provide similar equipment of same manufacturer (i.e., wiring devices).

1.3 CONTRACTOR'S CERTIFICATION

- A. Submittals will be submitted only by the Contractor. Indicate by signed stamp that the contract documents have been checked, that the work shown in the submittals is in accordance with contract requirements and that dimensions and relationship with work of other trades have been checked. If submittals are submitted for review that have not been checked and signed by the Contractor, they will be returned for checking before being considered by A/E.

1.4 PREPARATION

- A. Include information relevant to particular equipment or materials to be furnished, where product data published by manufacturer is part of submittal.
- B. Provide documentation of listing with UL or FM.
- C. Furnish submittals within 45 days after receiving a signed contract and prior to the start of installation.
- D. Include identifying symbols and equipment numbers used in the contract documents for all equipment and material submitted.
- E. Cross reference sheet numbers on Drawings for shop drawings. Provide shop drawings consisting of plans drawn to scale, with elevations and sections, to show clearly the location of major items of equipment and clearances for maintenance and code requirements.

- F. Submit only the requested submittals complete by types of equipment (i.e., lighting fixtures, power distribution, etc.) labeled with applicable specification section(s) included. Each submittal will be handled separately. Should any item not be acceptable, the entire submittal will be returned to the Contractor for correction and resubmittal. Partial submittals are unacceptable. The intent of this requirement is that all approved bound sets of data will be identical and will contain only acceptable information.
- G. Submit a compliance sheet for each submittal indicating the submittal is in full compliance with the drawings and specifications. Indicate by drawing number or specification section number and paragraph numbers all exceptions taken and include an explanation.
- H. The review of submittals does not relieve or modify the Contractor's responsibility for compliance with the Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that, in the review process, noting of some discrepancies but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the submittals, the Contract Documents govern the work, and are neither waived nor suspended in any way by the review of the submittals.
- I. A minimum review period of two weeks, exclusive of transmittal time, will be required in A/E office for each submittal. Take this time period into consideration when scheduling construction.
- J. Include in submittals sufficient plans, elevations, sections, performance data, dimensions, bolt locations, ratings, sound data, weights and schematics to clearly describe the equipment and to show compliance with these specifications. Provide a cover or title sheet for the submittal containing the following:
 - 1. Name of Contractor originating the submittal.
 - 2. Name of project for which the submittal is made.
 - 3. An index of all items submitted including:
 - a. Mark of equipment on drawings.
 - b. Manufacturer.
 - c. Catalog number.
 - d. Specification section number.
 - 4. Date of submittal and date of each revision.
 - 5. Contractor's certification of review.
 - 6. Contractor's certification of compliance.
- K. Shop drawings and product data which do not comply with the requirements herein will be returned for resubmittal. Submit two paper sepias for shop drawings.

- L. A/E will retain one copy and Owner will retain one copy of submittal. Remaining copies will be returned to Contractor marked FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. If it is marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED, no additional submittal is required. If it is marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, repeat submittal in accordance with this section. Submit complete and accurate shop drawings and product data at first submittal. If submittals are returned to Contractor marked REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one additional submission will be permitted.
- M. If the reproducible sepia or product data marked FURNISH AS SUBMITTED or FURNISH AS CORRECTED is altered for any reason after it has been stamped, the REVIEWED stamp shall automatically be voided.
- N. Provide all work in accordance with the submittals stamped FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with the Contract Documents. Where differences occur between the submittals and the Contract Documents, the Contract Documents shall govern the work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 REQUIRED SUBMITTALS

- A. Furnish product data for devices, equipment, or systems as specified. Other submittals will be returned to Contractor without review. Furnish shop drawings as indicated.

3.2 FINAL SUBMITTAL

- A. In addition to the number of copies of shop drawings and product data required to review submittals, maintain separate file of final reviewed copies of such material. Deliver approved submittals in a hard-back binder for the Owner's use. Incorporate changes and revisions made throughout the construction period. Refer to Section 01 78 23.16.

END OF SECTION 01 33 31

SECTION 01 78 23.16 CLOSEOUT SUBMITTALS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Preparation and submission of operation and maintenance manuals.
- B. Each section included in Division 26 - Electrical incorporates this section by reference and is incomplete without the provisions stated herein.

1.2 PREPARATION

- A. Furnish four copies of complete operation and maintenance instructions, service manuals and parts list applicable to each manufactured item of equipment furnished. Bind operation and maintenance information in four separate looseleaf binders and deliver to A/E at least four weeks prior to final review of the project.
- B. Organize binders to contain like equipment in separate divisions. Provide a complete double index for each binder to include:
 - 1. An alphabetized list of the products by name.
 - 2. An alphabetized list of manufacturers whose products have been incorporated in the work together with their addresses and the name, addresses and telephone numbers of the local sales representative or supplier.
- C. For each section of product, equipment or system, organize the data as follows:
 - 1. Furnish a general description of the equipment or system listing the major components, intended service and other general data.
 - 2. Furnish technical data including nameplate data, design parameters, ratings, capacity, performance data, operating curves, characteristics, and the like. Clearly distinguish between information which does and does not apply.
 - 3. List warnings and cautions to be observed during both installation and operations.
 - 4. Fully detailed installation and operation instructions including special tools required, alignment instructions, start-up, and shut-down sequences.
 - 5. Furnish maintenance, service and repair instructions including maintenance and service schedules, materials, and methods for performing routine and annual service.
 - 6. Furnish a troubleshooting guide and check list indicating common failures, test methods and procedures for determining component fault or failure.
 - 7. Furnish a spare parts list indicating part and order number with name, address, and telephone number of supplier. Include current prices of replacement parts and supplies. Furnish diagrams including controls, wiring, installation or operation of the equipment or system.

8. Furnish copies of all approved submittals. Refer to Section 26 00 20.
9. Furnish copies of all test reports. Refer to Section 26 01 26.
10. Print copies of the "AS-BUILT" drawings. Refer to Section 26 01 20.
11. Furnish all warranties and guarantees.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 78 23.16

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

1. Section Includes:
 1. Interior storefront framing.
 2. Interior manual sliding entrance doors
2. Related Requirements:
 1. Section 087100 "Door Hardware"

1.3 PREINSTALLATION MEETINGS

1. Preinstallation Conference: Conduct conference at Project site – location to be determined by HAS

1.4 ACTION SUBMITTALS

1. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 1. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Glazing.
3. Samples for Initial Selection: For units with factory-applied color finishes.
4. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

5. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
 1. Joinery, including concealed welds.
 2. Anchorage.
 3. Glazing.
6. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
7. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

1. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
2. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
3. Source quality-control reports.
4. Field quality-control reports.
5. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

1. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

1. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
2. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 MOCKUPS

1. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockup of typical wall area as shown on Drawings.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PROJECT CONDITIONS

1. Field Measurements: Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.10 WARRANTY

1. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Failure of operating components.
 2. Warranty Period: 10 years from date of Substantial Completion.
2. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

1. Delegated Design: Engage a qualified professional engineer, to design aluminum-framed entrances and storefronts.
2. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
3. Structural Loads:
 1. Other Design Loads: As indicated on Drawings

2.2 MANUFACTURERS

1. Basis of Design Manufacturer:
 1. Kawneer North America; an Alcoa company; 555 Guthridge Court Norcross GA 3009; (770) 449-5555; <http://www.kawneer.com>
 2. Alternate Manufacturers:
 - a. Oldcastle Building Envelope; 2425 Olympic Boulevard, Suite 525-E Santa Monica CA 90404; (866) 653-2278; <http://www.obe.com>
 - b. Tubelite Inc.; 3056 Walker Ridge NW Suite G Walker MI 49544; (800) 866-2227; <http://www.tubeliteinc.com>
 - c. Trulite Glass & Aluminum Solutions, LLC; 800 Fairway Drive, suite 200 Deerfield Beach FL 33441; <http://www.trulite.com>
2. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

1. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Basis of Design Product::

- a. Kawneer Company Inc.
 - b. Trifab™ VG 450 Framing System (Non-Thermal)
 - c. System Dimensions: 1-3/4" x 4-1/2" (44.5 mm x 114.3 mm)
 - d. Glass: Center
- ~~2.~~ Construction:-Nonthermal
3. Glazing System: [Retained mechanically with gaskets on four sides
 4. Glazing Plane: Center
 5. Finish: Prefinished Kynar coated silver metallic
2. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
 3. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
 4. Materials:
 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.
 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS – MANUAL SLIDING

1. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-sliding operation.
 1. Basis of Design Product:
 - A. Kawneer Company Inc,
 - B. Series 1010 Sliding Mall Front
 - C. Framing member profile: 1-3/8" (34.9 mm) Deep Frame
 2. Materials:
 1. Aluminum Extrusions: Alloy and temper recommended by sliding storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and sash members.

2. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with sliding storefront members, trim hardware, anchors, and other components.
3. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
4. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
5. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
 - a. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
6. Sealant: For sealants required within fabricated sliding storefront, provide sliding storefront manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.5 ENTRANCE DOOR HARDWARE

1. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware".
2. General: Provide entrance door hardware and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.
 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 3. Opening-Force Requirements:
 - a. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
3. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 2. ~~References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.~~
4. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
5. Manual Flush Bolts: BHMA A156.16, Grade 1.

6. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
7. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- ~~8.~~ Cylinders: As specified in Section 087100 "Door Hardware."
 1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation to be furnished by Owner.
9. Operating Trim: BHMA A156.6.
10. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
11. Weather Stripping: Manufacturer's standard replaceable components.
 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2.6 GLAZING

1. Glazing: Comply with Section 088000 "Glazing."
2. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers
- ~~3.~~ Glazing Sealants: As recommended by manufacturer.

2.7 ACCESSORIES

1. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads finished to match framing system.
2. Anchors: Three-way adjustable anchors with minimum adjustment of [1 inch (25.4 mm)] that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

2.8 FABRICATION

1. Form or extrude aluminum shapes before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
3. Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Physical and thermal isolation of glazing from framing members.
 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
4. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
5. Storefront Framing: Fabricate components for assembly using Stick assembly
6. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 1. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
7. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
8. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
9. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

1. Finish to match exterior curtain wall framing adjacent.

PART 3 - EXECUTION

3.1 EXAMINATION

1. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

1. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

2. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3. Install components plumb and true in alignment with established lines and grades.

4. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

5. Install glazing as specified in Section 088000 "Glazing."

6. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.3 ERECTION TOLERANCES

1. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
 - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

3.4 MAINTENANCE SERVICE

1. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

3.5 ENTRANCE DOOR HARDWARE SETS

1. Hardware Set 1:

1. Lock: Kawneer MS Hookbolt with cylinders both sides
2. Pulls: Kawneer flush pulls
3. Rollers: Kawneer Stainless steel rollers

END OF SECTION 084113

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cylinders for doors fabricated with locking hardware.
- B. Related Divisions:
 - 1. Division 08 – aluminum framed storefront entrances.
 - 2. Division 21 – fire and life safety systems
 - 3. Division 28 – security access systems
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Windows.
 - 2. Cabinets, including open wall shelving and locks.
 - 3. Signs, except where scheduled.
 - 4. Toilet accessories, including grab bars.
 - 5. Installation.
 - 6. Rough hardware.
 - 7. Conduit, junction boxes & wiring.
 - 8. Folding partitions, except cylinders where detailed. Sliding aluminum doors, except cylinders where detailed.
 - 9. Access doors and panels, except cylinders where detailed.
 - 10. Corner Guards.
 - 11. Welded steel gates and supports
 - 12. Access Control

1.2 REFERENCES:

- A. Use date of standard in effect as of Bid date.
 - 1. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
 - a) ICC/ANSI A117.1 - 1998 – Specifications for making buildings and facilities usable by physically handicapped people.
 - b) ANSI A156.18 Materials and Finishes
 - 2. ADA – Americans with Disabilities Act of 1990 BHMA – Builders Hardware Manufacturers Association
 - 3. DHI – Door and Hardware Institute
 - 4. NFPA – National Fire Protection Association
 - a) NFPA 80 – Fire Doors and Windows
 - b) NFPA 105 – Smoke and Draft Control Door Assemblies
 - c) NFPA 252 – Fire Tests of Door Assemblies
 - 5. UL – Underwriters Laboratories
 - a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
 - b) UL 305 – Panic Hardware

6. WHI – Warnock Hersey Incorporated
7. Local applicable codes
8. SDI – Steel Door Institute
9. WI – Woodwork Institute
10. AWI – Architectural Woodwork Institute
11. NAAMM – National Association of Architectural Metal Manufacturers

B. Abbreviations

1. Manufacturers: see table at 2.1.A of this section
2. Finishes: see 2.7 of this section.

1.3 SUBMITTALS & SUBSTITUTIONS

A. **SUBMITTALS:** Submit six copies of schedule per Section 01330. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Location of hardware set coordinated with floor plans and door schedule.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, materials and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.
11. Point-to-point wiring diagrams.
12. Manufacturer’s technical data and installation instructions for electronic hardware.

B. Bid and submit manufacturer’s updated/improved item if scheduled item is discontinued.

C. **Deviations:** Highlight, encircle or otherwise identify deviations from “Schedule of Finish Hardware” on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers’ installation, adjustment and maintenance information, and supplier’s final inspection report.

1.4 QUALITY ASSURANCE:

A. Qualifications:

1. **Hardware supplier:** direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during

course of work for project hardware consultation to Owner, Architect and Contractor.

- a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
- B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C Standard 7-2 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.
- E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.
- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
 1. Location of embedded and attached items to concrete.
 2. Location of wall-mounted hardware, including wall stops.
 3. Location of finish floor materials and floor-mounted hardware.
 4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.

5. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
 6. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.
 7. Manufacturers' templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
- D. Environmental considerations: segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

1.7 WARRANTY:

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:
1. Mortise Locksets: Three years
 2. Hinges: One year
 3. Other Hardware: Two years

1.8 COMMISSIONING:

- A. Conduct these tests prior to request for certificate of substantial completion:
1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
 2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
 3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers and their abbreviations used in this schedule:

| | |
|-----|---------------------|
| BES | BEST |
| IVE | H. B. Ives |
| SCE | Schlage Electronics |
| SCH | Schlage |
| ZER | Zero International |

2.2 LOCKSETS, LATCHSETS, DEADBOLTS:

- A. Mortise Locksets and Latchsets: as scheduled.
1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 2. Universal lock case – 10 functions in one case.
 3. Floating mounting tabs automatically adjusts to fit a beveled door edge.

4. Latchbolts: 0.75 inch throw stainless steel anti-friction type.
5. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
 - a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
 - b) Inside lever applied by screwless shank mounting – no exposed trim mount screws.
 - c) Levers rotate up or down for ease of use.
6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
7. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
8. Deadbolts: stainless steel 1-inch throw.
9. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
10. Scheduled Lock Series and Design: BEST 45H.
11. Certifications:
 - a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
 - b) ANSI/ASTM F476-84 Grade 31 UL Listed.
12. Accepted Mortise Lock substitutions: Schlage L9000

2.3 POWER SUPPLIES/ TRANSFERS

- A. Power supplies to be tested and certified to meet UL294.
- B. Universal 120-240 VAC input, low voltage DC output, regulated and filtered.
- C. Power supplies to have 2A, 4A, 6A output, 12/24 VDC field selectable with jumper.
- D. Provide emergency release terminals, where required, that allow the release of all devices upon activation of the fire alarm system complete with fire alarm input for initiating “no delay” exiting mode.
- E. Power supplies for Von Duprin and Falcon/ Monarch electric latch retraction shall be 4A, and include a high inrush module as required for electric latch retraction.
- F. Power supplies shall be flat mounting design with polarized locking connections for additional option boards as specified.
- G. Power supplies shall be of the same manufacture as electrified exit devices and or locking devices. Substitutions will not be considered or approved.
- H. Provide a means to transfer power from the door frame to door style. Devices shall be reversible and allow a full 180 degree door swing. When door is closed transfer unit shall be concealed.
- I. Provide Von Duprin EPT power transfers with swiveling stainless steel tube at all electrified locks and exit devices. Von Duprin EPT shall be used at all exits that require a high amp inrush to retract latch. Power transfer hinges or coiled spring power transfers will not be acceptable.
- J. Provide Allegion Connect connectors as scheduled, at all electrified door hardware in type and lengths required to connect to power supply.

2.4 OTHER HARDWARE

- A. Door Stops: Provide stops to protect walls, casework or other hardware.
- B. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
- C. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- D. Through-bolts: Verify with Architect. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
 - 1. Exception: surface-mounted overhead stops, holders, and friction stays.
 - 2. CONFIRM: Through-bolts typically required with FRP Doors & Frames. Consult FRP Door & Frame Manufacturer for proper Mounting of all Hardware.

2.5 FINISH:

- A. Generally: BHMA 626 Satin Chromium Steel **OR** BHMA 630 Satin Stainless Steel.
 - 1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.
- C. Finish designators used in appended hardware schedule:

| ANSI | US | Description | Base Metal |
|------|-------|-----------------------------------|----------------------|
| 626 | US26D | Satin Chromium Plated Over Nickel | Brass, Bronze |
| 628 | US28 | Satin Aluminum, Clear Anodized | Aluminum |
| 630 | US32D | Satin Stainless Steel | Stain. Steel 300 Ser |
| 652 | US26D | Satin Chromium Plated Over Nickel | Steel |
| 689 | US28 | Aluminum Painted | Any |
| AL | US28 | Aluminum Mill Finish | Aluminum |
| BLK | | Black | Any |
| BRN | | Dark Brown | Any |

- D. Seal color to be as selected by Architect.

2.6 KEYING REQUIREMENTS:

- A. Key System: Match Owners existing BEST SFIC Patented Key System. Initiate and conduct meeting(s) with Owner to determine system structure and keybow styles, furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. GC to confirm Owner will order and supply permanent cylinders/cores. Owner/Contractor will install permanent cylinders/cores.
- B. FOR ESTIMATE:
- C. Keys

1. Construction keying: furnish keyed-alike temporary cores plus 10 operating keys. Temporary cores and keys remain property of hardware supplier.
- D. Interchangeable Cores: 7-pin solid brass construction.
- E. Permanent cores: furnish factory-keyed.
 1. Locksets and cylinders same manufacturer.
- F. Permanent keys and cores: Match existing keyway, use secured shipment direct from point of origination to Owner.
 1. 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
- G. VKC stamping plus "DO NOT DUPLICATE".
- H. Bitting List: use secured shipment direct from point of origination to Owner upon completion.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

- A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 1. Notify Architect of code conflicts in writing before ordering material.
 2. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 1133B.2.5.2.
 3. Locate panic hardware between 36 inches to 44 inches above the finished floor.
 4. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

3.3 ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
 1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
 2. Adjust doors to fully latch with no more than 1 pound of pressure.
 3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
 4. Adjust door closers per 1.9 this section.
- B. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:

1. Has re-adjusted hardware.
2. Has evaluated maintenance procedures and recommend changes or additions, and instructed Owner's personnel.
3. Has identified items that have deteriorated or failed.
4. Has submitted written report identifying problems.

3.4 DEMONSTRATION:

- A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.5 PROTECTION/CLEANING:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.6 SCHEDULE OF FINISH HARDWARE

- A. See door schedule in drawings for hardware set assignments.

HARDWARE GROUP NO. 01 - BIPARTING ALUMINUM SLIDER PAIR
SL 9' 1" X 7' 0" X 1 3/4" X UNK X UNK
FOR USE ON MARK #(S):

101

EACH TO HAVE:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|---|--------|-----|
| 1 | EA | DOOR CONTACT | Sentrol 1078W or Department of Aviation approved equivalent substitute. | 628 | SCE |
| 1 | EA | PERMANENT CORE | Per HAS Standards | | BES |
| 1 | EA | BYPASS PAIR | ALL MATERIAL BY DOOR MANUFACTURER INCLUDING MS HOOKBOLT WITH CYLINDERS BOTH SIDES FLUSH PULLS STAINLESS STEEL ROLLERS | | B/O |

ALL HARDWARE BY DOOR MANUFACTURER. GC TO COORDINATE DOOR POSITION CONTACT BY DIVISION 28 / SECURITY CONTRACTOR.

END OF SECTION

SECTION 088000 - GLAZING

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.~~ Glass for storefront framing
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Section 084113 "Aluminum Framed Entrances and Storefront"

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- ~~A.~~ Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- ~~B. Glass Samples: For each type of glass product other than clear monolithic vision-~~
- C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" to match glazing systems required for Project, including glazing methods.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer:
 1. PPG Flat Glass; PPG Industries
 2. Alternate Manufacturers:
 - a. Cristacurva
 - b. Oldcastle Building Envelope
 - c. Pilkington North America
 - d. Technoglass
 - e. Trulite Glass & aluminum
 - f. Viracon, Inc
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For laminated-glass lites, properties are based on products of construction indicated.
 - 2. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of ~~the SGCC~~ the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) ~~or Class 2 (tinted)~~ as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.

2.6 GLAZING SEALANTS

- A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
 4. applications where this sealant is required>.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C),
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and

glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.
- 3. Grid suspension systems for gypsum board ceilings.

- B. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks, post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Horizontal Deflection: For composite and non-composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of **5 lbf/sq. ft. (239 Pa)**.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, **G40 (Z120)**, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
 - 1. Steel Studs and Tracks:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ClarkDietrich.
 - 2) MRI Steel Framing, LLC.
 - 3) SCAFCO Steel Stud Company.
 - 4) Steel Construction Systems.
 - b. Minimum Base-Steel Thickness: As indicated on Drawings.
 - c. Depth: As indicated on Drawings (**3-5/8 inches (92 mm)**, **6 inches (152 mm)**, **4 inches (102 mm)**, **2-1/2 inches (64 mm)**, **1-5/8 inches (41 mm)**).
 - 2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ClarkDietrich.
 - 2) SCAFCO Steel Stud Company.

- 3) [Steel Construction Systems.](#)
 - b. Minimum Base-Steel Thickness: As indicated on Drawings.
 - c. Depth: As indicated on Drawings .
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing **1-1/2-inch (38-mm)** minimum vertical movement.
 - a. [Manufacturers:](#) Subject to compliance with requirements, provide products by one of the following:
 - 1) [ClarkDietrich.](#)
 - 2) [SCAFCO Steel Stud Company.](#)
 - 3) [The Steel Network, Inc.](#)
 2. Single Long-Leg Track System: ASTM C645 top track with **2-inch- (51-mm-)** deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within **12 inches (305 mm)** of the top of studs to provide lateral bracing.
 3. Double-Track System: ASTM C645 top outer tracks, inside track with **2-inch- (51-mm-)** deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
 4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. [Manufacturers:](#) Subject to compliance with requirements, provide products by one of the following:
 - 1) [ClarkDietrich.](#)
 - 2) [SCAFCO Steel Stud Company.](#)
 - 3) [The Steel Network, Inc.](#)
 - D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 1. [Manufacturers:](#) Subject to compliance with requirements, provide products by one of the following:
 - a. [ClarkDietrich.](#)
 - b. [Fire Trak Corp.](#)
 - c. [The Steel Network, Inc.](#)
 - E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. [Manufacturers:](#) Subject to compliance with requirements, provide products by one of the following:

- a. [ClarkDietrich](#).
 - b. [SCAFCO Steel Stud Company](#).
2. Minimum Base-Steel Thickness: As indicated on Drawings.
- F. Cold-Rolled Channel Bridging: Steel, **0.0538-inch (1.367-mm)** minimum base-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. [ClarkDietrich](#).
 - b. [SCAFCO Steel Stud Company](#).
 - c. [Steel Construction Systems](#).
 2. Depth: **1-1/2 inches (38 mm)**.
 3. Clip Angle: Not less than **1-1/2 by 1-1/2 inches (38 by 38 mm)**, **0.068-inch- (1.72-mm-)** thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. [ClarkDietrich](#).
 - b. [SCAFCO Steel Stud Company](#).
 - c. [Steel Construction Systems](#).
 2. Minimum Base-Steel Thickness: As indicated on Drawings.
 3. Depth: **7/8 inch (22.2 mm)**.
- H. Resilient Furring Channels: **1/2-inch- (13-mm-)** deep, steel sheet members designed to reduce sound transmission.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. [ClarkDietrich](#).
 - b. [SCAFCO Steel Stud Company](#).
 - c. [Steel Construction Systems](#).
 2. Configuration: Hat shaped.
- I. Cold-Rolled Furring Channels: **0.053-inch (1.34-mm)** uncoated-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges.
1. Depth: **3/4 inch (19 mm)**.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of **0.0329 inch (0.8 mm)**.
 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.

- J. Z-Shaped Furring: With slotted or nonslotted web, face flange of **1-1/4 inches (32 mm)**, wall attachment flange of **7/8 inch (22 mm)**, minimum uncoated-steel thickness of **0.0179 inch (0.455 mm)**, and depth required to fit insulation thickness indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich.
 - b. SCAFCO Steel Stud Company.
 - c. Steel Construction Systems.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.
- B. Hanger Attachments to Concrete:
1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, AC193, AC58, or AC308 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Type: Torque-controlled, expansion anchor.
 - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or **ASTM F1941 (ASTM F1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group **1 (A1)** stainless-steel bolts, **ASTM F593 (ASTM F738M)**, and nuts, **ASTM F594 (ASTM F836M)**.
 2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.16 inch (4.12 mm)** in diameter.
- D. Flat Hangers: Steel sheet, **1 by 3/16 inch (25 by 5 mm)** by length indicated.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of **0.0538 inch (1.367 mm)** and minimum **1/2-inch- (13-mm-)** wide flanges.
1. Depth: **1-1/2 inches (38 mm)**.
- F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: **0.0538-inch (1.367-mm)** uncoated-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges, **3/4 inch (19 mm)** deep.
 2. Steel Studs and Tracks: ASTM C645.
 - a. Minimum Base-Steel Thickness: **0.0329 inch (0.836 mm)**.

- b. Depth: As indicated on Drawings.
 3. Embossed, High-Strength Steel Studs and Tracks: ASTM C645.
 - a. Minimum Base-Steel Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 4. Hat-Shaped, Rigid Furring Channels: ASTM C645, **7/8 inch (22 mm)** deep.
 - a. Minimum Base-Steel Thickness: **0.0329 inch (0.836 mm)**.
 5. Resilient Furring Channels: **1/2-inch- (13-mm-)** deep members designed to reduce sound transmission.
 - a. Configuration: Hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Rockfon (Rockwool International).
 - c. USG Corporation.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, **1/8 inch (3.2 mm)** thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
 - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
 2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
 3. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- E. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced **24 inches (610 mm)** o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (610 mm)** o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than **12 inches (305 mm)** from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than **1/8 inch (3 mm)** from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: **48 inches (1219 mm)** o.c.
 2. Carrying Channels (Main Runners): **48 inches (1219 mm)** o.c.
 3. Furring Channels (Furring Members): **24 inches (610 mm)** o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.

6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within **1/8 inch in 12 feet (3 mm in 3.6 m)** measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

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. Interior gypsum board.
- 2. Texture finishes.

- B. Related Requirements:

- 1. Section 055400 "Cold-Formed Framing" for load-bearing steel that supports gypsum board.
- 2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
- 3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
- 4. Section 099123 "Painting" for primers applied to gypsum board surfaces.
- 5. Section 078443 "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Samples: For the following products:

- 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

- 1. Build mockups for the following:

- a. Each level of gypsum board finish indicated for use in exposed locations.
- b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Gypsum.
 - c. Georgia-Pacific Gypsum LLC.
 - d. National Gypsum Company.
 - e. PABCO Gypsum.
 - f. USG Corporation.
 2. Thickness: **1/2 inch (12.7 mm)**.
 3. Long Edges: Tapered.
- B. Gypsum Board, Type X: ASTM C1396/C1396M.
1. Thickness: **5/8 inch (15.9 mm)**.
 2. Long Edges: Tapered.
- C. Flexible Gypsum Board: ASTM C1396/C1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Thickness: **1/4 inch (6.4 mm)**.
 2. Long Edges: Tapered.
- D. Gypsum Ceiling Board: ASTM C1396/C1396M.
1. Thickness: **1/2 inch (12.7 mm)**.
 2. Long Edges: Tapered.
- E. Foil-Backed Gypsum Board: ASTM C1396/C1396M.
1. Core: **5/8 inch (15.9 mm)**, Type X.
 2. Long Edges: Tapered.
- F. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
1. Core: **5/8 inch (15.9 mm)**, Type X.
 2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 3. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 5. Long Edges: Tapered.
 6. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- G. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
1. Core: **5/8 inch (15.9 mm)**, Type X.
 2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 3. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 5. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements according to test in Annex A1.
 6. Long Edges: Tapered.
 7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- H. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: **5/8 inch (15.9 mm)**, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Gypsum.
 - c. Georgia-Pacific Gypsum LLC.
 - d. National Gypsum Company.
 - e. PABCO Gypsum.
 - f. USG Corporation.
 2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
 3. Long Edges: Tapered.
- B. Glass-Mat Interior Gypsum Board: ASTM C1658/C1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.
1. Core: **5/8 inch (15.9 mm)**, Type X.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- C. Acoustically Enhanced Gypsum Board: ASTM C1396/C1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.
1. Core: **5/8 inch (15.9 mm)**, Type X.
 2. Long Edges: Tapered.
- D. Skim-Coated Gypsum Board: ASTM C1396/C1396M. Manufactured with a factory-applied skim coat.
1. Core: **5/8 inch (15.9 mm)**, Type X.
 2. Long Edges: Tapered.

2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.

- d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Exterior Trim: ASTM C1047.
1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.
- C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corporation.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 2. Aluminum: Alloy and temper with not less than the strength and durability properties of **ASTM B221 (ASTM B221M)**, Alloy 6063-T5.
 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified requirements for Class II anodic finishes and factory-painted, baked-enamel finishes.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
 2. Exterior Gypsum Soffit Board: Paper.
 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti, Inc.

- b. [Pecora Corporation.](#)
 - c. [Specified Technologies, Inc.](#)
 - d. [USG Corporation.](#)
- F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- G. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch (1.5 mm)** of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than **8 sq. ft. (0.7 sq. m)** in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow **1/4- to 3/8-inch- (6.4- to 9.5-mm-)** wide joints to install sealant.

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide ~~1/4- to 1/2-inch-~~ (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: Where required for fire-resistance-rated assembly and vertical surfaces unless otherwise indicated.
 - 3. Flexible Type: Apply in double layer at curved assemblies.
 - 4. Ceiling Type: As indicated on Drawings.
 - 5. Foil-Backed Type: As indicated on Drawings.
 - 6. Abuse-Resistant Type: As indicated on Drawings.
 - 7. Impact-Resistant Type: As indicated on Drawings.
 - 8. Mold-Resistant Type: As indicated on Drawings.
 - 9. Type C: Where required for specific fire-resistance-rated assembly indicated.
 - 10. Glass-Mat Interior Type: As indicated on Drawings.
 - 11. Acoustically Enhanced Type: As indicated on Drawings.
 - 12. Skim-Coated Type: As indicated on Drawings.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

- b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 - C. Multilayer Application:
 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, **16 inches (400 mm)** minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
 - D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.
 - E. Curved Surfaces:
 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus **12-inch- (300-mm-)** long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws **16 inches (400 mm)** o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced **12 inches (300 mm)** o.c.
- 3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS
 - A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 1. Install with **1/4-inch (6.4-mm)** open space where panels abut other construction or structural penetrations.
 2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated and locations indicated to receive tile. Install with **1/4-inch (6.4-mm)** gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated and locations indicated to receive tile.
- C. Water-Resistant Backing Board: Install where indicated with **1/4-inch (6.4-mm)** gap where panels abut other construction or penetrations.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. Bullnose Bead: Use where indicated.
 - 3. LC-Bead: Use at exposed panel edges.
 - 4. L-Bead: Use where indicated.
 - 5. U-Bead: Use where indicated.
 - 6. Curved-Edge Cornerbead: Use at curved openings.
- D. Exterior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.
- E. Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 4. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 099123 - INTERIOR PAINTING

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 surface preparation and the application of paint systems on **the following interior substrates:**

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
4. Cast iron.
5. Galvanized metal.
6. Aluminum (not anodized or otherwise coated).
7. Wood.
8. Gypsum board.
9. Plaster.

- B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
2. Section 099600 "High-Performance Coatings" for high-performance and special-use coatings.
3. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. LEED Submittals:
 - 1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit EQ 4: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- E. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
 - 3. VOC content.

1.5 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, **from the same product run**, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: **5** but not less than **1 gal. (3.8 L)** of each material and color applied.

1.7 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least **100 sq. ft. (9 sq. m)**.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 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.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
 - 1. Product name and type (description).
 - 2. Batch date.
 - 3. Color number.
 - 4. VOC content.
 - 5. Environmental handling requirements.
 - 6. Surface preparation requirements.
 - 7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between **50 and 95 deg F** (**10 and 35 deg C**).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than **5 deg F** (**3 deg C**) above the dew point; or to damp or wet surfaces.
- C. Lead Paint: It is not expected that lead paint will be encountered in the Work.
 - 1. If suspected lead paint is encountered, do not disturb; immediately notify Architect and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Duron, Inc.
 - 3. Glidden Professional, Division of PPG Architectural Finishes, Inc.
 - 4. PPG Architectural Finishes, Inc.
 - 5. Pratt & Lambert.
 - 6. **<Insert manufacturer's name>**.
- B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
 - 1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction **and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive**

of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Colors: **As indicated in a color schedule** on the Drawing Sheet A0.20
1. **10** percent of surface area will be painted with deep tones.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and

perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Masonry (Clay and CMU): 12 percent.
 - c. Wood: 15 percent.
 - d. Gypsum Board: 12 percent.
 - e. Plaster: 12 percent.
2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3. Plaster Substrates: Verify that plaster is fully cured.
4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

- C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer **but not less than the following:**
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply

additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #3**]: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat[, (**Gloss Level 1**), **MPI #53 X-Green/#143 X-Green**]: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - d. Topcoat: Latex, interior, low sheen[, (**Gloss Level 2**), **MPI #44 X-Green/#144 X-Green**]: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - e. Topcoat: Latex, interior, eggshell[, (**Gloss Level 3**), **MPI #52 X-Green/#145 X-Green**]: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 - f. Topcoat: Latex, interior, semi-gloss[, (**Gloss Level 4**), **MPI #43 X-Green**]: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - g. Topcoat: Latex, interior, gloss[, (**Gloss Level 5**), **MPI #54**]: S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat..
 - 2. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #3**]: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.

- c. Topcoat: Light industrial coating, interior, water based, eggshell[, **(Gloss Level 3), MPI #151**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 - d. Topcoat: Light industrial coating, interior, water based, semi-gloss[, **(Gloss Level 5), MPI #153**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 3. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."
 4. Concrete Stain System (Water-based) for Vertical Surfaces:
 - a. First Coat: S-W H&C Concrete Stain Solid Color Water Based, at **50 to 300 sq. ft. per gal (1.2 to 7.4 sq. m per l)**.
 - b. Second Coat: S-W H&C Concrete Stain Solid Color Water Based, at **50 to 300 sq. ft. per gal (1.2 to 7.4 sq. m per l)**.
- B. Concrete Substrates, Pedestrian Traffic Surfaces:
 1. Latex Floor Enamel System:
 - a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
 - b. Topcoat: Floor paint, latex, slip-resistant, low gloss[, **(maximum Gloss Level 3), MPI #60**]: S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.
 2. Clear Acrylic System, Gloss Finish:
 - a. First Coat: S-W H&C Concrete Sealer Wet Look Water Base, at **100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l)**.
 - b. Second Coat: S-W H&C Concrete Sealer Wet Look Water Base, at **100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l)**.
 3. Concrete Stain System (Water-based):
 - a. First Coat: Low-luster opaque finish: S-W H&C Concrete Stain Solid Color Water Based, at **50 to 300 sq. ft. per gal (1.2 to 7.4 sq. m per l)**.
 - b. Second Coat: Low-luster opaque finish: S-W H&C Concrete Stain Solid Color Water Based, at **50 to 300 sq. ft. per gal (1.2 to 7.4 sq. m per l)**.
 4. Epoxy and Urethane Coatings: Refer to Section 099600 "High-Performance Coatings."
 5. Epoxy- and Urethane- Based Aggregate-Filled Floor Surfacing: Refer to Section 09 67 23 "Resinous Flooring."
- C. CMU Substrates:
 1. Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior[, **MPI #4 X-Green**]: S-W PrepRite Block Filler, B25W25, at **100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l)**.
 - b. Intermediate Coat: Latex, interior, matching topcoat.

- c. Topcoat: Latex, interior, flat[, **(Gloss Level 1), MPI #53 X-Green/#143 X-Green**]: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - d. Topcoat: Latex, interior, low sheen[, **(Gloss Level 2), MPI #44 X-Green/#144 X-Green**]: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - e. Topcoat: Latex, interior, eggshell[, **(Gloss Level 3), MPI #52 X-Green/#145 X-Green**]: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 - f. Topcoat: Latex, interior, semi-gloss[, **(Gloss Level 4), MPI #43 X-Green**]: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - g. Topcoat: Latex, interior, gloss[, **(Gloss Level 5), MPI #54**]: S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
2. Water-Based Light Industrial Coating System:
 - a. Block Filler: Block filler, latex, interior/exterior[, **MPI #4 X-Green**]: S-W PrepRite Block Filler, B25W25, at **100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l)**.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, eggshell[, **(Gloss Level 3), MPI #151**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 - d. Topcoat: Light industrial coating, interior, water based, semi-gloss[, **(Gloss Level 5), MPI #153**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 3. Concrete Stain System (Water-based):
 - a. First Coat: S-W H&C Concrete Stain Solid Color Water Based, at **50 to 300 sq. ft. per gal (1.2 to 7.4 sq. m per l)**.
 - b. Second Coat: S-W H&C Concrete Stain Solid Color Water Based, at **50 to 300 sq. ft. per gal (1.2 to 7.4 sq. m per l)**.
 4. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."
 5. Epoxy and Urethane Coatings: Refer to Section 099600 "High-Performance Coatings."
- D. Metal Substrates (Aluminum, Steel, Galvanized Steel):
1. Latex System:
 - a. Prime Coat: Primer, rust-inhibitive, water based[, **MPI #107**]: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
 - c. Topcoat: Water-based acrylic, semi-gloss[, **(Gloss Level 5), MPI #147 X-Green**]: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

- d. Topcoat: Water-based acrylic, gloss[, (**Gloss Level 6**), **MPI #148 X-Green**]: S-W Pro Industrial Acrylic Gloss Coating, B66-660 Series, at 2.5 to 4.0 mils dry, per coat.
2. Water-Based Dry-Fall System:
 - a. Top Coat: Dry-fall latex, flat[, **MPI #118**]: S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-80 Series, at 6.0 mils wet, 1.7 mils dry.
 - b. Top Coat: Dry-fall latex, eggshell[, **MPI #131/155**]: S-W Pro Industrial Waterborne Acrylic DryFall Eg-Shel, B42-2 Series, at 6.0 mils wet, 1.9 mils dry.
 - c. Top Coat: Dry-fall latex, semi-gloss[, **MPI #226**]: S-W Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, B42-80 Series, at 5.8 mils wet, 2.3 mils dry.
3. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer, rust-inhibitive, water based[, **MPI #107**]: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, eggshell[, (**Gloss Level 3**), **MPI #151**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 - d. Topcoat: Light industrial coating, interior, water based, semi-gloss[, (**Gloss Level 5**), **MPI #153**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."
5. Acrylic/Alkyd System:
 - a. Prime Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
 - c. Topcoat: Water-based acrylic-alkyd, semi-gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 - d. Topcoat: Water-based acrylic-alkyd, gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Gloss, B35-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
- E. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.
 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #39**]: S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, eggshell[, (**Gloss Level 3**), **MPI #52 X-Green/#145 X-Green**]: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

- d. Topcoat: Latex, interior, semi-gloss[, **(Gloss Level 4), MPI #43 X-Green**]: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - e. Topcoat: Latex, interior, gloss[, **(Gloss Level 5), MPI #54**]: S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
2. Acrylic/Alkyd System:
 - a. Prime Coat: Primer sealer, latex, interior: S-W Premium Wall & Wood Primer, B28W8111, at 4.0 mils wet, 1.8 mils dry.
 - b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
 - c. Topcoat: Water-based acrylic-alkyd, semi-gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 - d. Topcoat: Water-based acrylic-alkyd, gloss, interior: S-W ProMar 200 Waterbased Acrylic-Alkyd Gloss, B35-8200 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 3. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #39**]: S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, eggshell[, **(Gloss Level 3), MPI #151**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 - d. Topcoat: Light industrial coating, interior, water based, semi-gloss[, **(Gloss Level 5), MPI #153**]: S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."
- F. Wood Substrates, Pedestrian Traffic Surfaces:
1. Latex Floor Enamel System:
 - a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
 - b. Topcoat: Floor paint, latex, slip-resistant, low gloss[, **(maximum Gloss Level 3), MPI #60**]: S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.
- G. **[Gypsum Board] [Plaster] [and] [Spray-Texture Ceiling]** Substrates:
1. Latex System:
 - a. Prime Coat: Primer, latex, interior[, **MPI #149 X-Green**]: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
 - b. Intermediate Coat: Latex, interior, matching topcoat.

- c. Topcoat: Latex, interior, flat[, **(Gloss Level 1), MPI #53 X-Green/#143 X-Green**]: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - d. Topcoat: Latex, interior, low sheen[, **(Gloss Level 2), MPI #44 X-Green/#144 X-Green**]: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - e. Topcoat: Latex, interior, eggshell[, **(Gloss Level 3), MPI #52 X-Green/#145 X-Green**]: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 - f. Topcoat: Latex, interior, semi-gloss[, **(Gloss Level 4), MPI #43 X-Green**]: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - g. Topcoat: Latex, interior, gloss[, **(Gloss Level 5), MPI #54**]: S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
2. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer sealer, latex, interior[, **MPI #50 X-Green**]: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, eggshell[, **(Gloss Level 3), MPI #151**]: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 - d. Topcoat: Light industrial coating, interior, water based, semi-gloss[, **(Gloss Level 5), MPI #153**]: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 3. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."

END OF SECTION 099123

SECTION 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Except as modified in this section, General Conditions, Supplementary Conditions, applicable provisions of Division 1, General Requirements, and other provisions and requirements of the Contract Documents apply to work of Division 16.
- B. Each section included in Division 16 is incomplete without the provisions stated herein.

1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Access doors.

1.3 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600kN-m/cu. m.)).
- B. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.
- C. IEEE C2 - National Electrical Safety Code.
- D. NFPA 70 - National Electrical Code.
- E. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.4 DEFINITIONS

- A. Provide: Where the word "provide" is used, the word is understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.
- B. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions, which directly affect the work being specified in the section where RELATED SECTIONS occurs.
- C. Concealed: Where the word "concealed" is used in conjunction with raceways, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.
- D. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

1.5 SUBMITTALS

- A. Access Doors: Indicate detailed dimension.

1.6 REGULATORY REQUIREMENTS

- A. Perform work in accordance with the National Electrical Code and all editions, revisions, amendments, or supplements of applicable statutes, ordinances, codes, or regulations of Federal, State, and Local Authorities having jurisdiction in effect on the date bids are received.
- B. Where approval standards have been established by OSHA, UL, ASME, AGA, AMCA, ANSI, ARI, NFPA, State Fire Insurance Regulatory Body, and FM, follow these standards whether or not indicated on the Drawings and Specifications. Include cost of work required to comply with requirements of these authorities in the original proposal. Comply with IEEE C2 where applicable.
- C. Requirements in reference specifications and standards are minimum for equipment, material, and work. In instances where capacities, size, or other scheduled features of equipment, devices, or materials exceed these minimums, meet scheduled or specified capacities.
- D. Resolve code interpretations discovered in Contract Documents with A/E prior to Contract award. After Contract award, make corrections or additions necessary for compliance with applicable codes.
- E. Arrange with local and state authorities and utility companies for permits, fees, and service connections, verifying locations and arrangement, and pay charges including inspections.

1.7 CONTRACT DRAWINGS

- A. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between conduit, equipment, architectural, and structural work. Provide a complete operational fire alarm system. Provide all necessary interfaces with the electrical BAS and HVAC systems. Route conduit raceways and install equipment to avoid conflicts with other trades and to enhance maintainability of system.
- B. Coordinate with architectural features, trim and millwork, and install equipment in cabinets or other special areas as directed by A/E.
- C. Drawings are based on equipment specified. Make adjustments, modifications, or changes required, due to use of other equipment at no additional cost to the Owner.

1.8 PROJECT/SITE CONDITIONS

- A. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing work.

- B. Space Requirements
 1. Consider space limitations imposed by contiguous work in selection and location of equipment and material. Do not provide equipment or material, which is not suitable in this respect.
 2. Make changes in equipment location of up to 5 feet, to allow for field conditions prior to actual installation, and as directed by A/E.
 3. Conceal conduit in finished areas. Conduit may be exposed in mechanical rooms, electrical rooms and where specifically allowed on Drawings. Route conduit through the building without interfering with other equipment or construction. Where existing construction prohibits the installation of conduit concealed provide wire mold metallic raceway and boxes.
 4. Provide maximum possible clear height underneath conduit. Install conduit as high as possible.
 5. Install equipment requiring service so that it is easily accessible.
 6. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
 7. Timely place equipment too large to fit through finished openings, and stairways.

- C. Site Obstructions:
 1. Drawings indicate certain information pertaining to surface and subsurface obstructions, which has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.
 2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
 3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
 4. Assume total responsibility for and repair damage to existing utilities or construction, whether or not such existing facilities are shown. Repair the lines, if damaged.

- D. Cutting and Patching:
 - 1. Submit written request to A/E in advance of cutting or alterations.
 - 2. Execute cutting and demolition by methods which will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
 - 3. Restore work which has been cut or removed; install new products complying with specified products, functions, tolerances and finishes as specified.
 - 4. Escutcheon Plates
 - a. Heavy chrome-plated or nickel-plated escutcheon plates for penetrations of finished surface.
 - b. Product: B&C No. 10 with concealed hinges.
 - 5. Fit work airtight to conduit, sleeves, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

1.9 MATERIALS AND WORKMANSHIP

- A. Provide new materials and equipment of a domestic manufacturer by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Install materials and equipment to present a neat appearance when completed and in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.
- C. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.
- D. Make written request to A/E for supplementary instructions in cases of doubt as to Work intended or in event of need for explanation thereof.
- E. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.
- B. Store equipment in a clean, dry place, protected from other construction. While stored, maintain factory wrappings or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft.
- C. Adequately brace and package equipment to prevent breakage and distortion while in transit.

1.11 EXCAVATION

- A. Trenching:
 - 1. Perform excavation of every description and of whatever substance encountered to depths indicated or specified. Pile materials suitable for backfilling a sufficient distance from banks of trenches to prevent slides or cave-ins. Comply with OSHA requirements for excavation, trenching, and shoring. Keep surface drainage of adjoining areas unobstructed. Waste excavated materials not required or satisfactory for backfill. Remove water by pumping or other approved methods, discharge at a safe distance from the excavation.
 - 2. Provide trenches of necessary width for proper laying of conduit and comply with latest publication of OSHA 2226 Excavating and Trenching Operations. Coordinate trench excavation with pipe installation to avoid open trenches for prolonged periods. Accurately grade to bottoms of trenches to provide uniform bearing and support for each section of conduit on undisturbed soil or the required thickness of bedding material at every point along its entire length.
 - 3. Provide minimum 12 inches between outer surfaces and embankment or shoring which may be used, when excavating for manholes, pull boxes, and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
 - 4. Material to be excavated is "unclassified." No adjustment in the contract price will be made on account of the presence or absence of rock, shale, masonry, or other materials.
 - 5. Protect existing utility lines that are indicated or the locations of which are made known prior to excavating and trenching and that are to be retained. Protect utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; if damaged, repair lines as directed by utilities, Owner, and A/E. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.

6. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
 - a. 3-Foot Minimum Cover: Raceways for primary voltage conductors.
 - b. 2-Foot Minimum Cover: Raceways for secondary conductors.
- B. Backfilling:
 1. Backfill trenches after conduit, fittings, and joints have been tested and approved.
 2. Backfill trenches with sand to provide 6 inches sand below conduit and 12 inches sand cover. Backfill remainder of trenches with satisfactory materials consisting of earth, loam, sandy clay, sand, and gravel, or soft shale, free from large clods of earth and stones not over 1-1/2 inch in size, and deposit in 9 inch maximum layers, loose depth as indicated or specified. Provide 6" wide red warning tape 6" below grade. Take care not to damage utility lines. Deposit the remainder of backfill materials in the trench in 1 foot maximum layers, and compact by mechanical means. Re-open trenches and excavation pits improperly backfilled or where settlement occurs to the depth required to obtain the specified compaction, then refill and compact with the surface restored to the required grade and compaction.
 3. Where trenches cross streets, driveways, building slabs, or other pavements, backfill trench utility line with sand backfill material in 6 inch layers. Moisten each layer and compact to 95 percent of the maximum soil density as determined by ASTM D 698. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.
 4. Restore surface/ slab/ drive to original "new" condition.

1.12 PAINTING

- A. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.
- B. Repair damage to factory painted finishes.
- C. Remove splattered and incidental paint from electrical equipment.

1.13 PILOT INSTALLATION

- A. Provide a pilot installation of items of equipment, which are concealed and require service, such as disconnect switches above ceiling, and transformers above ceiling. Have pilot installation approved before further installation work is performed for the particular items of equipment.

1.14 ACCESS DOORS

- A. Provide hinged access doors in walls, floors and ceilings to permit access to equipment requiring service or adjustment.
- B. Provide hinged access doors and frames as follows:
 - 1. Drywall Construction:
 - a. Provide with concealed spring hinges and flush screwdriver operated cam locks in sufficient number of the size of the panel. Factory prime paint surfaces not galvanized.
 - b. Product: Milcor, "Style DW".
 - 2. Visible Masonry and Ceramic Tile: Milcor, "Style M".
 - 3. Gypsum and Cement Plaster: Milcor, "Style K".
 - 4. Acoustic Plaster:
 - a. Reinforce panel as required to prevent sagging. Provide continuous steel piano type hinge for the length of the panel, and sleeved and grommeted screwdriver operated cam locks in sufficient number for the size of the panel. Factory prime paint surfaces not galvanized.
 - b. Product: Milcor, "Style AP".
 - 5. Acoustic Tile: Milcor, "Style AT".
 - 6. Inmate Accessible Areas: Security access doors in all hard ceilings as specified by the Architect.
- C. Provide continuous concealed hinges and cam locks.
- D. Provide UL listed 1-1/2 hour Label "B" access doors with automatic self-closing latching mechanism where required.
- E. Provide removable ceiling access tile section immediately adjacent to each mechanical or electrical device located in the ceiling plenum above removable tile ceiling.
- F. Coordinate approval and location of doors with A/E.

1.15 NOISE AND VIBRATION

- A. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, ballasts, or other parts of the work, rectify such condition at no additional compensation.

1.16 OPERATING INSTRUCTIONS

- A. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete electrical system. Notify A/E seven days prior to beginning equipment start-up.
- B. Certify in writing that these services have been performed.

- C. Perform tests as specified in Section 26 08 00.

1.17 SERVICE

- A. Inspect, clean, and service light fixtures; replace fluorescent or HID lamps if utilized for construction lighting immediately prior to final acceptance of project.
- B. Clean and polish fixtures, equipment, and materials thoroughly, and return to "as new" condition.
- C. Remove excess material and debris. Place fire alarm systems in complete working order before request for final review. Broom clean areas.

1.18 ARC FLASH HAZARD

- A. Perform calculations to determine the ARC flash hazard at switchboards, panelboards, motor control centers, starters and industrial control panels.
- B. Install ARC flash hazard labels at each piece of equipment in accordance with NFPA 70, Article 110.16.

1.19 PROJECT RECORD DOCUMENTS

- A. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed conduit and equipment.
- B. Obtain mylar Drawings from A/E, at Contractor's expense, and record as-built conditions.
- C. Clearly and accurately delineate the work by dimensions on the record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.

- D. Final record drawings shall be marked "AS-BUILT," and signed and dated by Contractor.
- E. Provide certified "AS-BUILT" drawings at the conclusion of project.

1.20 FINAL REVIEW

- A. Obtain necessary Certificates of Occupancy from local authorities.
- B. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

1.21 GUARANTEE

- A. Guarantee materials, parts and labor for Work for one year from the date of issuance of occupancy permit. During that period make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 26 05 00

SECTION 26 05 03 EQUIPMENT WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install splicing and terminating devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Burndy Corp.
- B. Dossert Manufacturing Corp.
- C. Ideal Industries, Inc.
- D. Ilsco Corp.
- E. Minnesota Mining and Manufacturing Co.
- F. Thomas & Betts Co., Inc.

2.2 MATERIALS

- A. Cable and wire connections for splicing or terminating shall be made with compression deforming type connectors. Connectors for cable sizes 250 kcmil and larger shall be the long barrel type for double indentation. Soldered connections will not be permitted. Twist-on insulated connectors may be used which are resistant to vibration and are used in the proper sizes.
- B. Provide terminal connectors with hole sizes and spacing in accordance with NEMA standards. Provide terminal connectors with two holes in tongue for use on conductor sizes 250 kcmil and larger. Terminal connectors will not be required for connections to the circuit breakers in the lighting and/or receptacle panels.
- C. Provide connections made with non-insulated connectors insulated with three layers of plastic tape, each layer being half lapped. Provide No. 33+ plastic tape.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide electrical connections to equipment furnished under other contracts and furnish wiring, conduit, outlet boxes, and safety switches, as required. Verify locations, horsepower, and voltages of equipment prior to installation of feeders. If apparent conflict arises in power wiring, advise A/E immediately for clarification.
- B. Provide switches as required by national or local codes.
- C. If the motor is integral to the equipment, isolate the entire piece of equipment with a short section of flexible metal conduit to prevent vibration and/or noise amplification to be transferred to the building structure.
- D. If the motor is adjustable, install an additional length of flexible metal conduit at the motor.
- E. Major equipment furnished under mechanical and other sections of specifications may require different rough-in requirements than those indicated on Drawings. Secure detailed drawings from source furnishing equipment to determine actual rough-in locations, conduit and conductor requirements to assure proper installation.
- F. Before connecting any piece of equipment, verify the name plate data corresponds with information shown on Drawings. Discrepancies shall be called to attention of A/E.
- G. Change any feeders installed incorrectly as a result of not verifying equipment requirements, of equipment provided by others, prior to feeder installation.

END OF SECTION 26 05 03

SECTION 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes grounding electrodes and conductors; equipment grounding conductors; bonding methods and materials; including:
 - 1. Power system grounding.
 - 2. Communication system grounding.
 - 3. Electrical equipment and raceway grounding and bonding.
 - 4. Structural steel grounding.
 - 5. Miscellaneous system grounding.

1.2 REFERENCES

- A. NECA - Standard of Installation.
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NFPA 70 - National Electrical Code.
- D. NFPA 99 - Health Care Facilities.

1.3 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Metal frame of the building.
 - 2. Rod electrode.
 - 3. Metal cold water pipe at building entry.
 - 4. Reinforcing steel in foundation.
- B. Grounding System Resistance: minimum 5 ohms.

1.4 SUBMITTALS

- A. Product Data: Submit grounding electrodes and connections; for fastening components; and nameplates, labels, and markers.
- B. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- C. Manufacturer's Installation Instructions: Submit for active electrodes.
- D. Project Record Documents: Record actual locations of components and grounding electrodes.
- E. Provide installation pictures for coordination and records.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Rod Electrodes: Stainless steel, 3/4-inch (19 mm) diameter, minimum length 10 feet.
- B. Mechanical Connectors:
 - 1. Manufacturers:
 - a. Burndy.
 - b. O.Z. Gedney.
 - 2. Heavy-duty, bolt-type, copper alloy or bronze for grounding and bonding applications, in configurations required for particular installation.
- C. Exothermic Connections:
 - 1. Type for underground and structural steel; Cadweld.
 - 2. Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.
- D. Wire:
 - 1. Stranded, copper cable.
 - 2. Foundation Electrodes: 2/0 AWG.
 - 3. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.
- E. Grounding Well Components:
 - 1. Well Pipe: 8 inch NPS by 24-inch long concrete pipe with belled end.
 - 2. Well Cover: Cast iron with legend "GROUND" embossed on cover.

PART 3 - EXECUTION

3.1 GROUNDING AND BONDING INSTALLATION

- A. Install rod electrodes as indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- B. Provide grounding well pipe with cover at each rod location. Install well pipe top flush with finished grade.
- C. Provide bonding to meet Regulatory Requirements.
- D. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- E. Interface with lightning protection system installed under Section 26 41 13.13.
- F. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- G. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

- H. Do not use spring steel clips and clamps.
- I. Do not use powder-actuated anchors.
- J. Do not drill or cut structural members.
- K. Do not use compression or mechanical connectors underground.
- L. All ground resistance tests shall be witness by an H.A.S. inspector to meet the current H.A.S. design specifications.

3.2 ELECTRIC SERVICE GROUND

- A. Ground the electrical service system neutral at service entrance equipment to grounding electrodes.
- B. Bond together system neutrals, service equipment enclosures, and equipment grounding conductor at service entrance.
- C. Connect the electric service grounding electrode conductors to the incoming metal water pipe system (when available, using a suitable ground clamp) and to supplemental electrodes such as ground rods or ground loop.
- D. Provide grounding and bonding at the power company's metering equipment.
- E. Provide test wells for access to the ground grid and removable connections for testing the system.

3.3 GROUND LOOP

- A. Provide an electrically continuous ground system consisting of minimum of #4/0 copper main ground loop and ground rod stations with the bare copper conductors connected to the ground rod stations. Verify that the resistance to ground between any point on the system does not exceed 3 ohms. *Required for buildings 60' and above.*
- B. Install the ground conductors in contact with the earth below the frost line or a minimum of 30 inches, whichever is deeper.

3.4 EQUIPMENT GROUND

- A. Provide a complete ground system for the building consisting of copper cable, ground rods and exothermic connections to serve the service entrance, building structural steel, metallic enclosures and conduit systems.
- B. Provide a separate, insulated equipment grounding conductor from the main service ground to each main switchboard and in all feeders and branch circuits. Terminate each end on a grounding lug, bus, or bushing. Do not use conduit as grounding conductor.

- C. Provide OZ Type "BJ" bonding jumper at all expansion joints, points of electrical discontinuity or connections in conduit where firm mechanical bond is not possible, such as flexible connections, insulating couplings, etc.
- D. Ground each lighting and power panelboard by connecting the grounding conductor to the grounding stud.
- E. Ground each secondary dry-type transformer to the ground bus of the primary side panelboard. Provide a bonding jumper between the ground stud and the neutral. Ground transformer ground stud to ground loop if a ground loop is installed or the nearest structural steel member.
- F. Bond every item of equipment served by the electrical system to the building equipment ground system. This includes switchboards, panelboards, disconnect switches, receptacles, controls, fans, air handling units, pumps, and flexible duct connections.
- G. Ground each light pole.

3.5 ISOLATED GROUND

- A. Isolated Grounding Systems: Use insulated equipment grounding conductor and connect only to separate grounding electrode as shown.

3.6 COMMUNICATIONS GROUND

- A. Provide communications system grounding conductor at point of service entrance and connect to ground loop.
- B. Use minimum No. 6 AWG copper conductor for communications service grounding conductor. Leave 10-foot slack conductor at terminal board.

3.7 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION 26 05 26

SECTION 26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install supporting devices, including:
 - 1. Conduit and equipment supports.
 - 2. Fastening hardware.

1.2 COORDINATION

- A. Coordinate size, shape and location of concrete pads with section on cast-in-place concrete.
- B. Coordinate size, shape and requirements for utility company equipment with local utility company.

1.3 QUALITY ASSURANCE

- A. Provide support systems adequate for weight of equipment and conduit, including wiring, which they carry.

1.4 SUBMITTALS

- A. Product Data: Data cut sheets for materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. B-Line.
- B. Kindorf.
- C. Unistrut.

2.2 MATERIAL

- A. Support Channel: Galvanized steel.
- B. Hardware: Galvanized steel.
- C. Provide epoxy or PVC coated materials for corrosive environments.
- D. Spring steel clips.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps or bolts.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; sheet metal screws in sheet metal studs and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- D. Do not use powder-actuated anchors on new concrete structure.
- E. Do not drill structural steel members.
- F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- G. Provide concrete pads and equipment bases for all outdoor equipment on grade, floor mounted equipment, areas with floors below grade, penthouse equipment rooms and where shown on Drawings.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- J. Do not support conduit from ceiling wire supports.
- K. Do not support conduits by individual hanger wires.
- L. Where multiple runs of conduit can be run grouped together, run conduit in racks supported from the building structure. Provide for future use of rack by properly planning routing of conduits in and through restricted areas such as through walls and around mechanical and electrical equipment.
- M. Use spring steel clips only with EMT for individual branch circuits and device boxes in drywall construction.

END OF SECTION 26 05 29

SECTION 26 05 33.13 BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install wall and ceiling outlet boxes, floor boxes, and pull and junction boxes.
- B. Furnish and install raceway systems including telephone, data, cable TV, and security.

1.2 REFERENCES

- A. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- C. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Product Data: Data and cut sheets for materials.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

- A. Provide galvanized or cadmium-plated pressed steel outlet boxes suitable for the conditions of each outlet. Provide multi-gang outlets of single box design; sectional boxes will not be acceptable.
- B. Provide deep type cast metal outlet boxes located in damp locations exposed to weather or exposed areas subject to damage, or where surface mounted below 8' above finished floor, complete with gasketed cover and threaded hubs.
- C. Provide outlet boxes of sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70, and not less than 4 inches square and 1-1/2 inch deep unless shallower boxes are required by structural conditions and are specifically approved by A/E.
- D. Provide non-metallic type outlet boxes only in corrosive areas.
- E. Provide 4-inch octagonal ceiling outlet boxes.

2.2 FLOOR BOXES

- A. Provide fully adjustable, cast iron, or formed steel floor boxes for installation in cast-in-place concrete floors.

2.3 PULL AND JUNCTION BOXES

- A. Provide galvanized sheet metal boxes conforming to NEMA OS 1. Provide hinged enclosures for any box larger than 12 inches in any dimension. Hinged covers must open at least 90 degrees.
- B. Provide cast metal boxes for outdoor and wet locations conforming to NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as watertight with cover and ground flange, neoprene gasket, and stainless steel cover screws.
- C. Provide precast concrete or fiberglass handholes for underground installations. Where fiberglass handholes are provided, provide die-molded type with pre-cut 6"x6" cable entrance at center bottom of each side and fiberglass weatherproof cover with non-skid finish.
- D. Provide pre-cast reinforced concrete type pull/splice boxes with flush cover as manufactured by Brooks Products, for underground circuits. Size boxes as indicated.
- E. Provide separate pull boxes and junction boxes for electric power, control, and communication systems.
- F. Duct Bank Pull Boxes
 - 1. Provide pull boxes constructed of cast-in-place concrete with steel reinforcing bars; precast concrete with steel reinforcing bars; or fiberglass.
 - 2. Design and test manufactured pull boxes to temperatures of minus 50 degrees F. Provide pull boxes with material compressive strength no less than 11,000 psi.
 - 3. Provide covers with a minimum coefficient of friction of .5 and which are full vehicular traffic H-20 rated. Provide factory engraved "logo" on cover to indicate "electrical" or "telephone". Provide lockable covers with two penta-head bolts and pull slot(s) for easy removal.

2.4 BACKBOARDS

- A. Backboards: 3/4-inch, fire-retardant, exterior grade plywood.
 - 1. Provide minimum of two 4-foot by 8-foot sheet of plywood for each telephone location shown unless otherwise noted.
 - 2. Provide minimum of two 4-foot by 4-foot sheet of plywood for each data, cable TV, or security location shown unless otherwise noted.

2.5 CONDUIT

MANUFACTURERS

- A. Rigid Metal Conduit, Intermediate Metal Conduit, Electrical Tubing and Fittings.
 - 1. Allied Tube and Conduit Corporation
 - 2. Triangle PWC, Inc.
 - 3. Wheatland Tube Co.

- B. Flexible Conduit and Fittings
 - 1. Anamet, Inc.
 - 2. Electri-Flex Co.
 - 3. Triangle PWC, Inc.

- C. Nonmetallic Conduit and Fittings
 - 1. Can-Tex Industries.
 - 2. Carlon
 - 3. Certain-Teed.

MATERIALS

- D. Rigid Metal Conduit and Fittings
- B. Intermediate Metal Conduit (IMC) and Fittings
- C. Electrical Metallic Tubing (EMT) and Fittings
- D. Flexible Metal Conduits and Fittings
- E. Liquidtight Flexible Conduit and Fittings
- F. Nonmetallic Conduit and Fittings

2.6 WIREWAYS

MANUFACTURERS

- A. BLine
- B. General Electric
- C. Hoffman
- D. Keystone
- E. Square D

MATERIALS

- A. General Purpose Wireway: Square D Square Duct, Series LD.
- B. Oiltight, Dust Tight Wireway: Square D Type JIC, Series LL.
- C. Raintight Wireway: Square D lay in raintight, Series LDR.
- D. Raintight Troughs: Square D, Series RD.

- E. Wireway End Closures, Supports and Associated Fittings: Square D of best forms and dimensions for applications.

Part 3 - EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Drawings are approximate unless dimensioned. Verify with A/E the location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. Provide access doors where installation is inaccessible. Coordinate locations and sizes of required access doors with those specified in Division 25 - Mechanical.
- D. Locate and install to maintain headroom and to present a neat appearance.

3.2 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24-inch separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings. Provide blank plates for all junction boxes.
- D. Securely fasten boxes to the building structure using an approved bracket (i.e., "H" bracket), independent of the conduit, except for splice boxes that are connected to two metal conduits, both supported within 12 inches of box.
- E. Provide access to all boxes.
- F. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- G. Install boxes in walls without damaging wall insulation.
- H. Coordinate with A/E for mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- I. Set boxes installed in concealed locations flush with the finish surfaces, and provide with the proper type extension rings and/or covers where required.
- J. Position outlets to locate luminaires as shown on reflected ceiling plans.

- K. In inaccessible ceiling areas, do not install junction boxes which are accessible only through luminaire ceiling opening.
- L. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use adjustable steel channel fasteners for flush ceiling outlet boxes.
- M. Align wall-mounted outlet boxes for switches, thermostats, and similar devices. Install all grouped device locations neat and symmetrical. Coordinate with A/E before rough-in.
- N. Label junction boxes as to circuits located within and panelboards serving those circuits.

3.3 FLOOR BOX INSTALLATION

- A. Set boxes level and flush with finish flooring material.
- B. Seal as recommended by manufacturer.

3.4 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.
- C. Provide pull boxes in feeder circuits as required but at least every 150 feet in straight runs.
- D. Identify all junction boxes by circuit number on cover with legible permanent ink marker.
- E. Duct Bank Pull Boxes
 1. Where installed outside, set pull boxes level with above finish grade.
 2. Rate all pull boxes for H-20 heavy traffic. Concrete encase pull boxes.
 3. Stack pull boxes or provide extensions as required for routing of conduits as indicated on Drawings.
- F. Provide weatherproof pull boxes or junction boxes where installed outdoors with watertight gasketed covers fastened by means of corrosion resistant screws.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16 EMPTY RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install raceway systems including telephone, data, cable TV, and security.

1.2 SYSTEM DESCRIPTION

- A. Provide conduit and terminal boards required to form a system of raceways for pulling of cable at a later date.

1.3 SUBMITTALS

- A. Product Data: Data and cut sheets for materials.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Backboards: 3/4-inch, fire-retardant, exterior grade plywood.
 - 1. Provide minimum of two 4-foot by 8-foot sheet of plywood for each telephone location shown unless otherwise noted.
 - 2. Provide minimum of two 4-foot by 4-foot sheet of plywood for each data, cable TV, or security location shown unless otherwise noted.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide underground system service as shown on drawings. Verify exact system requirements for each vendor or utility.
- B. Provide pull boxes in conduit runs spaced not greater than 100 feet apart. Install no more than two right angle bends between junction boxes for all empty raceway systems.
- C. Place label on pull and junction boxes indicating system type.
- D. Conduit
 - 1. Provide minimum 3/4-inch conduit from each telephone outlet to ceiling plenum.
 - 2. Provide minimum 1" inch conduit from each data outlet to ceiling plenum.
 - 3. Provide minimum 1-1/4"-inch conduit from each cable TV outlet to ceiling plenum.

4. Provide minimum 3/4-inch conduit from each security device outlet to ceiling plenum.
 5. Provide No. 12 AWG insulated conductor or suitable steel pull wire or nylon cord in all conduits which are for future use or do not call for wire or cable to be installed.
 6. Refer to contract documents to verify quantity and size of cables to determine actual conduit size.
 7. Coordinate exact conduit requirements and sizes with low voltage and fire alarm installer prior to commencement of work.
- E. Provide two coats of light gray paint for each backboard. Verify finish with low voltage designer.
- F. Provide bushing on all conduit or raceway entrances.

END OF SECTION 26 05 33.16

SECTION 26 05 33.19 CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install raceway systems, including:
 - 1. Rigid metal conduit and fittings.
 - 2. Intermediate metal conduit and fittings.
 - 3. Electrical metallic tubing and fittings.
 - 4. Flexible metal conduit and fittings.
 - 5. Liquid-tight flexible metal conduit and fittings.
 - 6. Nonmetallic conduit and fittings.

1.2 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.
- C. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- D. NEMA RN 1 - PVC Externally-Coated Galvanized Rigid Steel Conduit and Electrical Metallic Tubing.
- E. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- F. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SUBMITTALS

- A. Product Data: Data and cut sheets for materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Rigid Metal Conduit, Intermediate Metal Conduit, Electrical Metallic Tubing and Fittings
 - 1. Allied Tube and Conduit Corporation.
 - 2. Triangle PWC, Inc.
 - 3. Wheatland Tube Co.
- B. Flexible Conduit and Fittings
 - 1. Anamet, Inc.
 - 2. Electri-Flex Co.
 - 3. Triangle PWC, Inc.

- C. Nonmetallic Conduit and Fittings
 - 1. Can-Tex Industries.
 - 2. Carlon.
 - 3. Certain-Teed.

2.2 MATERIALS

- A. Rigid Metal Conduit and Fittings
 - 1. Rigid Steel Conduit: ANSI C80.1; hot-dip galvanized.
 - 2. PVC Externally Coated Conduit: NEMA RN 1; rigid steel conduit with external PVC coating and internal galvanized surface.
 - 3. Fittings and Conduit Bodies: NEMA FB 1; threaded type, material to match conduit.
- B. Intermediate Metal Conduit (IMC) and Fittings
 - 1. Conduit: Hot-dipped galvanized steel.
 - 2. Fittings and Conduit Bodies: NEMA FB 1; use fittings and conduit bodies specified above for rigid steel conduit.
- C. Electrical Metallic Tubing (EMT) and Fittings
 - 1. EMT: ANSI C80.3; hot-dipped galvanized tubing.
 - 2. Fittings and Conduit Bodies: NEMA FB 1; steel set screw type.
- D. Flexible Metal Conduit and Fittings
 - 1. Conduit: Galvanized steel strips, spirally wound.
 - 2. Fittings and Conduit Bodies: NEMA FB 1.
- E. Liquid-tight Flexible Conduit and Fittings
 - 1. Conduit: Flexible metal conduit with PVC jacket and integral grounding conductor.
 - 2. Fittings and Conduit Bodies: NEMA FB 1; liquid-tight, zinc coated steel.
- F. Nonmetallic Conduit and Fittings
 - 1. Conduit: NEMA TC 2; Schedule 40 PVC.
 - 2. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Minimum size of conduit is 3/4-inch. Minimum size of homerun and feeder conduits is 3/4-inch. Indicated sizes are minimum based on THW copper wire and larger sizes may be used for convenience of wire pulling.
- B. Arrange conduit to maintain headroom and present a neat appearance.

- C. Conceal conduit in ceiling of all finished areas and in walls of all areas of the building. In unfinished areas without ceilings, conduit may be run exposed overhead. Install all conduit, including conduit above accessible ceiling, parallel or perpendicular to walls and adjacent piping. Neatly route conduit in a common rack where possible.
- D. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit securely to building structure using clamps, hangers and threaded rod.
- F. Refer to Section 26 05 29 for support of conduit.

3.2 GENERAL CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipecutter; de-burr cut ends before joining.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Install no more than the equivalent of three 90-degree bends between boxes.
- D. Use conduit bodies to make sharp changes in direction, as around beams.
- E. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point. Seal conduit which crosses a boundary between areas of extreme temperature difference.
- F. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- G. Drawings indicate intended circuiting and are not intended to be scaled for exact conduit location.
- H. Install conduit such that it does not interfere with fire-proofing of steel.
- I. Do not install conduit in floor slab of ground floor of building.

3.3 NONMETALLIC CONDUIT INSTALLATION

- A. Wipe nonmetallic conduit clean and dry before joining. Apply full even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

3.4 METALLIC CONDUIT INSTALLATION

- A. Make joints mechanically tight and all conduit electrically continuous.

- B. Use conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations. Use sealing locknuts and other approved techniques for moisture proofing raceway in wet areas.
- C. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.
- D. Install expansion joints where conduit crosses building expansion joints and at 150 foot intervals in straight runs.
- E. Provide fire-stop compound at all penetrations of floor slabs or fire walls such that fire rating integrity of barrier is not lessened.

3.5 UNDERGROUND DUCT BANK INSTALLATION

- A. Install top of duct bank minimum 24 inches below finished grade, unless indicated otherwise.
- B. Slope duct banks that extend beyond the building outside walls, downward 4 inches per 100 feet from point of origin inside of building to manholes or junction boxes outside the building.
- C. Terminate conduit in end bell at manhole entries.
- D. Stagger conduit joints.
- E. Use suitable separators and chairs installed 5 feet on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement.
- F. Provide minimum 3 inches red concrete cover at top and bottom and 3 inches concrete at sides of duct bank.
- G. Provide two No. 5 steel reinforcing bars at each corner and at 12 inches on center on top and sides of all duct banks and at 6 inches on center on the bottom. Provide No. 3 steel reinforcing stirrups at 5 feet on center. Provide 3" minimum clear spacing between ducts.

3.6 CONDUIT INSTALLATION SCHEDULE

- A. Exterior
 - 1. Exposed
 - a. Rigid metal conduit.
 - b. PVC coated rigid metal conduit at all concrete slab penetrations.
 - c. Liquid-tight flexible metal conduit for connection to vibrating equipment including motors, transformers and control devices.
 - 2. Underground
 - a. Rigid nonmetallic conduit for all branch circuits.
 - b. Rigid nonmetallic conduit for all feeders with concrete encasement as specified.
 - c. PVC coated rigid metal factory elbows for all bends and for concrete slab penetrations.

- B. Interior
 - 1. Exposed
 - a. Rigid metal conduit in areas subject to moisture, corrosive agents, physical abuse or in unconditioned spaces.
 - b. Electrical metallic tubing in areas not subject to moisture, corrosive agents or physical abuse.
 - 2. Concealed
 - a. Rigid metal conduit in areas subject to moisture or corrosive agents.
 - b. Electrical metallic tubing in areas not subject to moisture or corrosive agents.
 - 3. Connections to Equipment:
 - a. Liquid-tight flexible metal conduit in areas subject to moisture, high humidity, or corrosive agents.
 - b. Flexible metal conduit in dry, noncorrosive areas.
- C. Electrical nonmetallic tubing, flexible polyethylene or PVC tubing will not be acceptable for use on this project.
- D. BX cable will not be acceptable for use on this project.

END OF SECTION 26 05 33.19

SECTION 26 05 36 CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes cable tray.

1.2 REFERENCES

- A. NEMA VE 1 - Metallic Cable Tray Systems.
- B. NEMA VE 2 - Metallic Cable Tray Installation Guidelines.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate tray type, dimensions, support points, and finishes. Provide layout of proposed cable tray routing.
- B. Product Data: Submit fittings and accessories.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.
- D. Project Record Documents: Record actual routing of cable tray and locations of supports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum three years documented experience.

1.5 PRE-INSTALLATION MEETING

- A. Convene minimum one week prior to commencing Work of this Section.

PART 2 - PRODUCTS

2.1 METAL LADDER-TYPE CABLE TRAY

- A. Manufacturers:
 - 1. Chatsworth Products, Inc.
 - 2. B-Line.
 - 3. PW.
 - 4. Thomas & Betts.
- B. Product Description: NEMA VE 1, Class 20C ladder type tray.

- C. Material: Steel, Stainless Steel (Mesh).
- D. Inside Width: Minimum 24".
- E. Inside Depth: Minimum 4 inches (152 mm).
- F. Straight Section Rung Spacing: 6 inches (152 mm) on center.
- G. Inside Radius of Fittings: 36 inches (914 mm).
- H. Provide manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.
- I. Covers: None.

2.2 WARNING SIGNS

- A. Engraved Nameplates: 1/2-inch (13-mm) black letters on yellow laminated plastic nameplate, engraved with the following wording:

**WARNING! DO NOT USE CABLE TRAY AS WALKWAY,
LADDER, OR SUPPORT. USE ONLY AS MECHANICAL
SUPPORT FOR CABLES AND TUBING!**

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install metal cable tray in accordance with NEMA VE 2.
- B. Install fiberglass cable tray in accordance with NEMA FG 1.
- C. Support trays and fasten to structure and finishes in accordance with Section 16050. Provide supports at each connection point, at the end of each run, and at other points to maintain spacing between supports of 20 foot (609 m) maximum.
- D. Contractor shall provide and install the necessary quantity and size of CADDY Fastener "CableCAT" hangers and support hardware necessary for routing all station cable bundles outside of cable tray systems.
- E. There shall be at a minimum one "CableCAT" hanger every 4 to 5 feet.
- F. Cable dressings will be required every two(2) to three(3) feet. Cables will be secured with Velcro type wrap. **Plastic tie/wire wraps are not permitted.**
- G. Use expansion connectors where required.
- H. Provide fire-stopping to sustain ratings when passing cable tray through fire-rated elements.

- I. Ground and bond metal cable tray under provisions of Section 26 05 26.
 - 1. Provide continuity between tray components.
 - 2. Use anti-oxidant compound to prepare aluminum contact surfaces before assembly.
 - 3. Connections to tray may be made using mechanical, compression or exothermic connectors.
 - 4. Cable tray to be bonded in accordance with Article 318, NFPA 70.

- J. Install warning signs at 50 feet (1,500 m) centers along cable tray, located to be visible.

- K. Provide curve and tee fittings for bends and transitions from manufacturer. Cable tray is not allowed to be cut and re-attached.

END OF SECTION 26 05 36

OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Documents, General Requirements for Building Construction and Related Work, apply to work specified in this section.

1.2 SCOPE

- A. Scope: This Section covers the furnishing of an electrical short circuit and overcurrent protective device coordination study and an arc flash hazard analysis for the building electrical system required under this construction contract.

1.3 SUBMITTALS

- A. Conform to the requirements of Section 01 33 31, "Submittal Procedures for Electrical".
 - 1. In addition to the requirements of Section 01 33 31, the short circuit and protection coordination studies shall be bound in 8-1/2-inch by 11-inch hard cover bound volumes with drawings and diagrams folded to fit the 8-1/2 by 11-inch format and securely retained in pockets or compartments of the rigid binder.
 - 2. Six (6) copies of the study shall be submitted.
 - 3. The study shall include the complete low voltage distribution system.
- B. Provide, for each section of the study, an identification and description of the industry testing standards on which the study is based.

1.4 STUDY REQUIREMENTS

- A. The fault study shall include the utility power company's available fault current of 85,900 amps, RMS symmetrical or as indicated on drawings.
- B. Provide calculations, impedance diagrams, conclusions and recommendations as part of the general content of the study.
- C. Provide short circuit tabulations, which include the system impedances, X/R ratio, asymmetry factor, KVA, symmetrical and asymmetrical fault currents.
- D. Provide each study with the following items as a minimum.
 - 1. Provide coordination plots which graphically indicate the coordination proposed for the several systems. Provide plots centered on full scale log-log forms.

2. Provide coordination plots with complete titles, representative one-line diagrams and legends, associated power company's system characteristics, significant motor starting characteristics, complete parameters for power, complete operating bands for switchboard circuit breaker trip devices, fuses, if applicable, and the associated system load protective devices.
 3. Provide coordination plots which define the types of protective devices selected, together with the proposed coil taps, time dial settings and pick-up settings required.
 4. The long time region of the coordination plots shall indicate a complete tap scale for each relay and full load current transformer parameters and designate the pick-ups required for low voltage circuit breakers.
 5. The short time region shall indicate the low voltage circuit breaker, short time and instantaneous trip devices, fuse manufacturing tolerance bands, when applicable, and significant symmetrical and asymmetrical fault currents.
 6. The study shall include coordination down to and including a 20 ampere, 277 volt lighting circuit breaker.
- E. Coordinate each item of equipment as follows:
1. Separate low voltage power circuit breakers from each other by a 16 percent current margin for coordination and protection in the event of secondary line-to-line faults.
 2. The protective device characteristics or operating band shall be suitably terminated to reflect the actual symmetrical and asymmetrical fault currents sensed by the device.
 3. Prepare the study with a network analyzer, computer or by written calculations. Include complete fault calculations as specified above for each proposed and ultimate source combination.
 4. Source combinations include proposed and future, large motors, or generators.
- F. The system studies shall be prepared by the manufacturer of the, switchgear or equipment for the incoming service to the building.
- G. The drawings and specifications indicate the general requirements for the motors, motor starter equipment, and low voltage equipment. Determine additional specific characteristics of equipment furnished in accordance with the results of the short circuit and protective device coordination study.
1. Submit any equipment design discrepancies and the proposed corrective modifications, if required, with the short circuit and protective device coordination study. Identify any variations clearly on the subsequent shop drawings.
 2. Provide the necessary equipment, overcurrent devices, field settings, adjustments and minor modifications for conformance with the approved short circuit and protective device coordination study, without additional expense.
 3. Do not submit equipment shop drawings until the short circuit and protective device coordination study has been approved.
- H. Prepare a tabulation of the arc flash hazard values at equipment required by NFPA 70, Article 110-16.

PART 2- PRODUCTS

Not Used.

PART 3- EXECUTION

Not Used.

END OF SECTION 26 05 73

SECTION 26 08 00 COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Test electrical systems and equipment.
- B. These tests are required to determine that the equipment involved may be safely energized and operated.
- C. Perform tests by and under the supervision of fully experienced and qualified personnel. Advise each respective manufacturer's representative of tests on their equipment.
- D. Record all test data.
- E. Each section of Division 16 that has products or systems listed herein incorporate this section by reference and is incomplete without the required tests stated herein.

1.2 REFERENCES

- A. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Submit test report forms for review a minimum of 90 days prior to requesting a final review by A/E.
- B. Furnish six individually bound copies of test data. Neatly type and arrange data. Include with the data the date tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken, both prior to and after any corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation.
- C. A/E will retain one copy. Remaining copies will be returned to Contractor for inclusion in the operation and maintenance manuals.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Furnish proposed test procedures, recording forms, list of personnel and test equipment for A/E review.
- B. Follow recommended procedures for testing as published by test equipment manufacturer.

3.2 WIRE AND CABLE

- A. Test insulation resistance of each main feeder and service after the installation is complete but before the connection is made to its source and point of termination.
- B. Test insulation resistance using Biddle Megger or equivalent test instrument at a voltage not less than 1,000 volts DC. Measure resistance from phase-to-phase and phase-to-ground. In circuits where insulation test value is lower than 1 megohm, remove and replace conductor and retest.
- C. Visually inspect connections of every branch circuit for tightness.
- D. Insure that grounding conductor is electrically continuous.
- E. Test branch circuits against grounds, shorts or other faults.
- F. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- G. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment.
- H. Test the system for stray currents, ground shorts, etc. If stray currents, shorts, etc., are detected, eliminate or correct as required.

3.3 WIRING DEVICES

- A. Operate switches at least twice.
- B. Test every convenience outlet with plug-in device for proper phasing and grounding.
- C. Demonstrate operation of lighting circuits and lighting control systems.

3.4 ELECTRICAL SWITCHGEAR

- A. Before Energization:
 - 1. Visually inspect connections for tightness and correctness.
 - 2. Verify proper fusing.

- B. After Energization:
 - 1. Verify proper voltage with system operating at load conditions.
 - 2. Verify proper operation.
 - 3. Operate every circuit breaker, switch and contactor.
 - 4. Modify tap settings on transformers as required.
 - 5. Measure line amperes with system operating at load conditions.
 - 6. Modify circuit breaker and relay settings as required.
 - 7. Megger meter centers for opens, shorts and grounds.
 - 8. Thermographic Tests:
 - a. With system operating at load conditions, perform thermographic test on switchgear, bus duct, control centers, distribution panelboards, lighting panelboards and equipment feeders using an infrared temperature scanning unit. Provide thermograph tests performed by General Electric Instrumentation Division.
 - b. Tighten or correct connections with higher temperatures than acceptable. After corrections have been made, perform thermograph test to confirm that problems have been corrected.

- C. Operate all equipment and control systems through intended sequence. Record all data pertaining to system operation.
 - 1. Contactors.
 - 2. Starters.
 - 3. Electrically operated circuit breakers.
 - 4. Measure noise level 3 feet from mechanical room where variable frequency drive starters are installed.
 - 5. Perform motor control center mechanical operator tests in accordance with manufacturer's instructions.
 - 6. Exercise each starter through entire operating sequence. Demonstrate that protective features such as phase failure, under-voltage and phase reversal are properly operating.
 - 7. Rotating Equipment:
 - a. Verify proper voltage and phasing.
 - b. Modify phasing as required for proper rotation.
 - c. Measure line amperes (starting and running) and rpm.
 - d. Demonstrate running of motors and operation of controls and interlocks.

3.5 GROUND FAULT

- A. Factory test switchboards at the manufacturer's factory prior to shipment as specified herein:
 - 1. Furnish a ground fault protection system test for circuit testing and verification of the tripping of the ground fault relays at the factory location. Pass predetermined values of current through the relay sensors and measure the relay tripping time for each phase and the neutral sensor (if one is required). Compare the measured time-current relationships to the tri-characteristic curves for each relay. If the relay trips outside the range of values indicated on the curve, replace or recalibrate the relays. Include a polarity verification of the interconnection of the ground sensor circuits as a part of the test.
 - 2. Have the proper voltages applied to their circuits and satisfactory operation demonstrated for additional auxiliary, pilot, control relays, electrically operated breakers, shunt-trip operated breakers, switches, etc.
 - 3. Furnish in accordance with NFPA 70 Section 230-95(c), test results certified by the switchboard manufacturer. One reviewed copy to be available at the job site for review by the authorities having jurisdiction.
 - 4. Upon completion of the factory ground fault protection system tests, the current and time adjustment on each relay are to be set on their minimum values.

- B. After construction work is complete and prior to energizing switchboards, field test ground fault protection system; provide reset to manufacturer's recommended setting for both current and time by General Electric Engineering and Service.
 - 1. The test procedure is to be similar to that specified for the factory test.
 - 2. Notify A/E in writing at least two weeks prior to the day of the field test. A/E may witness the field test if he so desires.
 - 3. Furnish all field test results certified by the testing company listed hereinbefore.

3.6 SECONDARY GROUNDING

- A. Test service entrance ground resistance.
- B. Provide additional made-electrodes if resistance is more than 3 ohms.
- C. Test grounding system resistance within building at a minimum of ten locations.

3.7 SOUND SYSTEM

- A. Test the system to determine that it is free from grounds, open and short circuits.
- B. Verify output volume meets Owner's requirements.

3.8 SOUND/CLOCK PROGRAM SYSTEM

- A. Test the system to determine that it is free from grounds, open and short circuits.
- B. Verify output volume meets Owner's requirements.
- C. Verify slave clocks respond to master controls.

3.9 FIRE ALARM SYSTEM

- A. Test system in accordance with manufacturer's recommendations in presence of manufacturer's and Owner's representatives:
 - 1. Operate initiating devices.
 - 2. Assure indicating devices operation.
 - 3. Assure system functions.
 - 4. Assure system interfaces with other systems.
- B. Test the system to determine that it is free from grounds, open and short circuits.

END OF SECTION 26 08 00

SECTION 260923 LIGHTING CONTROL DEVICES

PART 1 - GENERAL

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.
2. SUMMARY
 - a. Section Includes:
 1. Time switches.
 2. Photoelectric switches.
 3. Standalone daylight-harvesting switching controls.
 4. Indoor occupancy sensors.
 5. Outdoor motion sensors.
 6. Lighting contactors.
 7. Emergency shunt relays.
 - b. Related Requirements:
 1. Division 26 Section "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.
3. ACTION SUBMITTALS
 - a. Product Data: For each type of product.
 - b. Shop Drawings: Show installation details for occupancy and light-level sensors.
 1. Interconnection diagrams showing field-installed wiring.
 2. Include diagrams for power, signal, and control wiring.
 3. Shop drawings to reflect the overall coverages and sensor locations for all occupancy and daylight controls.
4. INFORMATIONAL SUBMITTALS
 - a. Field quality-control reports.

5. CLOSEOUT SUBMITTALS

- a. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

1. TIME SWITCHES

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Intermatic, Inc.
 - 2. Invensys Controls.
 - 3. Leviton
- b. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Contact Configuration: SPST.
 - 3. Contact Rating: 30-A inductive or resistive, 240-V ac
 - 4. Programs: 2 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
 - 5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
 - 6. Astronomic Time: All Selected channels.
 - 7. Automatic daylight savings time changeover.
 - 8. Digital LCD display.
 - 9. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.
- c. Electromechanical-Dial Time Switches: Comply with UL 917.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Contact Configuration: SPST.
 - 3. Contact Rating: 30-A inductive or resistive, 240-V ac
 - 4. Circuitry: Allows connection of a photoelectric relay as a substitute for the on-off function of a program.
 - 5. Astronomic time dial.
 - 6. Eight-Day Program: Uniquely programmable for each weekday and holidays.
 - 7. Skip-a-day mode.
 - 8. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2. OUTDOOR PHOTOELECTRIC SWITCHES

- a. Manufacturers: Subject to compliance with requirements, provide products by the following:
Hubbell Building Automations
 1. Invensys Controls.
 2. Leviton
 3. Lutron
 4. Sensor Switch

- b. Basis-of-Design Product: Subject to compliance with requirements, provide WattStopper or comparable product by one of the following:
 1. Cooper Industries, Inc.
 2. Intermatic, Inc.
 3. NSi Industries LLC; TORK Products.
 4. Tyco Electronics; ALR Brand.
 5. Sensor Switch

- c. Description: Solid state, with SPST dry contacts rated for 1800-VA to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
 3. Time Delay: Fifteen second minimum, to prevent false operation.
 4. Surge Protection: Metal-oxide varistor.
 5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

- d. Description: Solid state, with SPST dry contacts rated for 1800 VA, to operate connected load, complying with UL 773.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range.
 3. Time Delay: Thirty-second minimum, to prevent false operation.
 4. Lightning Arrester: Air-gap type.
 5. Mounting: Twist lock complying with NEMA C136.10, with base.

3. DAYLIGHT-HARVESTING SWITCHING CONTROLS

- a. Manufacturers: "Basis-of-Design Product": Subject to compliance with requirements, provide products by Phillips SpaceWise or comparable products approved by Port of Houston.

1. Cooper Industries, Inc.
 2. Eaton Corporation.
 3. Hubbell Building Automation, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lithonia Lighting; Acuity Lighting Group, Inc.
 6. NSi Industries LLC; TORK Products.
 7. Sensor Switch, Inc.
 8. Tyco Electronics; ALR Brand.
- b. Ceiling-Mounted Switching Controls: Solid-state, light-level sensor unit, with separate power pack mounted on luminaire, to detect changes in indoor lighting levels that are perceived by the eye.
- c. Electrical Components, Devices, and Accessories:
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120°F (0 to 49°C).
 3. Sensor Output: Contacts rated to operate the associated power pack, complying with UL 773A. Sensor is powered by the power pack.
 4. Power Pack: Dry contacts rated for 20 -A ballast load at 120- and 277-V ac, for 13 -A tungsten at 120-V ac, and for 1 HP at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 5. General Space Sensors Light-Level Monitoring Range: 10 to 200 fc (108 to 2152 lux), with an adjustment for turn-on and turn-off levels within that range.
 6. Atrium Space Sensors Light-Level Monitoring Range: 100 to 1000 fc (1080 to 10 800 lux), with an adjustment for turn-on and turn-off levels within that range.
 7. Skylight Sensors Light-Level Monitoring Range: 1000 to 10,000 fc (10 800 to 108 000 lux), with an adjustment for turn-on and turn-off levels within that range.
 8. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling.
 9. Set-Point Adjustment: Equip with deadband adjustment of 25, 50, and 75 percent above the "on" set point, or provide with separate adjustable "on" and "off" set points.
 10. Test Mode: User selectable, overriding programmed time delay to allow settings check.
 11. Control Load Status: User selectable to confirm that load wiring is correct.
 12. Indicator: Two digital displays to indicate the beginning of on-off cycles.
4. DAYLIGHT-HARVESTING DIMMING CONTROLS
- a. Manufacturers: "Basis-of-Design Product": Subject to compliance with requirements, provide products by Phillips SpaceWise or comparable products approved by Port of Houston.
1. Cooper Industries, Inc.
 2. Hubbell Building Automation, Inc.
 3. Leviton Mfg. Company Inc.
 4. Lithonia Lighting; Acuity Lighting Group, Inc.

- b. System Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, the lights are dimmed.
 - 1. Lighting control set point is based on two lighting conditions:
 - a. When no daylight is present (target level).
 - b. When significant daylight is present.
 - 2. System programming is done with two hand-held, remote-control tools.
 - a. Initial setup tool.
 - b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.
 - c. Ceiling-Mounted Dimming Photo-Sensor: Dimming control module with onboard controls, light-level sensor unit, to detect indoor lighting levels. Device shall be compatible with LED fixtures with 0-10V Dimming Ballast.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Sensor Output: 0- to 10-V dc to operate electronic dimming ballasts. Sensor is powered by nearby connected dimmable ballast.
 - 3. Blue enhance photodiode
 - 4. Light-Level Sensor Set-Point Adjustment Range: 10 to 140 fc
 - 5. UL 94HB flame retardant housing
 - 6. Housing shall not exceed 2.5" diameter base and 2" height.
 - 7. Device shall have a minimum five-year warranty.
 - d. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with separate controller unit, to detect changes in lighting levels that are perceived by the eye.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Sensor Output: 0- to 10-V dc to operate electronic dimming ballasts. Sensor is powered by controller unit.
 - 3. Power Pack: Sensor has 24-V dc, Class 2 power source, as defined by NFPA 70.
 - 4. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc (120 to 640 lux).
5. INDOOR OCCUPANCY SENSORS
- a. Manufacturers: Basis-of-Design Product: Subject to compliance with requirements, provide product Phillips SpaceWise; product name or designation or comparable product by one of the following.
 - 1. Bryant Electric; a Hubbell company.
 - 2. Cooper Industries, Inc.
 - 3. Hubbell Building Automation, Inc.
 - 4. Leviton Mfg. Company Inc.
 - 5. Lightolier Controls.
 - 6. Lithonia Lighting; Acuity Lighting Group, Inc.
 - 7. Lutron Electronics Co., Inc.

8. NSi Industries LLC; TORK Products.
 9. RAB Lighting.
 10. Sensor Switch, Inc.
 11. Square D; a brand of Schneider Electric.
- b. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
 4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
 7. Bypass Switch: Override the "on" function in case of sensor failure.
 8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.
- c. PIR Type: Ceiling mounted; detect occupants in coverage area by their heat and movement.
1. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm).
 2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
 3. Detection Coverage (Corridor): Detect occupancy within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling.
- d. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.
1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
 2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. (56 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
 4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. (186 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
 5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling in a corridor not wider than 14 feet (4.3 m).
- e. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
6. SWITCHBOX-MOUNTED OCCUPANCY SENSORS
- a. Manufacturers: Basis-of-Design Product: Subject to compliance with requirements, provide product Watt Stopper; product name or designation or comparable product by one of the following.
1. Bryant Electric; a Hubbell company.
 2. Cooper Industries, Inc.
 3. Hubbell Building Automation, Inc.
 4. Leviton Mfg. Company Inc.
 5. Lightolier Controls.
 6. Lithonia Lighting; Acuity Lighting Group, Inc.
 7. Lutron Electronics Co., Inc.
 8. NSi Industries LLC; TORK Products.
 9. RAB Lighting.
 10. Sensor Switch, Inc.
 11. Square D; a brand of Schneider Electric.
 12. Watt Stopper
- b. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked or intended location and application, and shall comply with California Title 24.
 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120°F (0 to 49°C).

3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.
 4. Sensor must also be compliant with LED fixtures.
- c. Wall-Switch Sensor Tag WS1:
1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m).
 2. Sensing Technology: Dual technology - PIR and ultrasonic.
 3. Switch Type: SP. SP, dual circuit. SP, manual "on," automatic "off."
 4. Voltage: 277 V; passive-infrared type.
 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc (108 to 1600 lux). The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
 8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
- d. Wall-Switch Sensor Tag WS2:
1. Standard Range: 210-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).
 2. Sensing Technology: PIR.
 3. Switch Type: SP, dual circuit.
 4. Voltage: 277 V dual-technology] type.
 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc (108 to 1600 lux). The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
 8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
7. EMERGENCY SHUNT RELAY
- a. Manufacturers: Basis-of-Design Product: Subject to compliance with requirements, provide product Watt Stopper "ELCU-200"; product name or designation or comparable product by one of the following.
 1. Lighting Control and Design; Acuity Lighting Group, Inc.
 2. Watt Stopper.
 - b. Unit shall be provided with pushbutton test switch and LED indicator light.
 - c. Housing shall be fire rated V-0, 176°F (80°C)
 - d. Unit shall also be approved to be wired as a bypass device.
 - e. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.

1. Coil Rating: 277 V.

8. CONDUCTORS AND CABLES

- a. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- b. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- c. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

1. GENERAL INSTALLATION

- a. The basis of design shall be subject in compliance with on-board wireless controls, provide Philips "SpaceWise" systems or a comparable equal.
- b. In the event that the on-board lighting controls does not meet the proposed budget, individual space base controls (ceiling mounted or wall mounted), shall be installed in each space to meet the observed energy code requirements. Contractor will be responsible for coordinating the proper layout with the selected lighting rep to provide shop drawings for approval prior to ordering any device.
- c. Stand alone or panel based daylight sensors shall be installed in spaces to meet the observed energy code. Provide all relays, panels, and devices to ensure a complete fully functioning system.

2. SENSOR INSTALLATION

- a. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- b. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3. CONTACTOR INSTALLATION

- a. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

4. WIRING INSTALLATION

- a. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).
- b. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- c. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- d. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

5. IDENTIFICATION

- a. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- b. Label time switches and contactors with a unique designation.

6. FIELD QUALITY CONTROL

- a. Testing Agency: Owner will engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- b. Manufacturer's Field Service: Engage a factory-authorized service representative to program, test and inspect components, assemblies, and equipment installations, including connections.
- c. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- d. Lighting control devices will be considered defective if they do not pass tests and inspections.
- e. Prepare test and inspection reports.

7. ADJUSTING

- a. Occupancy Adjustments: When requested within 18 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
 - 2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
 - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

8. DEMONSTRATION

- a. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Division 26 Section "Network Lighting Controls."
- b. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 09 23

SECTION 26 24 16 PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install distribution, lighting and appliance branch circuit panelboards.

1.2 REFERENCES

- A. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

1.3 SUBMITTALS

- A. Include outline and support point dimensions, NEMA enclosure type, voltage, main bus ampacity and material, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.4 SPARE PARTS

- A. Keys: Furnish two keys to Owner for each panelboard, all keyed alike.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design product: Subject to compliance with requirements, provide Siemens or a comparable product by one of the following:
 - 1. Square D
 - 2. General Electric
 - 3. Siemens

2.2 GENERAL

- A. Conform to UL standards and bear UL label. Form cabinets from code gauge galvanized steel. Form fronts of code gauge cold rolled steel bonderized after fabrication.
- B. Provide cabinet fronts with concealed hinges, concealed adjustment means, door-in-door type construction and master keyed flush lock. Finish front in manufacturer's standard gray enamel. Door-in-door shall allow for the interior of the panel to be accessed without the removal of any screws or bolts.
- C. Provide with main lugs and breakers or fuses as scheduled on the drawings. Provide main lug connection to accommodate T & B compression connector on end of cable. Attach connector to panel bus with two bolts per lug. Provide

captive type bolts or studs to facilitate reinstallation of the lugs with the wire attached.

- D. Provide all panelboards with copper bus of the ratings scheduled and designed for all indicated devices and spaces, complete with taps and trim.
- E. Provide panelboards, designated with "NL" on Drawings, UL listed for nonlinear loads, bearing UL label, and neutral bar rated at 200 percent of phase buses.
- F. Minimum integrated short circuit rating 10,000 amps RMS symmetrical for 240 volt panelboards; 14,000 amperes RMS symmetrical for 480 volt panelboards or as shown on the drawings. Integrated ratings may be based on tested series ratings in conjunction with feeder breaker actually used.
- G. Size bus bars to limit the temperature rise within the panelboard to 50 degrees C over a 40 degrees C ambient temperature.
- H. Provide adequate space and provisions for wire No. 6 AWG and larger conductors to terminate with compression type connector to main lugs.
- I. Connect all two-section panelboards with copper cable of an ampacity greater than the main bus ampacity.
- J. Provide 200% separate neutral and additional isolated ground for all low voltage 120/208 panels feed from K-13 transformers

2.3 DISTRIBUTION PANELBOARDS (1200 AMPS AND SMALLER)

- A. Enclosure: Type 1, unless scheduled otherwise.
- B. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.
- C. Provide plated copper grounding bus.
- D. Provide integral ground fault protection on each main device, rated 277/480 volts, 1,000 amps or larger.
- E. Provide 100% rated main breaker for all panels 600A and above.

2.4 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: Circuit breaker type.
- B. Enclosure: Type 1; unless indicated otherwise.

- C. Provide insulated neutral bus and separate copper grounding bus bonded to enclosure.
- D. Molded Case Circuit Breakers: Bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled.
- E. Sequence phase all adjacent breakers. All circuit breaker connection straps shall be rated at 100 amperes minimum.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards plumb surface or flush mount as scheduled, in conformance with NEMA PB 1.1. Mount securely to walls or structural spaces. Mount floor mounted panelboards on 4 inch housekeeping pads.
- B. Height: Install wall mounted panelboards at 6 feet to the top of the enclosure.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide GFCI rated breakers for all refrigerator and upright appliances in the breakroom.
- E. Provide typewritten circuit directory for each branch circuit panelboard mounted in permanent, clear Lexan card holder located on inside of door. Prepare directories only after permanent room numbers have been assigned. Do not use room numbers shown on construction drawings. Identify each circuit with type of load and room number or location.
- F. Stub three empty 1 inch conduits to accessible location above ceiling out of each recessed panelboard.
- G. Provide a minimum of four(4) 20A spare breaker in each panel or in one panel of a multiple panel section.
- H. Arrange branch circuit connections in three phase lighting and appliance panelboards such that when two or three circuits are run with a common neutral, each circuit is connected to a different phase.
- I. Distribute loading on circuits in panelboards to balance the load as evenly as possible in each phase.
- J. Provide and install a laminated copy of the load classification, that will indicate the connected and demand loads, in the bottom interior face of each panel.
- K. Terminate only one conductor under each lug of branch circuit breakers.

- L. Do not make splices or taps in panelboard gutters.

3.2 FIELD QUALITY CONTROL

- A. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION 26 24 16

SECTION 26 27 26.13 WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install specification grade wiring devices, including:
 - 1. Wall switches.
 - 2. Wall dimmers.
 - 3. Receptacles.
 - 4. Floor mounted service fittings.
 - 5. Occupant sensors.
 - 6. Device plates and box covers.

1.2 REFERENCES

- A. NEMA WD 2 - Semiconductor Dimmers for Incandescent Lamps.

1.3 SUBMITTALS

- A. Provide data sheets to include all device specifics.
- B. Furnish samples upon request of A/E.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Switches and Receptacles
 - 1. Hubbell.
 - 2. Leviton.
- B. Dimmers
 - 1. Leviton.
 - 2. Lutron.
- C. Cover Plates: Match device manufacturer.
- D. Floor Mounted Service Fittings
 - 1. Hubbell.
 - 2. RCI.
 - 3. Square D.
 - 4. Walker.
- E. Occupant Sensors

1. Hubbell.
2. Leviton.
3. Pass & Seymour

2.2 DEVICE COLOR

- A. Coordinate color selection with Architect during submittal phase.

2.3 SWITCHES

- A. 20A, 120-277V Single Pole: "1221", Hubbell.
- B. 20A, 120-277V Double Pole: "1222", Hubbell.
- C. 20A, 120-277V Three Way: "1223", Hubbell.
- D. 20A, 120-277V Four Way: "1224", Hubbell.
- E. 20A, 277V Single Pole with Pilot Light: "1221PL", Hubbell.
- F. 20A, 120-277V Single Pole, locking type: "1221L", Hubbell.

2.4 MOTOR RATED SWITCHES

- A. All motor rated switches shall be toggle type, provided with NEMA Rated enclosure, (NEMA 4 for exterior).
- B. Switches shall have a minimum 5 year warranty.
- C. Quiet switch, Industrial Grade, back and side wire.
- D. Provide with pole configuration to match the device load to be served. Refer to manufacturer device cut sheet prior to submittal.
- E. Voltage Rating shall be 600VAC
- F. Provide with black or red color with pilot light for all VAV and terminal units, mounted above the ceiling.

2.5 DIMMERS

- A. Rated for LED(0-10V) with toggle/pushbutton with 120/277V.
- B. 1500 watts minimum rating; larger size as necessary to accommodate load shown on contract drawings. Fully rated, gangable without breaking off cooling fins.

2.6 RECEPTACLES

- A. 15A, 125V, 2P3W Clock: NEMA 5-15R; "5235", Hubbell.
- B. 20A, 125V, 2P3W Duplex: Tamper resistant, NEMA 5-20R; "SC63H", Hubbell.
- C. 20A, 125V, 2P3W Simplex: NEMA 5-20R; "5361", Hubbell.
- D. 20A, 125V, 2P3W Duplex: NEMA 5-20R; "5362", Hubbell.

- E. 20A, 125V, 2P3W Duplex Ground Fault Interrupting: NEMA 5-20R; "GF5362", Hubbell.
- F. 20A, 125V, 2P3W Duplex Isolated Ground: NEMA IG5-20R; "IG5362", Hubbell.
- G. 20A, 125V, 2P3W Duplex Surge Suppression with Light and Alarm: NEMA 5-20R; "5352S", Hubbell.
- H. 20A, 125V, 2P3W Duplex Surge Suppression, Isolated Ground with Light and Alarm: NEMA IG5-20R; "IG5352S", Hubbell.
- I. 20A, 125V, 2P3W Duplex Hospital Grade: NEMA 5-20R; "8300", Hubbell.
- J. 20A, 125V, 2P3W Duplex Hospital Grade, Ground Fault Interrupting: NEMA 5-20R; "GF8300", Hubbell.
- K. 20A, 125V, 2P3W Duplex Hospital Grade, Isolated Ground: NEMA IG5-20R; "IG8300", Hubbell.
- L. 20A, 250V, 2P3W Simplex: NEMA 6-20R; "5461", Hubbell.
- M. 30A, 125V, 2P3W Simplex: NEMA 5-30R; "9308", Hubbell.
- N. 30A, 250V, 2P3W Simplex: NEMA 6-30R; "9330", Hubbell.
- O. 50A, 125V, 2P3W Simplex: NEMA 5-50R; "9360", Hubbell.
- P. 50A, 250V, 2P3W Simplex: NEMA 6-50R; "9367", Hubbell.
- Q. 20A, 125V, Duplex USB Receptacle with two USB ports for a minimum 3.6 amps of power. Leviton T5832, Topgreener TU-2204A, or approved equal.
- R. Heat trace or other loads continuously plugged in outdoors. Provide Crouse-Hinds WRLD-1 cover. Install round plug on cord supplied with heat trace or other equipment to match weatherproof bushing on receptacle cover.

2.7 OCCUPANT SENSORS

- A. Self-Contained
 1. Leviton 6775.
 2. Single gang, gangable device designed to fit behind a standard decorator switch plate.
 3. Infrared detector behind a fresnel lens.
 4. Detection Range
 - a. 2700 square feet field of view.
 - b. 180-degree sensing field.
 - c. 40 foot sensing distance.
 5. Adjustable Time-Out Delay: 30 seconds - 30 minutes.
 6. Adjustable Ambient Override: 4 foot candles to full daylight.
- B. Network

1. Sensor.
 - a. Leviton 6778.
 - b. Self-mounting, ceiling bracket.
 - c. Infrared detector behind a fresnel lens.
 - d. Detection Range
 - 1) 8 to 14 micrometer frequency spectrum of bodily emitted infrared radiation.
 - 2) 110-degree sensing field over 400 gross square feet.
 - e. Time Delay: 30 seconds - 30 minutes.
2. Control Unit
 - a. Leviton 6779.
 - b. Enclosure: Galvanized, heavy duty for mounting to a 4 inch or 4-1 1/16 inch square box.
 - c. Control up to five sensors.
 - d. Power Rating
 - 1) 2400 watts fluorescent at 120 volts.
 - 2) 4800 watts fluorescent at 277 volts.
3. Auxiliary Relays for Additional Load
 - a. 120 Volt: Leviton 6783-120.
 - b. 277 Volt: Leviton 6783-277.

2.8 FLOOR MOUNTED SERVICE FITTINGS

- A. Recessed Fittings (In Grade)
 1. Floor Box Outlet
 - a. Provide Legrand Evolution 6 Series.
 - b. Two(2) 20A duplex receptacles.
 - c. Minimum two(2) data outlets at each location.
 - d. Coordinate final finish with architectural drawings. Cover finishes shall match the surface(carpet, slab, etc.) where installed.
- B. Flush Floor Fittings (On Grade)
 1. Duplex Receptacle
 - a. 20A, 125V, 2P3W, NEMA 5-20R: "5362", Hubbell.
 - b. Brass cover with flaps: "S-3925", Hubbell.
 - c. 4-inch square, fully adjustable box with round ring: "B-2529", Hubbell.
 2. Data Outlet
 - a. Brass cover with 1-inch and 2-1/8-inch plugs: "S-2725", Hubbell.
 - b. 4-inch round, fully adjustable box with round ring: "B-2529", Hubbell.

2.9 COVER PLATES

- A. Provide one piece cover plates for all group mounted devices.
- B. Provide satin smooth stainless steel of the same manufacturer and color as the device.

- C. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device covers.
- D. Exposed Box Cover Plate: Stamped steel handy box covers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install receptacles and switches only in electrical boxes which are clean and free from excess building materials, debris, etc.
- B. Install wall switches with OFF position down.
- C. Where switches and other devices are mounted at one location, provide single coverplate to cover all devices.
- D. Align the tops of all group mounted devices. Install plumb and aligned in the plane of the wall.
- E. Derate ganged dimmers as instructed by manufacturer; do not use common neutral.
- F. Install convenience receptacles in vertical position with grounding pole on bottom unless otherwise noted.
- G. Provide ground fault circuit interrupting type devices in all locations requiring weatherproof devices. Where located near water outlets or sinks.
- H. Do not use feed through feature for ground fault interrupting devices. Install GFI device at each location. GFI circuit breaker will not be acceptable.
- I. Install plates on all devices and blank outlets in finished areas. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlets in unfinished areas.
- K. Install galvanized steel plates on outlet boxes and junction boxes above accessible ceilings.
- L. Provide a minimum of two(2) spare devices for each usb receptacle, lighting occupancy sensors (all types), and photo sensors.
- M. All switches shall be decorative pushbutton or rocker type.
- N. There shall be an aesthetic uniformity for all the light switches, and receptacles.
- O. Mounting Heights:
 - 1. Refer to drawing cover sheet or contact A/E.

2. Convenience Receptacles Above Counter or Backsplash: 6 inches above counter or backsplash in horizontal position.
 3. Receptacles for Water Coolers: Mount directly behind water cooler to eliminate visibility of cord and attachment plug. Coordinate elevation with the cooler to be installed prior to installation of box.
 4. Install devices in mill work as shown in details and elevations or as directed by A/E.
- P. Electrical Water Coolers:
1. Provide GFI receptacles for all electrical water coolers. Coordinate exact power connections and requirements with plumbing plans. Provide connection to 120V receptacle circuit at each location shown.
- Q. Network Occupant Sensors
1. Coordinate the sensors and the control units for compatibility. Provide auxiliary relays as necessary.
 2. Verify the sensor coverage of the approved manufacturer and provide the necessary sensors, control units and auxiliary relays required to adequately cover and control the indicated area. Where corridors are covered, install ceiling mounted back-to-back sensors.

END OF SECTION 26 27 26.13

SECTION 26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install disconnect switches, including:
 - 1. Fuses.
 - 2. Enclosures.
 - 3. Circuit Breakers.

1.2 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. UL 248-8 - Class J Fuses.

1.3 SUBMITTALS

- A. Furnish dimensions and ratings for voltage, ampacity, horsepower and short circuit.
- B. Indicate enclosure material finish and NEMA classification type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Disconnect Switches
 - 1. Square D.
 - 2. General Electric.
 - 3. Cutler-Hammer.
 - 4. Siemens.
- B. Fuses
 - 1. Bussmann.
 - 2. Gould-Shawmut.
 - 3. Littelfuse.

2.2 DISCONNECT SWITCHES

- A. Fusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class J.
- B. Nonfusible Switch Assemblies: Heavy duty; quick-make, quick-break, load interrupter enclosed switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

- C. Enclosed Circuit Breakers: Thermal magnetic with externally operable handle.
- D. Enclosures: Unless indicated otherwise, provide general purpose, NEMA 1 for indoor locations; and weatherproof, NEMA 4, stainless steel for outdoor locations.
- E. General-Use Snap Switch: Motors of one HP or less as allowed by code.
- F. Construct all current carrying parts of high conductivity copper with silver-plated switch contacts.
- G. Provide solid copper neutral bar where a neutral is present in the circuit.
- H. All disconnects, motor starters, enclosed circuit breakers, etc. located in exterior locations shall be provided with Nema 4X stainless steel housing.

2.3 FUSES

- A. Fuses 600 Amperes and Less: Class J; as indicated on drawings; time delay, dual element, current limiting, 600 volt.
- B. Fuses Over 600 Amperes: Class L, bolt-on type with time delay and capability to hold 500 percent rated fuse current for a minimum of four seconds and clear 20 times rated fuse current in .01-second or less. Provide fuses with 'O' ring seals between end bells and glass melamine barrel similar to Bussman time delay KRP-C.
- C. Interrupting Rating: 200,000 RMS symmetrical amperes.
- D. Provide all fuses of the same manufacturer.
- E. Install fuses in motor circuits in accordance with motor manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide disconnect switches, where required by NFPA 70, where indicated on drawings, where required by equipment manufacturer, in a location convenient for maintenance on each switch and adjacent equipment.
- B. Provide fused disconnect switches when required to maintain equipment manufacturer's warranty. Coordinate with Division 23 for warranty requirements of equipment approved by submittal.
- C. Install fuses in fusible disconnect switches. Provide permanent marking inside switch enclosure for fuse type.
- D. Wall mount switches, where possible, or mount on Uni-Strut supports.

- E. Provide spare fuse cabinet in main electrical room complete with three spare fuses for each rating installed for fuse sizes over 600 amperes, and ten percent spare fuses (minimum of three) of each type and rating installed for 600 amperes or less.
- F. Provide fuse identification label showing type and size inside door of each switch.

END OF SECTION 26 28 16

SECTION 26 35 53.19 TRANSIENT-VOLTAGE SUPPRESSION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS (LOW EXPOSURE)

PART 1 - GENERAL

1.1 SCOPE

- A. These specifications describe the requirements for an electrical transient surge suppression filter system integrating both transient voltage surge suppression (TVSS) and electrical high frequency noise filtering for "Low Exposure" locations as defined in ANSI/IEEE C62.41-1991.
- B. The unit shall be designed for parallel connection to the facility's wiring system. The suppression filter system shall be designed and manufactured in the USA by a qualified manufacturer of suppression filter system equipment. The qualified manufacturer shall have been engaged in the commercial design and manufacture of such products for a minimum of five (5) years.

1.2 STANDARDS

- A. The specified unit shall be designed, manufactured, tested and installed in compliance with the following standards:
 - 1. ANSI/IEEE C62.41-1991 and C62.45-1992.
 - 2. ANSI/IEEE C62.1 and C62.11.
 - 3. Canadian Standards; (CUL).
 - 4. Federal Information Processing Standards Publication 94.
 - 5. National Electrical Manufacturers Association (NEMA LS1-1992).
 - 6. National Fire Protection Association (NFPA 70 [NEC], 75, and 78).
 - 7. Underwriters Laboratories (UL 1449 and 1283).
 - 8. Underwriters Laboratories (UL 489 and UL 198).
- B. The unit shall be UL 1449 Listed and CUL Approved as a Transient Voltage Surge Suppressor and UL 1283 Listed as an Electromagnetic Interference Filter.

1.3 SUBMITTALS

- A. Provide an equipment manual that details the installation, operation and maintenance instructions for the specified unit.
- B. Provide drawings that show unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.
- C. Provide data showing UL1449 product listing. Also submit certified documentation of applicable Location Category Testing in full compliance with NEMA LS 1-1992, paragraphs 2.2.10 and 3.10.
- D. Provide certified documentation of the unit's Single Pulse Surge Current Capacity based on ANSI/IEEE C62.41-1991 Standards.

- E. Provide certified documentation of the unit's Minimum Repetitive Surge Current Capacity Testing based on ANSI/IEEE C62.45-1987 Standards.
- F. Provide a list of customer-replaceable spare parts. All spare parts shall be quickly and easily field-replaceable.
- G. The unit shall include a Diagnostic Signature Card listing factory-established benchmark suppression voltage values for all modes of protection. The suppression voltage values shall be established during final production line testing utilizing the DTS-2 Diagnostic Test Set. This Diagnostic Signature Card shall provide space for subsequent field testing allowing comparison of the initial factory benchmark testing with subsequent field testing suppression voltage values.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Siemens.
- B. Current Technology
- C. Square D

2.2 ENVIRONMENTAL REQUIREMENTS

- A. Storage Temperature. Storage temperature range: -40□ to +85□ C, (-40□ to +185□ F).
- B. Operating Temperature. Operating temperature range: -40□ to +60□ C, (-40□ to +140□ F).
- C. Relative Humidity. Reliable operation with 5% to 95% non-condensing relative humidity.
- D. Operating Altitude. Capable operation up to 13,000 feet above sea level.
- E. Audible Noise. The unit shall not generate any audible noise.
- F. Magnetic Fields. No appreciable magnetic fields shall be generated. Unit shall be capable of use in computer rooms without danger to data storage systems or devices.

2.3 ELECTRICAL REQUIREMENTS

- A. Unit Operating Voltage shall be as shown on Drawings.
- B. Maximum Continuous Operating Voltage (MCOV) shall be greater than 115% of nominal voltage.

- C. Operating Frequency. Operating frequency range shall be 47 to 63 Hz.
- D. Protection Modes. All protected modes are defined per NEMA LS 1-1992, paragraph 2.2.7. Following IEEE Standard 1100-1992, Section 9.11.2 recommendations, units shall provide protection in all modes. WYE configured system shall provide Line-to-Neutral, Line-to-Ground, Line-to-Line and Neutral-to-Ground protection. DELTA configured systems shall provide Line-to-Line protection. Line-to-Line and Line-to-Ground protection shall be provided for all corner grounded DELTA systems.
- E. Rated Single Pulse Surge Current Capacity. The rated single pulse surge current capacity, in amps, for each mode of protection of the unit shall be no less than as follows:

| L-N | L-G | N-G | L-L |
|----------|----------|----------|----------|
| 80,000 A | 80,000 A | 80,000 A | 80,000 A |

- F. Tested Single Pulse Surge Current Capacity. In compliance with NEMA LS 1-1992, paragraphs 2.2.7, 2.2.9 and 3.4.8.

The test shall include an ANSI/IEEE C62.41-1991 Category C1 surge defined as a 1.2 X 50 μ sec, 6000V open circuit voltage waveform and an 8 X 20 μ sec, 3000A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current (for units rated over 200,000A per mode, components or sub-assemblies are tested) magnitude with an approximated 8 X 20 μ sec waveform. To complete the test, another Category C1 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage measured from the two category C1 surges does not vary by more than 10%.

- G. Minimum Repetitive Surge Current Capacity. Per ANSI/IEEE C62.41 and ANSI/IEEE C62.45-1992, all suppression filter systems shall be repetitive surge current capacity tested in every mode utilizing a 1.2 x 50 μ sec, 20 KV open circuit voltage, 8 x 20 μ sec, 10 KA short circuit current Category C3 bi-wave at one minute intervals without suffering either performance degradation or more than 10% deviation of clamping voltage at a specified surge current.

Repetitive Surge Current Capacity-Number of Impulses

| L-L | L-N | L-G | N-G |
|--------|--------|--------|--------|
| >3,500 | >3,500 | >3,500 | >3,500 |

- H. NEMA LS1-1992 Clamping (Let-Thru) Voltage Data. Maximum clamping (Let Thru) voltages for units without an integral fused disconnect are as follows.

| System Voltage | Mode | B3 Ringwave | B3/C1 | C3 |
|----------------|------|-------------|-------|------|
| 120/240 | L-N | 300 | 400 | 550 |
| 120/208 | L-G | 400 | 400 | 600 |
| | N-G | 325 | 475 | 800 |
| | L-L | 425 | 725 | 900 |
| 277/480 | L-N | 500 | 875 | 1050 |
| | L-G | 825 | 825 | 1025 |
| | N-G | 650 | 875 | 1200 |
| | L-L | 700 | 1625 | 1825 |

- I. UL1449 Ratings. All suppression filter system products are UL1449 rated and listed.
- J. High Frequency Extended Range Power Filter. EMI-RFI noise rejection or attenuation values are in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, paragraphs 2.2.11 and 3.11.

| | | | | |
|-----------------------|--------|------|-------|--------|
| Attenuation Frequency | 100KHz | 1MHz | 10MHz | 100MHz |
| Insertion loss (dB) | 50 | 37 | 38 | 53 |

NOTE: Standardized insertion loss data obtained utilizing MIL-STD-E220A 50 ohm insertion loss methodology.

The Suppression Filter System shall function in conjunction with other suppression filter devices of the same manufacturer via coordinated filters within the facility-wide suppression filter system that provide minimum noise attenuation as follows:

| | | | | |
|-----------------------|--------|------|-------|--------|
| Attenuation Frequency | 100KHz | 1MHz | 10MHz | 100MHz |
| Insertion loss (dB) | 83 | 68 | 67 | 84 |

NOTE: Standardized insertion loss data obtained utilizing MIL-STD-E220A 50 ohm insertion loss methodology, based on a minimum of 100 ft. of #4 AWG conductor between the two devices.

- 2.4 High Performance Suppression System. Units shall include an engineered solid-state high performance suppression system utilizing a arrays of non-linear voltage dependent metal oxide varistors with similar operating characteristics.

The suppression system components shall optimally share surge currents in a seamless, low-stress manner assuring maximum performance and proven reliability. The suppression system shall not utilize gas tubes, spark gaps, silicon avalanche diodes or other components which might short or crowbar the line, thus leading to

interruption of normal power flow to or system upset of connected loads. The suppression system shall not incorporate non-field replaceable encapsulated fusing or any other components which may degrade performance or long term reliability of the suppression system. Suppression system shall reduce transient levels and provide protection for sensitive electronics susceptible to catastrophic or long-term damage. Clamp voltages are specified in Section 2.3 H of this specification.

- 2.5 The unit shall include a high frequency extended range power filter and shall be UL 1283 listed as an Electromagnetic Interference Filter. The filter shall reduce fast rise-time, high frequency, error-producing transients and electrical line noise to harmless levels, thus eliminating disturbances which may lead to electronic system upset. The filter shall provide minimum noise attenuation values as specified in Section 2.3 d. of this specification.
- 2.6 All internal wiring associated with the suppression filter system and subject to surge currents shall utilize low-impedance copper bus bar. For internal wiring, minimum wire size is shown in table below. All internal connections associated with the suppression filter system and subject to surge currents shall be made with compression or mechanical solderless-type lugs and shall be bolted to the bus bars in order to reduce overall system impedance. No plug-in component modules, quick-disconnect terminals, non-field replaceable fusing or printed circuit boards shall be used in surge current-carrying paths.

Minimum Wire Size

#8 AWG Copper

- 2.7 Field Connections. The unit shall include mechanical or compression lugs for each phase, neutral and ground, if applicable. Recommended wire size range is as follows:

| Phase | Neutral | Ground |
|------------------|------------------|------------------|
| #8-#2 AWG Copper | #8-#2 AWG Copper | #8-#2 AWG Copper |

- 2.8 Unit Status Indicators. The unit shall include long-life, solid state, externally visible status indicators that monitor the on-line status of each phase of the unit.
- 2.9 Integral Test Point. The unit shall incorporate an integral test point allowing easy off-line diagnostic testing verifying the operational integrity of the unit's suppression filter system. Field testing shall permit proactive testing to ensure performance and long term reliability. Testing shall include injection of an impulse into the off-line suppression filter system to verify the suppression performance values established at final factory testing and recorded on the Diagnostic Signature Card. Indicator lights monitoring fuse condition or power available which inform the user of failure after the fact do not meet the intent of this specification.
- 2.10 Enclosure. Standard unit shall be supplied in a NEMA 4 metallic enclosure.
- 2.11 Units shall include a battery-powered audible alarm that detects and provides notification of any single or multiple phase failure of the suppression filter system. The unit shall also include a status indicator for each phase that extinguishes to

indicate a failure mode and an LED that flashes to indicate any alarm condition. The alarm shall have a silence switch and a test switch for ensuring positive function and shall have an alarm disable LED that illuminates when the alarm is disabled. The monitoring unit shall have an easily replaceable, commonly available battery for backup to ensure audible alarm function in the event of a total power failure. The unit shall have a battery backup monitor light which shall illuminate when the battery requires replacement. To monitor on-line status, the monitoring package shall also include two sets of form C dry contacts (N.O. or N.C.) to facilitate connection to a building management system. The contacts shall be normally open or normally closed and shall change state upon the failure of the suppression system or power loss in any combination of all three phases. The unit for WYE distribution systems with a neutral shall include two (2) solid state eight (8) digit liquid crystal displays that discriminate between and exhibit both common mode (L-G) and normal mode (L-N) disturbances. The unit for DELTA distribution systems shall include one (1) solid state eight (8) digit liquid crystal display that exhibits normal mode (L-L) disturbances. The Display Event Counters shall utilize self-contained lithium batteries with a nominal life of ten (10) years. Reset function shall be secure and remotely located.

- 2.12 Provide a Diagnostic Test Set. The Diagnostic Test Set shall be self-contained and portable and shall provide complete assurance of suppression capability without stressing the suppression system or posing detriment to continued operation. Testing shall be achieved by injecting a high voltage low current transient to test the function of each mode of the suppression filter system. Use of a low current transient shall ensure there is no damage or degradation to the suppression filter system.

PART 3 - EXECUTION

3.1 TESTING

- A. Each unit shall be factory tested at the applicable MCOV to assure proper field operation.
- B. Each unit shall be thoroughly factory tested before shipment. Testing of each unit shall include but shall not be limited to UL manufacturing and production-line tests, quality assurance checks, MCOV and clamping voltage verification tests.
- C. Upon completion of installation, a factory-certified local service technician shall provide testing services. The following tests shall be performed:
 - 1. Voltage measurements from Line-to-Ground, Line-to-Neutral, Line-to-Line and Neutral-to-Ground (no neutral in DELTA configurations) at the time of the testing procedure.
 - 2. Impulse injection to verify the system suppression voltage tolerances for all suppression paths. Impulse testing shall be completed while the unit is off-line to isolate the unit from the distribution system. Test results should be recorded and compared to factory benchmark test parameters supplied with each individual unit. A copy of the start-up test results and the factory benchmark testing results shall be supplied to the engineer and the owner for confirmation of proper suppression filter system junction. In addition, the integrity of the neutral-ground

bond should be verified through testing and visual inspection. A Ten Year Limited Warranty shall initiate after the owner has accepted the testing results and taken possession of the equipment.

3.2 INSTALLATION

- A. Connect unit to electrical system with 100 amp, 3-pole circuit breaker.

3.3 WARRANTY

- A. The manufacturer shall provide a Ten Year Limited Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

END OF SECTION 26 35 53.19

SECTION 26 51 13 INTERIOR LIGHTING FIXTURES, LAMPS AND BALLASTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install light fixtures associated with building, including:
 - 1. Interior luminaires and accessories.
 - 2. Lamps.
 - 3. Ballasts.

1.2 SUBMITTALS

- A. Include product data for fixtures, including photometric data, reflectance, lens, lamps, ballasts, poles and lighting control.
- B. Furnish samples upon request.
- C. Provide operation and maintenance manual.

1.3 RELATED SECTIONS

- A. Section 26 05 13 Medium Voltage Cables
- B. Section 26 05 19 Low-Voltage Electrical Power Conductors and Cables
- C. Section 26 05 23 Control Voltage Electrical Power Cables
- D. Section 26 09 23 Lighting Control Devices

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Lighting Fixtures
 - 1. Manufacturers of individual lighting fixtures shall be as scheduled on Drawings, and indicate quality and design features required.
 - 2. Products of other manufacturers will be considered upon submittal of proper data.
- B. Drivers
 - 1. Advance.
 - 2. Eldo
 - 3. Samsung
 - 4. Universal
- C. LED LAMPS
 - 1. Samsung

2. Philips
3. Nichia
4. Cree

2.2 GENERAL

- A. Provide lighting fixtures of the size, type and rating indicated, complete with lamps, lampholders, reflectors, ballasts, starters, wiring and accessories.
- B. Where fixtures are recessed mounted in ceiling system, provide trim and accessories required for installation in the ceiling system installed.
- C. It is the intent of the drawings and specifications to indicate the type of fixture for each intended use. It is generally intended that rooms of similar usage and configuration will have similar fixture types. Where fixture type is not indicated, it is the duty of the Contractor to request clarification prior to proceeding with the work.
- D. All fixtures shall meet or exceed the latest Chicago Plenum Rating requirements.
- E. Contractor shall be provided with a \$15,000 allowance for any lighting or power associated modifications.

2.3 INTERIOR LUMINAIRES AND ACCESSORIES

- A. Recessed LED Luminaires: Prewired type, provide trim type required for ceiling system installed.

2.4 LED LUMUNIARES AND DRIVERS

- A. All Luminaires
 1. Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.
 2. All LED's on the first floor shall have 3500K color temperature. All fixtures on the second floor and hangers shall have 4100 K.
 3. LED fixtures shall meet or exceed the minimum delivered lumen level specified on fixture schedule.
 4. Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.
 5. Comply with In-Situ testing for more reliable results.
 6. LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.
 7. LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.
 8. LED luminaires shall deliver a minimum of 100 lumens per watt.
 9. Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.

10. The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.
11. Luminaires shall have internal thermal protection.
12. Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.
13. Indoor luminaires shall have a minimum CRI of 80.
14. LED package(s)/module(s)/array(s) used in qualified luminaires shall deliver a minimum 70% of initial lumens, when installed in-situ, for a minimum of 50,000 hours.
15. Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.
16. LED drivers shall be provided with minimum 5-year manufacturer warranty of full replacement of board and driver. Indirect fixtures shall be provided with a minimum 10-year manufacturer warranty.
17. All LED fixtures shall be provided with lenses unless noted otherwise.

B. Downlights

1. All downlights shall be provided with 0-10V driver.
2. Drivers shall dim light down to 1%.
3. Downlights shall have wet location UL listing.
4. LED drivers and modules shall be fully accessible from below ceiling. Where installed in hard ceilings, LED hardware shall be fully accessible from below for maintenance purposes.
5. Downlight housings shall not exceed height of 8-1/4".

C. Power Supplies and Drivers

1. Power Factor 0.90 or higher
2. Maximum driver case temperature not to exceed driver manufacturer recommended operation.
3. Solid-state control components to be integral or external per each specified luminaire. Remote control gear to be enclosed in Class 1, Class 2, or NEMA 3R enclosures as required.

D. Controller and Control System

1. System electronics driver / controller to use coordinated communication protocols: DMX512, 0-10V, DALI, or proprietary as required.
2. The Contractor to ensure that external control equipment is compatible with LED control requirements

3. Provide connector types and wiring as appropriate for un-interrupted communication between devices, considering distance maximums, field obstructions, and accessibility.

2.5 EMERGENCY LIGHTING

- A. Emergency lighting shall consist of normal lighting fixtures with battery-inverter system backup, or emergency lighting fixture with individual battery backup, or sealed beam emergency lighting units in accordance with the fixture schedule.
 1. Emergency Battery-backed LED emergency lighting fixtures shall consist of a normal LED fixture with some or all of the LEDs connected to a battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of fixture operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The fixture shall include a test/monitor module with LED status indicating lights mounted so as to be visible to the public. The fixture shall not contain an audible alarm.
 2. Sealed beam emergency lighting units shall consist of sealed beam LED lamps connected to an internally mounted battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of battery operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The unit shall be suitable for wall or ceiling mounting as required. It shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The unit shall include a test/monitor module with LED status indicating lights mounted so as to be visible to the public. The unit shall not contain an audible alarm.
- B. EXIT SIGNS
 1. Exit signs shall be of LED type. Fluorescent, electro luminescent light panel, or self-powered luminous signs shall not be used. Chloride, Dual-Lite, Emergi-Lite, Lithonia, Prescolite, or Sure-Lites.
 2. LED's shall be wired in parallel to prevent multi-lamp failure, and shall be concealed within the sign by a clear panel and red optical diffuser. Power consumption shall not exceed 3 watts per face.
 3. Exit signs shall have white die cast aluminum or polycarbonate housings with universal mounting brackets; brushed aluminum stencil faces with red letters and multidirectional knockout arrows.
 4. Exit signs shall be provided with emergency battery packs and battery chargers when required. Batteries shall be maintenance-free nickel cadmium, and shall be mounted within the signs.

2.6 EMERGENCY LIGHTING INVERTER

INTERIOR LIGHTING FIXTURES, LAMPS AND BALLASTS

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Issue for Construction

6. Basis of design shall be Manufacturer shall be Thomas & Betts Emergi-Lite Nexus Mini Inverter, Myers Illuminator LV, or approved equal.
7. Unit shall have the following requirements:
 - Minimum of .8 power factor at full load
 - 65K AIC rating
 - Advance Self- Diagnostic
 - UL 924 listed
 - Minimum 90 minute standard runtime.
 - Standard input and output circuit breakers
 - Micro-processor controlled
 - Automatic even and alarm log
 - LCD display
 - Maintenance free standard batteries
 - Low Voltage Battery Disconnect
 - Harmonic distortion <10% with a power factor or 0.5 lag/lead
 - Input power walk-in: limiting inrush current to less than 125%, 10 times for 1 line cycle.
 - Input Frequency 60Hz, with 277V 1-phase 2-Wire+10%-15%
8. Inverter housing shall be NEMA Type 1 steel cabinets with powder coating for corrosion and scratch resistance.
9. Batteries shall have a standard 10 year warranty, with 24 hour standard recharge time when fully discharged.
10. In the event that the device cannot installed above ceiling on wall unit shall be relocated to be mounted on wall of the nearest electrical or data room. Units shall be mounted above 6-1/2' in room away from cabling and conduit from panels or telecommunication devices.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Support surface-mounted luminaires to ceiling using bolts, screws, or approved clips.
- B. Install recessed luminaires with proper frames in accordance with manufacturer's recommendations.
- C. Locate recessed luminaires as indicated on reflected ceiling plan.
- D. Support pendant or bracket fixtures as indicated and as recommended by manufacturer for job conditions encountered.
- E. Provide two supplemental 12 gauge slack hanger wires from opposite corners of troffers installed in grid ceiling to the structure above.
- F. Wall mount exit fixtures where shown above doors. Coordinate fixture location with actual door arrangement as indicated. Connect exit fixtures to unswitched power source as indicated.
- G. Connect fixtures designated as night lights to unswitched circuit and burn continuously.
- H. Install lamps in luminaires and lampholders.
- I. Connect all exit lights to unswitched emergency circuit.

INTERIOR LIGHTING FIXTURES, LAMPS AND BALLASTS

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Issue for Construction

- J. Refer to architectural reflected ceiling plans to ensure the correct ceiling types (gypsum, ACT, or open to structure). Provide flange kit, grid clips, etc. for proper installation as shown per location on architectural plans.
- K. Flex conduit is only allow for installation with a maximum length of 6' from the junction box.

3.2 FIELD QUALITY CONTROL

- A. Coordinate receipt and installation of all fixtures with regard to the overall schedule of the project.
- B. Align luminaires and clean lenses, diffusers, and downlight trims at completion of work. Clean paint splatters, fingerprints, dirt and debris from installed luminaires.
- C. Demonstrate proper operation of all luminaires and controls.
- D. Refer to Section 16050 regarding lamp replacement prior to final acceptance.
- E. Contract shall conduct field inspection to verify that all fixtures are functioning properly prior to the final punch by the A/E firms.

END OF SECTION

SECTION 27 05 26 TELECOMMUNICATIONS GROUNDING & BONDING STRUCTURES

PART 1 - GENERAL

2.1 PROJECT SCOPE SUMMARY

2.2 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors
- C. Bonding.
- D. Communication system grounding.
- E. Electrical equipment and raceway grounding and bonding.
- F. Control equipment grounding.

2.3 REFERENCES

- A. Related Specification Sections
 - 1. Section 27 05 53 Identification and Labeling of Communication Infrastructure
 - 2. Section 27 11 00 Communication Cabinets and Equipment Rooms
 - 3. Section 27 13 00 Backbone and Riser Media Infrastructure
 - 4. Section 27 15 00 Horizontal Media Infrastructure
 - 5. Section 27 05 43 External Communication Pathways
- B. American Society for Testing and Materials (ASTM):
 - 1. B 3 Soft or Annealed Copper Wires
 - 2. B 8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
 - 3. B 33 Tinned Soft or Annealed Copper Wire for Electrical Purposes
- C. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. 142-82 Recommended Practice for Grounding of Industrial and Commercial Power Systems
 - 2. 383-2.5 IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations.
 - 3. 1100 IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems.
- D. Underwriters' Laboratories (UL):

1. 83 Thermoplastic Insulated Wire and Cables
 2. 96 Lightning Protection Components
 3. 96A System Installation
 4. 467 Grounding and Bonding Equipment
- E. National Fire Protection Association (NFPA):
1. 780 Lightning Protection Code
 2. 70 National Electrical Code (NEC)
 - a. NEC Article No. 250 - Grounding
- F. American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance (ANSI/TIA/EIA):
1. J-STD-607-B Commercial Building Grounding and Bonding Requirements.
- G. Telcordia – Network Equipment Building Systems (NEBS) GR-1275.
- H. Building Industry Consulting Services International (BICSI):
1. Telecommunications Distribution Methods Manual (Latest Issue)
 2. Customer Owned Outside Plant Design Manual (Latest Issue)
- I. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- J. Local, county, state and federal regulations and codes in effect as of date of “notice to proceed” shall be complied with.
- K. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components which may be of foreign manufacture, if any, and the country of origin.
- L. Reference attached Figure 1 for general grounding infrastructure layout and connectivity.
- M. 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.

2.4 DESIGN REQUIREMENTS

- A. Design grounding system following ANSI J-STD 607-B – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, BICSI Telecommunications Distribution Methods Manual, NECA/BICSI 607-2011, NEC Article No. 250 - Grounding, IEEE 1100 – Recommended Practices for Powering and Grounding Sensitive Electronic Equipment, and IEEE 142-82 - Recommended Practice for Grounding of Industrial and Commercial Power Systems, by a firm acceptable to Owner's insurance

underwriter. All labeling shall follow standards set forth by ANSI/TIA/EIA-606 and Houston Airport System's Information Technology (HAS-IT) requirements.

B. Design Standards:

1. Completely protect above-surface structures and equipment.
2. Calculate system on the basis of existing soil resistivity.
3. If cathodic protection for underground sewer pipe is installed (see applicable Division 2 Sections), ensure the pipe is not connected to the general grounding system, either directly through grounding cable or indirectly through grounded electrical devices connected to the pipe.
4. Electrically isolate electrical devices from sewer pipe.

C. Radio Equipment

1. All Radio equipment/systems shall be grounded per Motorola Standard R56.

2.5 SUBMITTALS

A. Follow Section 01340 for the following:

B. Product Data:

1. Manufacturers catalog data and applicable special fabrication and installation details.
2. Installation, terminating and splicing procedures.
3. Instructions for handling and storage.
4. Dimensions and weights.
5. Conformance Certificate and Quality Assurance Release: Signed by QAP Manager (Section 01450). Specifically identify products and include purchase order number, supplements, and item number where applicable. Indicate that requirements are met and identify approved deviations.
6. Include spares list to be approved by HAS IT Project Manager for approval.

2.6 QUALITY ASSURANCE

- A. Furnish products of latest proven design, new and in current production. Do not use obsolete components or out-of-production products.
- B. Tests for Insulated Cable: Pass vertical tray flame test following IEEE 383-2.5.
- C. HAS retains the right to inspect all work during the entire duration of the project and any items that do not adhere to the reference, contract, bid, or project documents will be corrected immediately at the expense of the contractor.

2.7 SHIPPING AND HANDLING

- A. Ship on manufacturer's standard reel sizes of one continuous length. Where cut lengths are specified, mark reel quantity accordingly.
- B. Protect wire wood lagging or suitable barrier across the traverse of reels. Provide heat-shrink self-sealing end caps on cable.
- C. Equipment shall be delivered in original packages with labels intact and identification clearly marked. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other containments. Equipment damaged prior to system acceptance shall be replaced at no cost to the HAS.

PART 2 - PRODUCTS

2.8 MANUFACTURERS

- A. Cable Manufacturers/Suppliers:
 - 1. Houston Wire and Cable Company
 - 2. Okonite Company
 - 3. Anixter
 - 4. Graybar
 - 5. CSC (Communication Supply Company)
 - 6. Cablec Continental Cables Company
 - 7. Pirelli Cable Corporation
 - 8. Triangle Wire and Cable, Inc.
- B. Ground Rod and Connector Manufacturers:
 - 1. Copperweld
 - 2. Thomas & Betts
 - 3. Blackburn
- C. Exothermic Connector Manufacturers:
 - 1. Erico Products (Cadweld)
 - 2. Burndy Corporation (Therm-O-Weld)
 - 3. OZ Gedney
- D. Grounding Connector Manufacturers:
 - 1. Thomas & Betts
 - 2. Burndy Corporation
 - 3. O.Z. Gedney
 - 4. Panduit
- E. Telecommunications Busbars:
 - 1. Erico Products
 - 2. Cooper B-Line
 - 3. CPI Chatsworth

4. Panduit

2.9 MATERIALS

- A. Grounding Conductors: Bare or insulated copper AWG wire following ASTM-B3, ASTM-B8 and ASTM-B33, of following sizes:
1. A minimum of 6 AWG, stranded, insulated (green) copper conductor shall be used for communications since this accommodates different code requirements and allows for future changes.
 2. Metallic cable shield shall NOT be used as a Telecommunication Bonding Backbone (TBB).
 3. Interior water piping system shall NOT be used as a TBB
- B. Grounding Connectors: It is recommended that connectors should be one of the following:
1. Tin-plated copper.
 2. Copper.
 3. Copper alloy.
- C. Ground Rods: A minimum of 10 feet long, 3/4-inch diameter, copper-clad steel.
- D. Where single conductor insulated grounding conductors is required, furnish green color (or tape marking) insulation rated for 600 volts.
- E. Telecommunications Main Grounding Busbar (TMGB):
1. The TMGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used. (Both holes in two holed lugs must be attached to busbar)
 2. The TMGB shall be sized for the immediate requirements and allow for 100% growth.
 3. The minimum busbar dimensions are .25" thick x 4" wide x 20" long.
 4. The busbar shall be electrotin plated for reduced contact resistance.
- F. Telecommunications Grounding Busbar (TGB):
1. The TGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used. (Both holes in two holed lugs must be attached to busbar)
 2. The TGB shall be sized for the immediate requirements and allow for 100% growth.
 3. The minimum busbar dimensions are .25" thick x 2" wide x 12" long.
 4. The busbar shall be electrotin plated for reduced contact resistance.
- G. Rack-Mounted Grounding Busbar (RMGB):
1. The RMGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used. (Both holes in two holed lugs must be attached to busbar)

2. The TGB shall be sized for the immediate requirements and allow for 100% growth.
3. The minimum busbar dimensions are 3 /16" thick x 19" wide x 3/4" long.
4. The busbar shall be electrotin plated for reduced contact resistance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Complete site preparation and soil compaction before trenching and driving ground rods for underground use.
- B. Verify exact location of stub-up points for grounding of equipment, fences and building or steel structures.
- C. Verify wiring for lighting systems is single conductor cable in conduit and each conduit contains a green-color insulated equipment-grounding conductor connected to lighting system. If no ground conductor is present, install conductors as required.
- D. Copper and copper alloy connections shall be cleaned prior to connection.
- E. In new construction, the electrical contractor must provide accessible means to a direct electrical service ground, which is one of the best points for grounding communications systems. NEC Section 250.94 and 800.100 requires an intersystem bonding connection accessible at the electrical service equipment, such as:
 1. Approved external connection on the power service panel. The NEC allows direct connection to a provided minimum 6 AWG copper conductor. See Chart 1.
 2. Exposed metallic service raceway (using an approved bonding connector).
 3. Grounding electrode conductor.
 4. For connectivity between buildings and rooms, all bonding conductors are to be placed in conduit end to end and conduit shall be properly grounded. 3/0 conductor to be placed in 2 inch conduit and minimum 6 AWG to be placed in a 1 inch conduit run.

| TBB Conductor Size vs. Length | |
|-------------------------------|-------------|
| TBB/GE Linear Length | TBB/GE Size |
| Feet (m) | (AWG) |
| Less than 13' (4) | 6 |
| 14-20' (4 -6) | 4 |
| 21-26' (6-8) | 3 |
| 27-33' (8-10) | 2 |
| 34-41' (10-13) | 1 |

| | |
|---|-----|
| 42-52' (13-16) | 1/0 |
| 53-66' (16-20) | 2/0 |
| 37-84' (20-26) | 3/0 |
| 85-105' (26-32) | 4/0 |
| *Reference ANSI-J-STD-607-B for more information. | |

Chart 1

3.2 INSTALLATION

- A. Install work following drawings, manufacturer's instructions and approved submittal data.
- B. Bonding conductors shall be routed with minimum bends or changes in direction and shall be made directly to the points being bonded, and shall be one continuous run NO splices.
- C. Bonding connections shall be made by using:
 - 1. Double crimp connectors only for all horizontal runs (cabinets trays etc.). Use listed hardware that has been laboratory tested. For double crimp connectors use 2 hole type connector.
 - 2. Exothermic welding (per NEC) within the ground electrode system, for parts of a grounding system that are subject to corrosion or that must carry high currents reliably, or for locations that require minimum maintenance. Exothermic-weld to be used on the Telecommunications Bonding Backbone (TBB) conductor for all connections.
- D. Install main ground loop minimum 18" (inches) below ground surface.
- E. Drive grounding rods vertically, so at least 8 feet of rod is in contact with the soil. All connections shall be exothermic-weld. Install additional ground rods as required to pass resistance test.
- F. Make connections only to dry surfaces with paint, rust, oxidation, scales, grease, dirt or other foreign material is removed. Ensure proper conductivity.
- G. Make above-grade grounding connections with Exothermic-weld.
 - 1. Ground small groups of isolated equipment with No. 3/0 minimum insulated conductor connected to the main loop.
- H. Equipment Grounding:
 - 1. Make grounding connections to electrical equipment, vessels, mechanical equipment, equipment enclosure, relay racks, and ground rods in accordance with NEC.

2. Make grounding connections to tanks and vessels to integral structural supports or to existing grounding lugs or pads, and not to the body of the tank or vessel.

I. Telecommunications Raceway and Support Systems Grounding:

1. Bond and ground raceway, cable rack or tray and conduit together and permanently ground to the equipment grounding busbar. Connection to conduit may be with grounding bushing.
2. Connect ladder-type cable tray to grounding electrode system. Telecommunications cable tray that is located in the same room, as the TGB shall be connected to the TMGB.
3. Bond and ground raceway at low voltage motor control centers or other low voltage control equipment, except conduit which is effectively grounded to sheet metal enclosure by bonding bushing or hubs need not be otherwise bonded.
4. Where only grounding conductor is installed in a metal conduit, bond both ends of conduit to grounding conductors.
5. Provide flexible "jumpers" around raceway expansion joints and across cable tray joints parted to allow for expansion and hinged cable tray connections.
6. Provide copper bonding straps for steel conduit.

J. Telecommunications Grounding and Bonding Infrastructure:

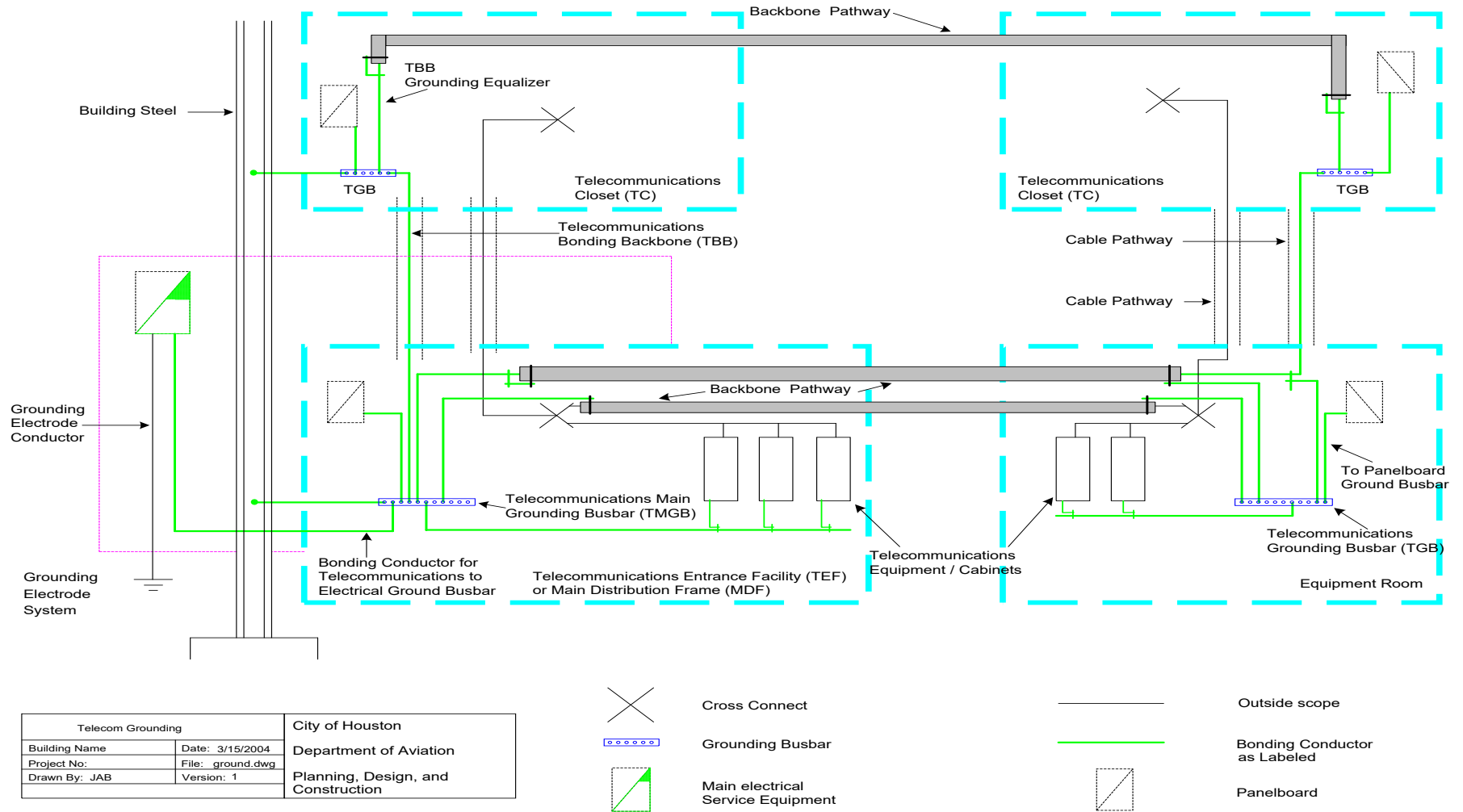
1. Install the TMGB in the Telecommunications Entrance Facility (TEF) or Main Distribution Frame (MDF) as close to the panel-board as possible. The TMGB shall also be located so that the bonding conductor is as short and straight as possible. Maintain clearances required by applicable electrical codes.
2. If a panel-board is not installed in the TEF or MDF, locate the TMGB near the backbone cabling and terminations.
3. The TMGB shall be insulated from its support with a recommended separation of 2 inches.
4. Connect the TMGB to the electrical service ground and telecommunications primary protectors.
5. The minimum Telecommunications Bonding Backbone (TBB) conductor size shall be No. 2 AWG. The TBB originates at the TMGB and extends throughout the building using the telecommunications backbone pathways, and connects to the TGB(s) in all telecommunication closets and equipment rooms.
6. Install the TGBs in the telecommunications closets and equipment rooms as close to the panel-board as possible. The TGB shall also be located so that the bonding conductor is as short and straight as possible. Maintain clearances required by applicable electrical codes.
7. The TGB shall be insulated from its support with a recommended separation of 2 inches.
8. Properly bond and ground all communications cabinets, equipment racks, raceway, cable rack or tray, and conduit directly to TMGB or TGB. Daisy chaining of equipment is not permitted
9. Refer to the Telecom Grounding diagram in the design documentation (see figure 1).

10. Preparation: Copper and copper alloy connections shall be cleaned prior to connecting.
 11. Bonding conductors shall be routed with minimum bends or changes in direction and shall be made directly to the point being bonded. Change of direction shall be taken over as wide a radius as possible with a minimum radius of one foot.
 12. Make connections only to dry surfaces with paint, rust, oxides, scales, grease and dirt removed. Ensure proper conductivity.
 13. Grounding conductors, by gauge, shall be continuous, with splices, from a larger gauge feeder to the last frame or component served by the grounding lead (ex. 750 KCM to 500 KCM to 1/0, etc.).
 14. C-Taps from Aisle equalizer to a frame can be the same gauge (ex. E.g., 6 AWG to 6 AWG).
 15. Cable to Cable taps shall be made with exothermic weld, or listed compression connectors.
 16. No aluminum conductors or connectors shall be used in any bonding and grounding system.
 17. Ground bars not supplied as part of a standard assembly shall be copper or tinned copper.
 18. Refer Telecommunications Grounding drawings for additional information.
 19. Both ends of the grounding conductors shall be equipped with a printed destination label recording the far end termination. The label shall be applied within 6 inches of the termination and be visible from the floor.
 20. All metallic items that interact electro-magnetically with Network/Telecommunications equipment shall have their framework bonded and grounded to the Telecommunications grounding system with a minimum #6 AWG grounding conductor. Example includes switch frames, power plants frames, battery stands, storage cabinets and other metallic objects, etc. "Daisy Chaining" or frame to frame connecting of these conductors is NOT permitted.
 21. TMGB and TGB shall be stenciled and labeled per HAS requirements.
- K. Fences and Gates in the equipment rooms:
1. Ground fences, fence posts and gates to nearest TMGB or TGB.
- L. Telecommunications Cable Armored and/or Shielded:
1. Terminate and ground shield of shielded control cable at one end only, preferably at the control panel end for instrument and communication cable and at the supply end forelectronic power cables. Maintain shield continuity by jumpering the ground shield across connection point where it is broken at junction boxes or other splice points.
 2. Connect ground wire in power cable assemblies at each terminal point to a ground bus, if available, or to the equipment enclosure. Do not extend these ground wires through "doughnut" CTs used for ground fault relaying, but do extend ground leads from stress cones. Ground power cable armor and shield at each terminal point.
 3. Bond and ground exposed cable shields and metallic sheaths according to the manufacturer's guidelines. They shall also be grounded as close as possible to the point of entrance.
 4. Intra-building telecommunications cabling that is armored or has a metallic shield must be bonded to the building grounding system at each end.

3.3 TESTING

- A. Follow Section 01 45 00.
- B. Test grounding system before grid trenches are back-filled. Test for ground resistance after installation of underground grid and grounding connections.
- C. Install ground access test wells at locations as required for testing, using a pipe surrounding the rod and connections with a cover placed on top at grade level.
- D. Test system resistance at each test well using "Fall of Potential" method Per IEEE Standard No. 81-1983) with a maximum resistance of 5 ohms.
- E. Upon completion of the electrical system, including all grounding, the Electrical Contractor shall test the system for stray currents, ground shorts, etc. Approved instruments, apparatus, service, and qualified personnel shall be utilized. If stray currents, shorts, etc., are detected, eliminate or correct as required. The test procedure shall be as follows:
 - 1. Open all main disconnects for the system being tested.
 - 2. Disconnect the system neutral from the service entrance or step-down transformer neutral connection.
 - 3. Connect a DC ohmmeter across the system neutral and equipment ground.
 - 4. An ohmmeter reading in excess of 100 ohms shall indicate that the system neutral and equipment ground are properly isolated.
 - 5. An ohmmeter reading less than 100 ohms shall indicate that the system contains ground shorts (stray currents) at some point along the system neutral.
 - 6. Grounded neutrals may be identified by disconnecting individual neutral conductors from the system, one at a time, while monitoring the ohmmeter.
 - 7. The systems shall be re-tested after correction of all ground shorts is complete.

END OF SECTION 27 05 26



| | | |
|-------------------|------------------|------------------------------------|
| Telecom Grounding | | City of Houston |
| Building Name | Date: 3/15/2004 | Department of Aviation |
| Project No: | File: ground.dwg | Planning, Design, and Construction |
| Drawn By: JAB | Version: 1 | |


-  Cross Connect
-  Grounding Busbar
-  Main electrical Service Equipment
-  Outside scope
-  Bonding Conductor as Labeled
-  Panelboard

Figure 1

SECTION 27 05 28 INTERIOR COMMUNICATION PATHWAYS

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 27 05 26: Telecommunication Grounding and Bonding
 - 2. Section 27 05 43: Exterior Communication Pathways
 - 3. Section 27 05 53: Identification and Labeling of Communication Infrastructure
 - 4. Section 27 11 00: Communication Cabinets and Equipment Rooms
 - 5. Section 27 13 00: Backbone and Riser Media Infrastructure
 - 6. Section 27 15 00: Horizontal Media Infrastructure
 - 7. Section 27 21 00: Data Communication Network Equipment
 - 8. Section 27 22 00: PC, Laptop, Servers and Equipment
 - 9. Section 27 51 13: Audio Communication System
 - 10. Section 28 13 00: Access Control System
 - 11. Section 28 23 00: 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
 - 6. 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 started. Shop Drawings shall be submitted in accordance with Specification 01340.
- C. Submit prototype test reports for all vault covers verifying conformance to the specification requirements in this document and HAS.
- D. 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.
- E. Test Reports: Submit certified test reports indicating compliance with material reference standard indicated for material performance characteristics and physical properties of fire stopping materials
- F. Certificates: Submit product certificates, signed by manufacturer certifying materials comply with specified performance characteristics and physical properties of fire stopping materials.
- G. Copy of Building Industry Consulting Services International (BICSI) Registered Communication Distribution Designer (RCDD) certificate for Contractor's on-site RCDD supervisor. RCDD shall supervise all parts of communications installation at all times.

1.5 QUALITY ASSURANCE

- A. Verify conduit, raceway, cable tray runs, etc. Shall 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.
 - 1. 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 and screw on bushings.
- 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. Manufactures:

- 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 | 15 | 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 radiuses 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.
 - 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 ¼" 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 condulet (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 bends 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. Minimum of 6 inches above the cable tray and not to exceed 12 inches above the cable tray.
- 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, uni-strut 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 placed 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 bend.
- 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. 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.
- C. Protect installed products from damage during construction operations until completions.
- D. 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 COMMUNICATIONS INFRASTRUCTURE STRUCTURES

PART 1 - INTRODUCTION

1.1 GENERAL

- 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.
- B. Note: For specific criteria concerning GIS/GPS datum, refer to the OASIS Standards document maintained by direction under the HAS Planning Design and Construction department. Said datum is not specific to the Information Technology department and thus will not be replicated here.

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

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1.5 GENERAL

- 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.
 9. NOTE: Whereas this document provides an outline and overview of the GIS documentation process, the following Telecommunications Infrastructure Specifications for the Houston Airport System should be referenced for detailed administrative requirements:
- 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.
- D. Contracting parties, by this standard, are required to attend an HAS-IT coordination meeting prior to commencement of any documentation effort; the scope of work and project expectations will be discussed at length. You will be given additional direction

as required and any useful maps, diagrams, numerical sequences, etc. will be provided to you at this time.

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. 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. For the purposes of this standard, the following definitions apply:
 - 1. Assignment
 - a. 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.
 - 2. Backbone
 - a. Network of copper and fiber connections between termination panels/switches.
 - 3. Cable
 - a. 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.

4. Campus
 - a. The buildings and grounds have legal contiguous interconnection. (TIA)
5. Equipment
 - a. Generally, an endpoint for cable lengths; any hardware device/component. Used to terminate cable for cross-connection or interconnection to other cables or devices.
6. Grounding electrode conductor
 - a. 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.
7. Handhole (HH)
 - a. 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.
8. Identifier
 - a. An item of information that links a specific element of the telecommunications infrastructure with its corresponding record. (TIA)
9. Linkage
 - a. A connection between a record and an identifier or between records.(TIA)
10. Location
 - a. A position occupied or available for occupancy within a site or infrastructure network.
11. Manhole (MH)
 - a. 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).
12. Outlet box (telecommunications)
 - a. A metallic or nonmetallic box mounted within a floor, wall or ceiling and used to hold telecommunications outlet/connectors or transition device. (TIA)
13. Outlet / connector (telecommunications)

- a. A connecting device in the work area on which horizontal cable or outlet cables terminates. (TIA)
- 14. Pathways
 - a. A raceway, conduit, sleeve, or exposed location, for the placing of telecommunications cable that links telecommunications spaces together.
- 15. Record
 - a. The permanent documentation of installed telecommunications infrastructure obtained from as-builts.
- 16. Record drawing (as-built)
 - a. 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.
- 17. Report
 - a. A presentation of a collection of information from various records.
- 18. Site
 - a. Spatial location of an actual or planned structure or set of structures.
- 19. Span
 - a. A raceway, conduit, sleeve, or exposed location, for the placing of telecommunications cable that links telecommunications spaces together.
- 20. Splice
 - a. A joining of conductors meant to be permanent. (TIA)
- 21. Splice box
 - a. A box, located in a pathway run, intended to house a cable splice.(TIA)
- 22. Splice enclosure
 - a. A device used to protect a cable or wire splice.(TIA)
- 23. Structure
 - a. Generally an endpoint for span lengths; i.e., manhole, handhole, cabinet, junction box, pedestal, building access point, communications rooms, work areas.
- 24. Structure unit

- a. A component of the structure; usually housing equipment i.e., cabinet, rack.
- 25. Telecommunications
 - a. 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)
- 26. Telecommunications infrastructure
 - a. The components (telecommunications spaces, cable pathways, grounding, wiring and termination hardware) that together provide the basic support for the distribution of all telecommunications information.
- 27. Telecommunications media
 - a. Wire, cable, or conductor used for telecommunications.
- 28. Telecommunications space
 - a. Areas used for the installation and termination of telecommunications equipment and cable, e.g., telecommunications closets, work areas, false ceilings, and manholes/handholes.
- 29. Termination position
 - a. A discrete element of termination hardware where telecommunications conductors are terminated.
- 30. Work area; (work station)
 - a. A building space where the occupants interact with telecommunications equipment.(TIA)

1.8 DOCUMENTATION CONCEPTS

- A. This section describes the concepts of identifiers, records, linkages among records, and presentation of information necessary to administer infrastructure cable, spans and structures.

1.9 IDENTIFIERS

- A. 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.
- B. Identifiers used to access record sets of the same type shall be unique. For example, each identifier for each one of the set 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.

- C. 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.

1.10 RECORDS

- A. A record is a collection of information about or related to a specific element of the telecommunications infrastructure.
- B. 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.
- C. 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.
- D. 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.

1.11 RELATIONSHIPS

- A. Relationships are the logical connections between identifiers and records. The records for infrastructure 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.

1.12 ASSIGNMENT

- B. 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.

1.13 PRESENTATION OF INFORMATION

- A. 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 presented in drawing format. Work orders document the operations needed to implement changes affecting the telecommunications infrastructure.

- B. 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.
- C. 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.
- D. 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.
- E. 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.
- F. 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.
- G. 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.

1.14 WORK ORDERS (SYMANTEC)

- A. 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.

1.15 SUMMARY

- A. This section has presented basic concepts of documentation for the Houston Airport System Telecommunications Infrastructure. The sections that follow specify the administration of each of the components of the infrastructure in greater detail.

1.16 DATA COLLECTION AND ADMINISTRATION CONCEPTS

- A. 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.
- B. The following outline assumes that the contracting parties understand the GIS/GPS datum specifications and requirements as provided in the OASIS standards. Further, that the equipment to be used towards gathering the data has been configured accordingly.

1.17 STRUCTURES

- A. Standard 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

- B. 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.
4. Airport Campus Characters:
 - a. IAH: I
 - b. HOU: H
 - c. EFD: E
5. Asset Designation Character:
 - a. Technology: T
6. Feature-Category Characters:
 - a. Structure: S
 - b. Pathway: P
 - c. Equipment: E
 - d. Cable: C
7. Numerical Range:
 - a. 0000 – 9999
8. Example:
 - a. ITS0054 (IAH Structure), HTS0054 (HOU Structure), ETS0054 (EFD Structure)
9. Manhole Numerical Range:
 - a. Note: When planning to identify newly constructed or newly placed HAS assets, the contractor is expected to coordinate with the HAS IT GIS staff prior to labeling. This action will account for all identifiers previously assigned and prevent duplications or omissions.

C. 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.
4. Required Fields
5. 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
- d. COORD_Z
- e. AIRPORT
- f. AGENCY
- g. LID_TYPE
- h. DEPTH_INCH
- i. SPLICE_CLOSURE
- j. SLACK_LOOP
- k. GROUNDING
- l. COMMENTS
- m. BUILDING_NAME
- n. LEGACY_ID
- o. STRUCTURE_TYPE
- p. STRUCTURE_SUBTYPE
- q. HAS_LEVEL
- r. LID_SIZE
- s. PROJECT
- t. COLLECTION_DATE
- u. LID_SHAPE
- v. LID_MATERIAL
- w. PROJECT_CLASS

D. GPS

- 1. Each manhole should be recorded as follows:
- 2. 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 work.

E. Supporting documentation deliverables

- 1. Additional documentation records are required to support GPS data. The documentation is as follows:
- 2. Manholes and Handholes only
 - a. 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.
 - b. 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).
 - c. Video – 360 degree imagery of interior; .mpg format.
- 3. Communication Room

- a. 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).
4. Spatial Data Deliverables
 - a. 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.
 5. Special Instructions
 - a. None

PART 2 - PRODUCTS

2.1 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.

PART 3 - EXECUTION

3.1 CABINETS/RACKS

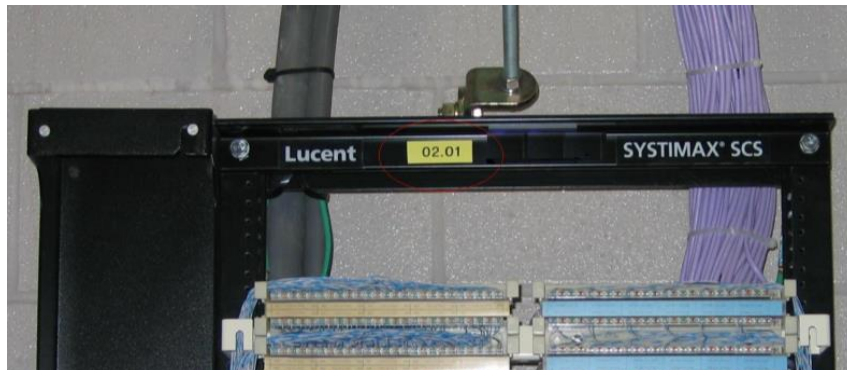
- A. Identification
 1. Each cabinet/rack has been assigned a unique campus identifier. All structure identifiers follow some specific schema; new structures must be identified

accordingly. In the event that a determination can not 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 prefixed with 'PC' (pedestal cabinet) or 'PM' (pole mounted cabinet). The ranges are as follows:
3. Example:
 - a. ITS0054.02.01
 - 1) Translation: Cabinet or Rack in Room (Structure) ITS0054, row 02, column or position 01.
 - b. ITS0054.BB01
 - 1) Translation: Backboard (plywood) 01 in Room (Structure) S103.1.
4. Note: Backboards tend to be randomly arranged within the structure and are usually not numbered according to wall orientation. Different identifiers are however assigned to each. Any one backboard could host a wide assortment of equipment; see EQUIPMENT for identifier schemas.
5. Note: Future expansion of rows should be a major consideration during identifier/labeling phase; numbering from low to high in the direction of any available space.

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
2. Labels should be affixed to the cabinet housing.
3. 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.



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 require

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.

3.2 PATHWAYS

A Pathway Types

1. Ductbank
2. Trench
3. Direct Buried
4. Cable Tray

B 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 airport campus, technology asset designation, and feature-category.
4. Airport Campus Characters:
 - a. IAH: I
 - b. HOU: H

- c. EFD: E
- 5. Asset Designation Character:
 - a. Technology: T
- 6. Feature-Category Characters:
 - a. Structure: S
 - b. Pathway: P
 - c. Equipment: E
 - d. Cable: C
- 7. Numerical Range:
 - a. 0000 – 9999
- 8. Example:
 - a. ITP0054 (IAH Pathway), HTP0054 (HOU Pathway), ETP0054 (EFD Pathway)

C 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.

D 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
- bb. GPS

2. 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. 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.

F. Special Instructions

- 1. No action required

3.3 CABLE TRAY

A. Identification

- 1. no requirements per current guidelines

B. Required Fields

- 1. no requirements per current guidelines

C. GPS

- 1. no requirements per current guidelines

D. Supporting Documentation Deliverables

- 1. no requirements per current guidelines

E. Spatial Data Deliverables

- 1. no requirements per current guidelines

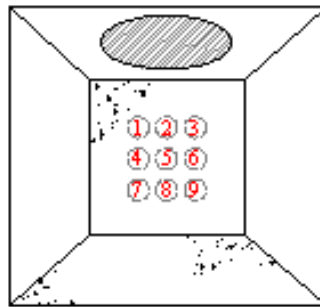
F. Special Instructions

- 1. no requirements per current guidelines

3.4 PATHWAY UNITS

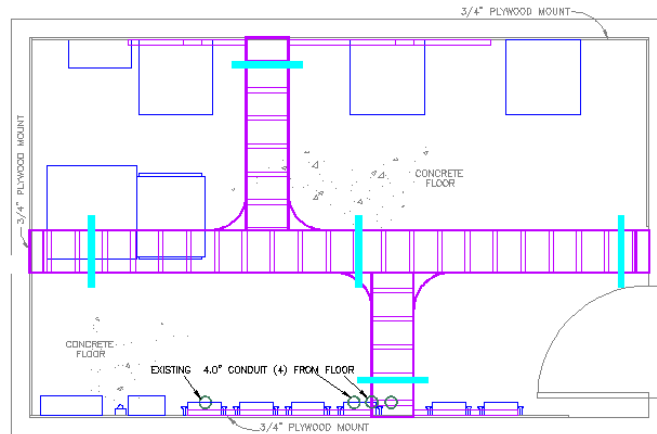
A. Conduit Identification

1. For deliverable purposes conduits are only being depicted via AutoCAD formats; i.e. butterfly diagrams or floorplans (see Exhibits: Communication Room Exhibit, Rackface Exhibit)
2. 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.
3. 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

- B. For the purposes of illustration and to be included as part of the manhole butterfly diagram draft document, each wall should identify the following:
 - C. Ductbank (Telecom Pathway Identifier for each respective manhole / handhole wall face)
 - D. Conduits (Count, Orientation)
 - E. Cabling (Telecom Cable Identifier, Cable Type, Cable Count, location within respective conduit)
- F. 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
- G. ISP conduits are depicted on communication-room AutoCAD layouts as to their position and orientation; and are not numbered.
- H. Example:



I. Labeling

1. Not physically labeled per current guidelines.

J. Required Fields

1. Conduit counts, and size as prescribed in the pathway sub-topic

K. GPS

1. No action required

L. Supporting Documentation Deliverables

1. AutoCAD manhole / handhole butterfly diagrams for OSP conduits and communication-room layouts for ISP conduits; (See manhole / handhole AutoCAD butterfly exhibit.).

M. Spatial Data Deliverables

1. No action required

N. Special Instructions

1. See note regarding annotation above.

3.5 CABLE

A. Cable Types

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

B. 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

4. Numerical Range:

- a. 0000 – 9999

5. Example:

- a. ITC0054 (IAH Cable), HTC0054 (HOU Cable), ETC0054 (EFD Cable)

6. Note: When planning to identify newly constructed or newly placed HAS assets, the contractor is expected to coordinate with the HAS IT GIS staff prior to labeling. This action will account for all identifiers previously assigned and prevent duplications or omissions.

C. 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"

- D. Each cable requires that specific data be collected per unit. GPS equipment should be formatted to account for this information.
 - 1. TELECOM_ID
 - 2. LEGACY_ID
 - 3. AIRPORT
 - 4. AGENCY
 - 5. CABLE_TYPE
 - 6. CABLE_COUNT
 - 7. FROM_TELECOM_ID
 - 8. TO_TELECOM_ID
 - 9. FROM_STRUCTURE_UNIT_ID
 - 10. TO_STRUCTURE_UNIT_ID
 - 11. FROM_EQUIPMENT_ID
 - 12. TO_EQUIPMENT_ID
 - 13. HAS_LEVEL
 - 14. PROJECT
 - 15. PROJECT_CLASS
 - 16. COLLECTION_DATE
 - 17. SYMANTEC_TICKET
 - 18. COMMENTS
 - 19. GPS
- E. OSP – continuous GPS shot between identified structures
- F. 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.
- G. Supporting Documentation Deliverables
- H. ISP Horizontal cabling (see Exhibits – iPatch SOP.pdf).
- I. Cable testing records; .pdf format (see Exhibits – C_Cable Test Exhibit, F_Cable Test Exhibit.pdf).
- J. Butterfly diagrams (OSP) AutoCAD format; (See AutoCAD manhole / handhole butterfly exhibit).
- K. 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.
- L. 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.

3.6 JUMPER CABLES / PATCH CORDS / CROSS-CONNECTS:

- A. Identification
 - 1. No action required
- B. Labeling
 - 1. No action required
- C. Required Fields
 - 1. Refer to iPatch SOP (see Exhibits - iPatch SOP.pdf)
- D. GPS
 - 1. No action required
- E. Supporting Documentation Deliverables
 - 1. ISP cabling (see Exhibits - iPatch SOP.pdf)
- F. Spatial Data Deliverables
 - 1. No action required
- 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.
 - 2. 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.
 - 3. Bulk import of key iPatch modeling components can be facilitated by utilization of a specifically formatted spreadsheet (see Exhibits - iPatch Bulk Import.xls).
 - 4. 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. Termination Point
 - 1. Patch Panel
 - 2. Network Switch
 - 3. 110 Block
 - 4. Splice Enclosure
 - 5. Cable Transition
 - 6. EFSO Button
 - 7. Copper Modem

8. Tap
9. 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.
4. Airport Campus Characters:
 - a. IAH: I
 - b. HOU: H
 - c. EFD: E
5. Asset Designation Character:
 - a. Technology: T
6. Feature-Category Characters:
 - a. Structure: S
 - b. Pathway: P
 - c. Equipment: E
 - d. Cable: C
7. Numerical Range:
 - a. 0000 – 9999
8. Example:
 - a. ITE0054 (IAH Equipment), HTE0054 (HOU Equipment), 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. ¾" Flexible Industrial Strength Nylon label tape – yellow
2. Labels should be affixed to the splice enclosure housing.
3. 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:
3. 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) format 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.

3.8 OUTLETS

A. Identification

1. 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.
2. Example Outlet-Faceplate Identifier:
 - a. S103.1
 - 1) Translation: Outlet serviced by IDF S103.1
3. 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.
4. Note: When planning to identify newly constructed or newly placed HAS assets, the contractor is expected to coordinate with the HAS IT GIS staff prior to labeling. This action will account for all identifiers previously assigned and prevent duplications or omissions.

B. Labeling

1. Outlet label placement 2-port: under top-aligned, Plexiglas cover – servicing IDF identifier over port identifiers. Ports should be identified left-to-right.



2. 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.
3. 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.



4. 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'.

C. Required Fields

1. No action required

D. GPS

1. OSP – No GPS action required
2. ISP – No GPS action required

E. Supporting Documentation Deliverables

1. Additional documentation records are required to support iPatch data. The documentation is as follows:
2. AutoCAD – floorplan (where applicable) depicting outlet locations; (See AutoCAD communications room exhibit).).

F. Spatial Data Deliverables

1. No action required

G. Special Instructions

1. 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.

3.9 DOOR CONTACTS

A. Identification

1. 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.'
2. Example Outlet-Faceplate Identifier: B-2057CCM
 - a. Translation:
 - b. B (building/complex character) Terminal B
 - c. 2 (level character) Level 2
 - d. 057 (numerical sequence character) Contact # 057
 - e. CCM (CCM designation) Control Contact Monitoring
3. 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.
4. Note: When planning to identify newly constructed or newly placed HAS assets, the contractor is expected to coordinate with the HAS IT Project Manager prior to labeling. This action will account for all identifiers previously assigned and prevent duplications or omissions.

B. Labeling

1. Door-contacts (without card-reader) require identifier plates per 'Special Instruction' specification below

C. Required Fields

1. TBD

D. GPS

1. OSP – No GPS action required
2. ISP – No GPS action required

E. Supporting Documentation Deliverables

1. AutoCAD floorplans indicating door contact location including label plate identifier annotation

F. Spatial Data Deliverables

1. No action required

G. Special Instructions

1. 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.
2. 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.

3.10 CARD READERS

A. Identification

1. 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.
2. Example Outlet-Faceplate Identifier:C-1015
3. Translation:
 - a. C (building/complex character) Terminal C
 - b. 1 (level character) Level 1
 - c. 015 (numerical sequence character) Lock # 015
4. 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.
5. Note: When planning to identify newly constructed or newly placed HAS assets, the contractor is expected to coordinate with the HAS IT Project Manager prior to labeling. This action will account for all identifiers previously assigned and prevent duplications or omissions.

B. Labeling

1. Electronic locks require identifier plates per 'Special Instruction' specification below

C. Required Fields

1. TBD

D. GPS

1. OSP – No GPS action required
2. ISP – No GPS action required

E. Supporting Documentation Deliverables

1. AutoCAD floorplans indicating card reader location including label plate identifier annotation

F. Spatial Data Deliverables

1. No action required

G. Special Instructions

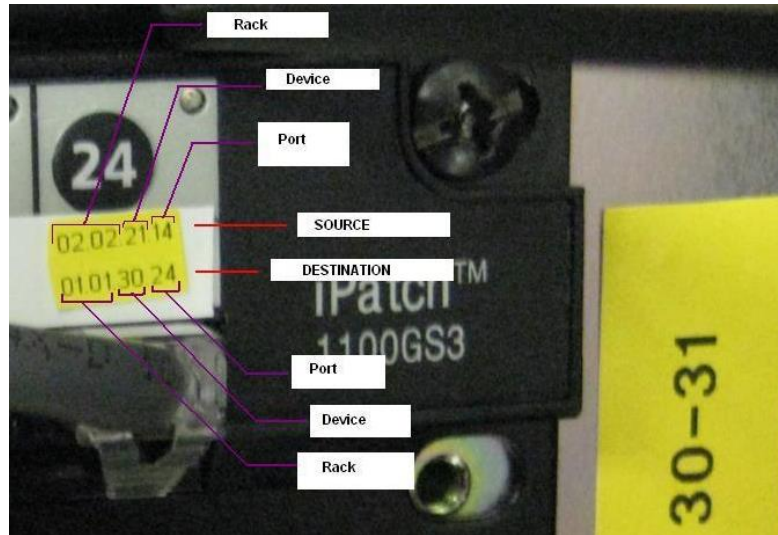
1. Install Black Lexan Label Plate: sized approximately 3 ¼" X 5 ½", black background, white lettering and Card Reader Identifier engraved (i.e. C-1015). Affix plate to single-gang cabinet with 5/32" screws.
2. Provide paper and electronic copies (.pdf format) of all Electronic Lock Permits and Submittal Documents for any door requiring City of Houston door lock permit to the HAS IT Project Manager prior to Acceptance Testing.

3.11 CONNECTIONS

1. Ports

A. Identification

1. 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.
2. Example:
 - a. 100.20.01.02.35-39 (equipment ID) + FP03 = 100.20.01.02.35-39
FP03
 - b. 100.25.01.01.12-17 (equipment ID) + FP03 = 100.25.01.01.12-17
FP03
3. Fiber port 03 is replicated on two different pieces of equipment. Coupling it to the equipment ID makes the string unique
4. All ports are identified through a numerical range specific to its respective equipment. Ports may be prefixed with 'FP' (fiber port) or 'CP' (copper port) as is pertinent to the cable category and space allows on the equipment.
5. 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.
6. Regarding termination panels: ports are identified according to equipment port capacity.
7. Regarding patch panels: ports are identified in sequence and may be prefixed with structure identifier references.
8. 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.
9. 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.
10. 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.
11. Regarding SYSTIMAX (iPatch) 'service panels': ports are identified in sequence and may be prefixed with structure identifier references.



12. 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.
13. Note: When planning to identify newly constructed or newly placed HAS assets, the contractor is expected to coordinate with the HAS IT GIS staff prior to labeling. This action will account for all identifiers previously assigned and prevent duplications or omissions.

B. Labeling



1. Regarding switches: generally space does not allow for switch port labeling; ports must be identified however in order to correlate circuit connectivity to/from/through the device.
2. Labeling should follow the identification schema and further be accomplished via the use of below specified labeling device or approved equivalent:
3.
 - a. DYMO rhinoPRO 5000 Industrial Label Maker
 - b. 3/4" Flexible Industrial Strength Nylon label tape – yellow
4. 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.

C. Required Fields

1. Each port requires that its relationship be established between cable and equipment via use of the iPatch cut sheet (see Exhibits – iPatch SOP.pdf).
 - D. GPS
 1. No action required
 - E. Supporting Documentation Deliverables
 1. ISP cabling/port configurations (see Exhibits – iPatch SOP.pdf)
 - F. Spatial Data Deliverables
 1. No action required
 - G. Special Instructions
 1. Careful attention should be given to accurately accounting for and recording relationships established between ports – cable, and ports – equipment.
- 3.12 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.
 3. Note: Safety is paramount and discussions with regard to OSHA and other regulatory or governing authorities including Airport Operations must be coordinated with the HAS IT representatives prior to commencement of any project scope.
 - A. 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 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 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 campus, format code-list.
 4. GPS locate structures; ensure all attribute fields are populated. For MH, HH produce field sketch - butterfly 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

B. 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 information 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 27 05 53: Identification and Labeling of Communication Infrastructure
- B. Specification 27 13 00: Backbone/Riser Media Infrastructure
- C. Specification 27 15 00: Horizontal Media Infrastructure
- D. Specification 27 05 43: External Communication Pathways
- E. Specification 27 05 26: 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. 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.
- B. 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.
- C. Telecommunications Industry Association /Electronic Industries Association (TIA/EIA) 568-D -Commercial Building Telecommunications Wiring Standards.
- D. TIA/EIA-569-B -Commercial Building Standard for Telecommunications Pathways and Spaces.

- E. ANSI/TIA/EIA 607-B -Commercial Building Grounding and Bonding Requirements.
- F. Underwriters Laboratories (UL®) Cable Certification and Follow Up Program.
- G. National Electrical Manufacturers Association (NEMA).
- H. National Electric Code (NEC®).
- I. UL Testing Bulletin.
- J. 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 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 HAS/CBP 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 PDUs (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 PDUs (Part # P4-1D0A5) L5-30P input; output (24) 5-20Rs.
2. Grounding Bus Bar:
 - a. Provide Rack-Mounted Ground Bar. See Specification 270526
- D. Co-location Cabinet – three compartment: Chatsworth Part #TS1034205 Rev B
1. Cabinets shall be fully assembled by the manufacturer with the components listed below.
 - a. Dimensions - 600MM W X 800MM D (650MM USEABLE DUE TO 150MM D CABLE RACEWAY)
 - b. Provide Rack-Mounted Ground Bar. See Specification 270526
 - c. 12-24 Tapped sliding rails / 2-pair
 - d. Single perforated metal front doors (with beam) per compartment
 - e. Single perforated metal rear door per compartment ; swing handle latches, with hasp lock
 - f. Standard top panel
 - g. Glacier white finish
 2. All three compartments to have PDU power strip CPI (13239-755) in each of the compartments.
- E. Co-location Cabinet – two compartment: Chatsworth Part #TS1034203 Rev B
1. Cabinets shall be fully assembled by the manufacturer with the components listed below.
 - a. Dimensions - 750MM W X 800MM D (650MM USEABLE DUE TO 150MM D CABLE RACEWAY)
 - b. Provide Rack-Mounted Ground Bar. See Specification 270526
 - c. 12-24 Tapped sliding rails / 2-pair
 - d. Single perforated metal front doors (with beam) per compartment

- e. Single perforated metal rear door per compartment ; swing handle latches, with hasp lock
 - f. Standard top panel
 - g. Glacier white finish
2. Both compartments to have PDU power strip CPI (13239-755) in each of the compartments.

2.3 CBP WALL-MOUNTED FLOOR SUPPORTED EQUIPMENT CABINETS

- A. Manufacturer: CUB-It cabinets or submitted and owner-approved equivalent.
 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 # 13496-E72 - 40RU ; 693mm W; 760mm D; CUBE-iT
 - 1) 12-24 Tapped sliding rails / 2-pair
 - 2) Tempered glass front door with swing latch w/padlock feature
 - 3) Glacier white
 - b. Each cabinet to have two (2) PDU power strip CPI (13239-755).

2.4 WALL BACKBOARDS

- A. All walls in telecommunication rooms (MDF/IDF's, Tenant etc.) will be covered with $\frac{3}{4}$ 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 contaminants and pollutants that could affect operation and material integrity of the installed equipment. When contaminants 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 preaction 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 steam, 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 work space.

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 27 11 00

Appendix A

1. 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.

2. All cabling necessary to operate the areas to be opened is completed.

- 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.

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.

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.

5. Other IT-related systems that must be operational, tested, and accepted or approved temporary provisions.

- 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 11 00: Communication Cabinets and Equipment Rooms
 - 3. Section 27 13 00: Backbone/Riser Media Infrastructure
 - 4. Section 27 05 43: Exterior Communication Pathways
 - 5. Section 27 05 26: Telecommunications Grounding and Bonding

1.2 SUBMITTALS

- A. Qualifications: Demonstrate compliance with requirements of Paragraph 1.05A 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 270553 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 01340.
- E. Record Drawings: Furnish CAD drawings, following format in Section 01340, of completed work including cable numbers. Refer to Specification 270553 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 3.04. in this document for test equipment requirements.
- I. Submit Technology Implementation Plan in accordance with 1.07 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:
SP/ND3360 - SYSTIMAX SCS 360 Solutions
SP/ND3321 - SYSTIMAX SCS Design & Engineering
SP/ND3361 - SYSTIMAX SCS Installation and Maintenance
 - 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 five-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 five-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 and X10D solutions, SYSTIMAX XX71 Media, and SYSTIMAX XX91 Media.
- 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 CAT 6A data cables for 802.11ACv2)
 - c. Access Control Panels
 - d. IP Phones
 - e. Etc
 - 2. Yellow – Tenant Data
 - 3. Red – Special circuits, including Automated External Defibrillation (AED) Circuits
 - 4. Blue – CBP (Cat 6A)
 - 5. Purple – TSA (Cat 6A)
 - 6. White – CBP Access Control Video Systems (Cat 6A)
- 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 manufactures 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. The Category 6 Augmented (6A)/Class EA Unshielded Twisted-Pair (UTP) Cable shall be of round construction, shall contain 4 color coded pairs, and be listed for the environment for which it is being installed (Plenum, Riser, etc.)
- J. Systimax part numbers for Plenum-rated Horizontal Cabling are as follows:

| Product Number | Color | COM code | Qty per Unit |
|----------------|--------|-----------|--------------|
| 2071E YEL C6 4 | Yellow | 700210123 | W1000 |
| 2071E SGR C6 4 | Green | 700210164 | W1000 |
| 2071E RED C6 4 | Red | 700210263 | W1000 |
| 2091B GRN C6A | Green | 760107219 | W1000 |
| | | | |

2.5 UNITED AIRLINES COPPER HORIZONTAL CABLING

- A. Category 6 UTP Plenum Rated Cable.
 - 1. Belden RevConnect 2400 Series - Blue
- B. Category 6A UTP Plenum Rated Cable.
 - 1. Belden RevConnect 10GXW Series Plenum Rated – Orange

2.6 CUSTOMS AND TSA HORIZONTAL CABLING

- A. Category 6A UTP Plenum Rated Cable Colors:
 - 1. CBP – Blue 2071E BLU 700208093
 - 2. CBP AVS – White 2071E WHT 700208101
 - 3. TSA – Purple 20171E PRP 760185041
 - 4. HAS Wireless - TBD

2.7 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 WHRL RG11 QD 1000 4103304/10
 - 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 a 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 WHRL RG6 QD 1000 4112704/10

3. Must use compression type connectors from IDEAL part number:
 - a. IDEAL F connector - RG6-F-XR-RTQ #92-651
 - b. IDEAL BNC connector - RG6-INSITE-BNC #89-048(security camera install only)
4. The copper cable shall meet or exceed the electrical specifications set by the manufacture.

2.8 SECURITY CABLES

- A. Manufacturer: CommScope or approved equivalent.
- B. 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.
- C. 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

2.9 FIBER PATCH CORDS

- A. Manufacturer: SYSTIMAX Solutions ONLY. If required see specification 271300.

2.10 COPPER HARDWARE TERMINATION STANDARDS - Real Time Infrastructure Management -

- 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 Fiber Optic Patching System as follows:

| Product Number | Description |
|--|--|
| Fiber Shelves (19 inch rack-mountable) and accessories | |
| 760209940 | HD-1U sliding fiber shelf(holds four modules) |
| 760148502 | 360-LP-STACK-SPT |
| 760109470 | 12-LC-LS-AQ-Pigtails |
| 760109496 | 12-LC-SM-BL-Pigtails |
| 760109504 | 12-LCA-SM-GR-Pigtails |
| 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 |
| 760152587 | 360-IPR-1100E-GS6-1U-24 - 360 iPatch/imVision (ready) 24 port panel |
| 760152595 | 360-IPR-1100E-GS6-2U-48 - 360 iPatch/imVision (ready) 48 port panel |
| imVision Rack manager | |
| 760237876 | 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-xxF003 |
| GS8E-5ft | 5FT | CPC3312-xxF005 |
| GS8E-7ft | 7FT | CPC3312-xxF007 |
| GS8E-9ft | 9FT | CPC3312-xxF009 |
| GS8E-15ft | 15FT | CPC3312-xxF015 |

NOTE: 15 ft. UTP patch cords shall be used at the workstation only.

D. Outlets

1. Manufacturer: Systimax
2. Systimax 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. Systimax 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. Systimax 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. Systimax 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 |

2.11 UNITED AIRLINES OUTLETS

- A. Category 6 modular keystone jacks

1. Hubbel

2.12 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.**

2.13 CABLE MANAGEMENT

- A. Horizontal Manager
 - 1. Manufacturer: CPI – 30130-719
- B. Fiber patch cords
 - 1. Manufacturer: Panduit – Fiber runner(Applies to all new or expand existing BDF/MDF/Computer room build outs)

2.14 SPECIAL APPLICATIONS SHIELDED TWISTED PAIR SOLUTION

- B. 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 |
| 2291B GRN 4/23 R1000 | | Green | 760122663 |

- C. 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.

- D. 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 |
| 360-IPR-MFTP-E-HD6B-1U-24 | 1 | Silver | 760150144 |

- E. High Density M-Series Adapter
 - 1. Systimax High Density M-Series Adapter - White

| Product Numbering | # per pack | Color | COM code |
|-------------------|------------|-------|-----------|
| HGS-A-MS-WHITE | 1 | White | 760154187 |

F. Shielded Patch Cords

1. CommScope Shielded Patch Cords, F/UTP, Black Jacket, RJ45-RJ45, 7ft

| Product Numbering | # per pack | Color | COM code |
|-------------------------|------------|-------|----------------|
| PCOSP-6AS-BK-07FT (OSP) | 1 | Black | CO11192-01F007 |
| G10FP-GR-7FT | | Green | CPCZZK1-01F007 |

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify raceways, boxes, hand holes and maintenance holes are properly installed following Sections 270528, and 270543.
- 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 270526.
- 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 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.
 - K. The installation contractor shall be responsible for coordination, testing and problem resolution with the system vendors.
 - L. 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.
 - M. 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 3.04.D below. No cabling installation is considered complete until test results have been completed, submitted and approved as defined in 3.04.D below.

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 3.05 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.
 - b. Category 6A Horizontal Cabling shall be tested to the manufactures specification for Category 6A Cabling and SYSTIMAX SCS X10D System.
2. All test equipment used shall meet the performance specifications defined in 3.04.

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 3.04. "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 3.04.
 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.

END OF SECTION 27 15 00

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.

2. All cabling necessary to operate the areas to be opened is completed.
 - 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 jumpers and patch cords specified by the contract are transmitted to the owner for use.
 - f. 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, television, 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.

5. Other IT-related systems that must be operational, tested, and accepted or approved temporary provisions.

- 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 28 13 00 ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 PROJECT SCOPE SUMMARY

- 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. Provide all system documentation and submittals.
- C. Provide warranty and maintenance support as specified.
- D. Provide and pay for all labor, materials, and equipment.
- E. Secure and pay for plan check fees, permits, fees, and licenses necessary for execution of Work as applicable for the project.
- F. Give required notices.
- G. Comply with all codes, ordinances, regulations, and other legal requirements of public authorities that bear on performance of Work.

1.2 SECTIONS INCLUDES

- A. This section includes specification for the installation of the Access Control System.
- B. Provide all required software and hardware as specified herein to produce complete and operational access control and alarm monitoring functions for PROJECT NAME and LOCATION
- C. 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.
- D. These Specifications may include components that are not required. Use drawings to determine the quantities to be installed. Include in the original bid, all equipment, software, cabling, connectors, transformers, relays, etc., whether specified here or not, such that said bid fulfills the intent of these Specifications and renders these systems functional and fully operational.

1.3 REFERENCES

SECURITY SENSITIVE INFORMATION – LAW ENFORCEMENT CONFIDENTIAL. DO NOT PHOTOCOPY. THIS INFORMATION IS PROTECTED AGAINST DISCLOSURE BY THE PROVISIONS CONTAINED IN THE HOMELAND SECURITY ACT OF 2002, 49 U.S.C. 114(s), AND TSA'S REGULATION IMPLEMENTING THIS AUTHORITY, SET FORTH IN 49 CFR PART 1520.

- A. Related Sections: The references and standards listed herein shall be considered part of this specification. Bidder and Contractor shall conform to the following references and standards:
1. Section 270526: Telecommunication Grounding and Bonding
 2. Section 270528: Interior Communication Pathways
 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 273226: Ring-Down Emergency Telephone
 10. Section 281300: Access Control System
 11. Section 282300: Video Surveillance Control and Management System
- B. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
- C. 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.
- D. 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.
- 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
- F. Definitions:
1. ANSI – American National Standards Institute
 2. EIA – Electronics Industries Alliance
 3. IEEE – Institute of Electrical and Electronic Engineers
 4. ISO – International Organization for Standardization
 5. Multi-path – The possible multiple routes of a single source of RF energy due to reflection, refraction, or diffraction.
 6. NEC – National Electrical Code
 7. NEMA – National Electrical Manufacturing Association
 8. UL – Underwriter's Laboratories

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G. Conflicts:

1. Between reference requirements and contract documents: Comply with the one establishing the more stringent requirements.

1.4 SUBMITTALS

- A. Qualifications: Demonstrate compliance with requirements of Paragraph 1.5 below.
- B. Submit manufacturer's technical data for each product provided.
- C. Submit HAS provided card reader software programming work sheet for each card reader a minimum of two weeks prior to cut-over of the respective card reader.
- D. Submit technical and operations manuals.
 1. Manuals shall describe function, operation, and programmable parameters for each device to be installed.
 2. Manuals shall include required maintenance to be performed.
 3. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed.
 4. Manuals shall include required maintenance to be performed.
 5. 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. List of HAS naming conventions for logical devices and Card reader (i.e. Facility (C), Geo (N), Level (1) = CNE-1001) and associated devices
- F. AOC Security Schedule in Excel (See Exhibit A) Test Equipment Calibration Certificates
- G. Test results
- H. Spare parts list and quantities
- I. Warranty list with equipment make, model, serial number, commission date, warranty start date, and, warranty end date. Also include RMA Procedure and contact information for warranty claims.
- J. Schedule of Unit Price Values
- K. As-builts to include but not limited to HAS' naming conventions, card readers, cameras, door numbers per layer, per floor. Submitted in latest Auto-CAD version.

1.5 QUALITY ASSURANCE

A. Contractor Qualifications:

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1. The contractor shall 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 shall be factory certified by the manufacturer(s) as having completed the necessary training to complete their part of the installation. Written confirmation of such certification by manufacturer(s) shall be submitted to the Owner if requested.
 3. Contractor shall provide five references for projects completed within the last five years of approved equivalent scope, type and complexity.
- B. Equipment and materials supplied shall be a standard product of manufacturers regularly engaged in the manufacture and installation of access control systems 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.
- D. HAS retains the right to access and inspect all work during the entire duration of the project. Any items that do not adhere to the standards, reference, contract, bid, or project documents will be corrected immediately at the expense of the contractor.

1.6 WARRANTY

- A. Warrant all equipment and work for a period of not less than one year following formal notice of substantial completion or commencement of beneficial use. 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 Licenses
1. Required software licenses shall be identified and supplied by the Contractor.
 2. All software licenses and warranties shall be registered in the name of Houston Airport System.

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1.7 PROCUREMENT

- A. Procure equipment specified in this document in order to ensure that the technology is acquired in a timely fashion, but not outdated by the installation date.
- B. The Contractor shall not purchase any materials requiring submittals until the City Engineer approves the submittal for that material and the Technology Implementation Schedule.
- C. All products shall be purchased not earlier than 6 months prior to installation.

1.8 DOOR PERMITTING

- A. Contractor is responsible for submitting permit drawings for approval by the City of Houston permitting office.
- B. Contractor is responsible for coordinating the final inspection with the City of Houston permitting office.
- C. Contractor is responsible for all fees and materials required for door permitting.
- D. Contractor shall notify Engineer if door configuration is not code compliant.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All products shall be procured not earlier than 6 months prior to installation as required to ensure delivery of current technology. Contractor shall warrant that all products will be supported by the contractor and manufacturer for a minimum of two years following acceptance by the Owner.
- B. Unless otherwise noted, all materials and equipment shall be new, of the type, capacity, and quality specified and free from defects. Material shall bear the label of or be listed by the Underwriters' Laboratories (U.L.) unless of a type for which label or listing service is not provided.
- C. All equipment listed in this specification may not be required. It is the Contractors responsibility to determine exact equipment and quantities from the contract drawings.
- D. For compatibility and ease of installation, materials shall be of same brand or manufacturer throughout for each class of material or equipment, wherever possible.
- E. All enclosures for all equipment shall be of metal throughout the system unless noted otherwise.

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2.2 INTELLIGENT FIELD PANELS (IFP's):

- A. The Intelligent Field Panel shall be connected to the security host, by means of a TCP/IP network. It shall respond to commands from the host. Each IFP shall connect into the TCP/IP network through an Ethernet HUB. The IFP shall forward to the host information regarding access, status and alarms, which the IFP has gathered from the readers and sensor devices that the IFP controls. The IFP shall meet or exceed the following functional requirements: Each IFP shall be identifiable from the central host by means of a unique IP address. IFPs and associated modules and components shall be manufactured by Honeywell, no substitution.
- B. The IFP shall operate normally as an online device.
- C. In its offline mode, the IFP shall be able to save (buffer) 50,000 badge transactions.
- D. When the IFP returns to online mode from its stand-alone (offline) mode of operation, the transactions it stored shall be transmitted to the host during the subsequent polling sequences. Such transmission shall not impede current transaction processing. Historical activity must be differentiated from current activity.
- E. Any portal controlled by the IFP shall be capable of being opened or closed by the issuance of a command from the host.
- F. Each IFP shall be capable of supporting up to 64 card readers for badge access.
- G. The IFP shall support readers, which utilize HAS compatible smart card technology.
- H. Time shall be generated locally at each IFP, and the local time shall be capable of being updated for accuracy from a host master clock at any time.
- I. The IFP shall be in current factory production.
- J. The IFP shall include power backup in the form of re-chargeable batteries. In the event of an AC power failure, the battery backup shall protect any data or software stored in the memory of the IFP for not less than 1 hour.
- K. The IFP shall be installed with capacity to connect one additional card reader for each 3 card readers installed.
- L. Operation from 0 to +49 degrees Celsius, at up to 85% non-condensing relative humidity.
- M. Provide each IFP with an enclosure. Enclosures shall be rack mounted if it is determined that this configuration would result in a more reliable, simple to service, and less costly system. Remote mounting of these devices is also approved. Provide each enclosure with an integral tamper alarm switch.
- N. The IFP shall be capable of maintaining a database of badge holders, badge holder PINs (user definable) and their privileges. During degrade mode, the IFP will continue

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to grant appropriate accesses for individuals based on this database and shall not degrade the access selection rules. IFPs are to be capable of maintaining at least 240,000 badge holders.

- O. The IFP shall communicate via an Ethernet TCP/IP or RS232 communication data interface.
- P. Provide the intelligent controller with an Ethernet daughter board, a 3MB memory expansion module and a daisy-chain harness.
- Q. COMPONENT MODELS:
 - 1. Intelligent Field Panels PW7K1IC
 - 2. Enclosure PW5K1ENC2
 - 3. Enclosure power supply PW7KPSU120
 - 4. Dual Reader Module PW7K1R2
 - 5. Input Module PW7K1IN
 - 6. Output relay Module PW7K1OUT
 - 7. Daisy-chain harness PW5K1DCC

2.3 CARD READERS:

- A. Provide HID iCLASS Elite Contactless Smart Card readers, NO EXCEPTIONS, as shown on the drawings. Card readers shall be "single-package" type, combining controller, electronics and antenna in one package, in the following configurations:
 - 1. R40 - Contactless Smart Card Reader, Wall Mounting (Single-Gang Mounting Applications)
 - 2. iClass SE@R10 /iClass SE@R15 - Contactless Smart Card Reader, Special Mounting (applications with a minimum of mounting space) Provide "surface" mounting style contactless smart card readers for door mullions, special minimum-space mounting configurations, and where shown on plans.
 - 3. RK40 - Contactless Smart Card Reader with Keypad, Wall Mounting (Single-Gang Mounting Applications) Provide "single-gang" mounting style contactless smart card readers for wall mounting, Vehicle Stanchions and Pedestals, and where shown on plans.

2.4 DOOR POSITION SWITCHES

- A. Recessed Door Position Switch
 - 1. Construction - totally encapsulated brushed housing.
 - 2. Life Expectancy - Greater than 10,000,000 cycles.
 - 3. Gap distance - 5/8" or greater for contacts on pedestrian doors; 2" or greater for overhead doors.
 - 4. UL listing - UL listed 634 for use with security systems.
 - 5. The door position switch shall be recessed, normally closed, with a wide gap.

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6. Interlogix 1078W or Department of Aviation approved equivalent substitute.

B. Overhead Door Position Switch

1. Construction: Aluminum
2. Contact Configuration: N.O, SPDT
3. Environmental Specifications: Hermetically Sealed Reed Switch Encapsulated in Polyurethane
4. Lead Type: 3/16 Armored (A) Stainless Steel Cable with Wire Leads
5. Interlogix 2200 Series or Department of Aviation approved equivalent substitute.

C. Surface Mounted Door Position Switch

1. Construction: Aluminum
2. Electrical Configuration: SPDT
3. Lead Type: 3' 3/16" Armored Cable
4. Interlogix 2500 Series or Department of Aviation approved equivalent substitute

2.5 ELECTRIC LOCKS

A. Electrified Mortise Lock:

1. Replaceable breakaway spindle.
2. Solid stainless steel 1.5" deadbolt with 1" throw.
3. Reversible handing without disassembly (lock case is not required to be opening in order to reverse).
4. Universal lock chassis.
5. Free-wheeling lever to resist force when locked.
6. Independent heavy-duty spring cage for level support.
7. Interchangeable core compatible with master keying, grand master keying and construction keying. Furnish core that is compatible with existing HAS Master cores (Best Series V Core).
8. Furnish with ADA compliant lever set that is consistent with building standards.
9. Lockset shall include request-to-exit feature and fail secure design.
10. Furnish with switch for monitoring of the retractor crank. Switch to be activated when rotation of the lever rotates the retractor hub.
11. Inside lever must allow immediate egress.
12. Electric Lock: Best Model 45 or Department of Aviation approved equivalent.

B. Electric Strikes

1. Stainless Steel ANSI size Faceplate
2. Frame Type - Hollow Metal or Aluminum
3. Corrosion - Resistant case and moving parts
Tamper Strength Test - 1700 lbs. (765kg)
4. Cycle Test 500,000 cycles

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5. Keeper Depth - 5/8" Maximum Latch Projection possible with 1/8" Door/Frame Clearance - 3/4"
 6. Strike Depth 1.50" Overall
 7. Handed - When ordering indicate RH or LH
 8. ANSI/BHMA A 156.5 (1-1/4" x 4-7/8"), fits cutout Specification A 115.1 (with slight jamb modification)
 9. Keeper Opening 3/8" below center line
 10. Electric Strike: ROFU or approved Department of Aviation approved equal.
- C. Electromagnetic Lock: Provide magnetic lock complete with necessary mounting brackets, adapter plates, and mounting hardware. Locks shall have the following features and characteristics:
1. Construction - lock body constructed of steel with aluminum finish. Strike plate constructed of 1/2" cadmium plated steel.
 2. Holding force - 1200 lbs. or greater for doors without panic hardware, 500 lbs. or greater for doors equipped with panic hardware.
 3. Mounting - surface mounted on frame and door. Provide brackets and Adapters as required.
 4. Power - 24 VDC, not more than 0.2 amps for 500 lb. Units and not more than 0.5 amps for the 1200 lb. units.
 5. Door Status Sensing (optional) - Dry contact closure to the Intelligent Field Panel or Reader/or reader controls to indicate that the magnetic bond is present between the lock and the strike plate.
 6. Remote Control - Accept control via power interruption from the Intelligent Field Panel or reader (or reader controller) to lock/unlock the door.
 7. Electromagnetic locks shall be ROFU or Department of Aviation approved equivalent.
- D. Electric Power Transfer:
1. The electrical power transfer shall provide a means of transferring electrical power from a door frame to the edge of a swinging door. Provide with the following minimum features:
 - a. The unit shall be completely concealed when the door is in the closed position.
 - b. The unit shall provide access for up ten (10) 24 AWG wires, up to 1 amp at 24VDC with a maximum surge of 16 amps.
 - c. The unit shall be UL listed for use on fire doors.
 - d. Stanley APEX2000 Series or Department of Aviation approved equal. Electrified hinges shall not be acceptable.
 - e. Electrified hinges shall not be acceptable.

E. Electrified Panic Hardware:

1. The panic hardware shall be suitable for emergency/fire exit and provide optional delayed-egress functionality. The unit shall include the following minimum features/functions:
 - a. The unit shall be permit connection to the fire alarm system for immediate release upon alarm condition.
 - b. All controls, auxiliary locking, local alarm and remote signaling output shall be self-contained inside the unit.
 - c. The unit shall be installed with an electric mortise lock when electric locking is required.
 - d. The unit shall provide a request-to-exit feature to detect when someone attempts to exit. The feature will active when a force of less than 15 pounds is applied.
 - e. An option shall be included so that alarming does not occur for a period 2 seconds pf pressure on the unit to avoid nuisance alarming. This shall be a selectable feature capable of being turned off for immediate alarming.
 - f. The unit shall be installed with a minimum of three relays. One relay shall be tied into an external audible alarm. One relay shall be tied into an external visual alarm and one relay shall be spare.
 - g. The unit shall include a key switch for alarm reset, arm or disarm.
 - h. The delay time shall be a programmable feature from 0 to 60 seconds as defined by the user.
 - i. Von Duprin CHEXIT #9975L-F0E0 or Department of Aviation approved equivalent substitute.

2.6 LOCK POWER SUPPLIES

A. Rack Mounted Power Supply: Provide 24VDC power supply

1. 12 amp @ 12VDC and/or 24VDC output.
2. 2.0 amp max. current per output.
3. Sixteen (16) fuse protected non-power limited outputs.
4. 115VAC 50/60Hz. Input Normally closed [NC] or normally open [NO] dry contact inputs (switch selectable).
5. Individually selectable, Mag Lock/Strike (Fail-Safe, Fail-Secure) solid state fuse protected power outputs.
6. Fire Alarm disconnect (latching with reset or non-latching) is individually selectable for any or all of the outputs.
7. Fire Alarm disconnect input options:
8. Normally open [NO] or normally closed [NC] dry contact input.
9. Polarity reversal input from FACP signaling circuit.
10. Remote reset capability for latching Fire Alarm Interface mode
11. Filtered and electronically regulated outputs.
12. Short circuit and thermal overload protection.
13. Removable terminal blocks with locking screw flange.
14. 3-wire line cord.
15. Illuminated master power switch.

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16. Built-in charger for sealed lead acid or gel type batteries.
17. Zero voltage drop upon transfer to battery backup.
18. Automatic switch over to stand-by battery when AC fails.
19. AC fail, low battery and battery presence supervision.
20. Individual output status LEDs located on the front panel.
21. Lifetime warranty
22. Modular 2U standard EIA 19" rack mount chassis.
23. Dimensions: 3.25"H x 19.125" W x 8.5" D.
24. Allow 1/2U space on top and bottom of the unit for ventilation.
25. Altronix (Maximal) Rack mount series:
 - a. Maximal3RD (12VDC or 24VDC @6A) 16 outputs
 - b. Maximal33RD (12VDC or 24VDC @12A) 16 outputs
 - c. Houston Airport System Approved equivalent substitute.

2.7 REQUEST-TO-EXIT DEVICE:

- A. UL listed
- B. Complies with current City of Houston Building Codes.
- C. 2 5/8" Red Mushroom Button mounted to single gang backbox
- D. Momentary DPST switch contacts
- E. ASSA ABLOY Model TS-21R Series or approved equivalent.
- F. Motion Detector, Honeywell IS310WH

2.8 DURESS ALARM SWITCH

- A. SPDT switch in surface mounted plastic housing
- B. Switch remains activated until reset with key
- C. Honeywell Model 269R or approved equivalent

2.9 COMPOSITE SECURITY CABLE:

- A. 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

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- B. The composite access control cable shall be Genesis 3295 or approved equivalent for cables up to 150 feet in length.
 - 1. Cables between controlled portals and IFPs with lengths from 150 to 240 feet shall include an additional one (1) 16 AWG 2/C Shielded CMP-CL2P, Genesis 3225 by contractor used for lock power.
 - 2. Cables between controlled portals and IFPs between 240' and 400' shall include an additional (1) 12 AWG 2/C STR Shielded CMP-CL2P Genesis 3225 by contractor.

2.10 SPARE PARTS

- A. Provide 5% spare card readers of each type used with a minim 1 of each type.

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. 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. Coordinate with Owner to obtain inspection and approval of all cable raceway prior to installation of cable.
- F. Install manufacturer approved weather gasket for all Card Readers installed outdoors.

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

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- A. Unless otherwise specified herein, or shown on the drawings, provide electrified mortise locks, electric strikes or electrified panic hardware. Provide electromagnetic locks only upon receipt of written authorization from HAS.
- B. Unless otherwise specified herein, or shown on the drawings, provide end-of-line resistor packs at field device (door position switched, tamper switches, duress alarm switches, etc.) contacts as required for continuous supervision of field device cable. Resistor packs shall be located to maximize cable supervision. Resistor packs shall be configured to produce discreet annunciation of open and short conditions.
- C. The Contractor shall take all steps necessary to ensure that all public areas remain clear or are properly marked during installation or maintenance.
- 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 CONFIGURATIONS

- A. Definitions of the alarm status signals are:
 - 1. Authorized Card – Valid card has been presented. Central System logs event and approves unlock.
 - 2. Undefined Card – A card that is not in the system has been presented (used to detect lost or stolen cards). Central System logs event and disapproves unlock and reports alarm event.
 - 3. Invalid Area – Card has been presented at a reader that is not a part of the readers assigned to that card. Central System logs event and disapproves unlock and reports alarm event.
 - 4. Invalid Time Period – Card has been presented at a time that is not defined in the system as a valid time assigned to that card. Central System logs event and disapproves unlock and reports alarm event.
 - 5. Expired Card – Card that is presented has been programmed to be inactive after a specific date. Central System logs event and disapproves unlock and reports alarm event.
 - 6. Inactive Card – Card that is programmed in the system as inactive is presented. Central System logs event and disapproves unlock and reports alarm event.
 - 7. Door Held Open Alarm – A door is held open longer than the programmed time. Alarm event is sent to Central System.
 - 8. Forced Door Alarm – A door that has been opened without presenting a valid card or PIN code and received an unlock command. Alarm event is sent to Central System.
 - 9. Door Restore – The door has been closed and condition has returned to normal and event is sent to Central System.
- B. Install each configuration listed below found on drawings with the appropriate functional description and alarm/status signals.
 - 1. Type 1 – single door, single card reader, door contacts, electric panic hardware w/latch retraction and integral REX, EPT.

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2. Type 2 – single door, single card reader, door contacts, Electric Mortise Lock w/integral REX, EPT.

3.5 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 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.

3.6 ACCEPTANCE TESTING

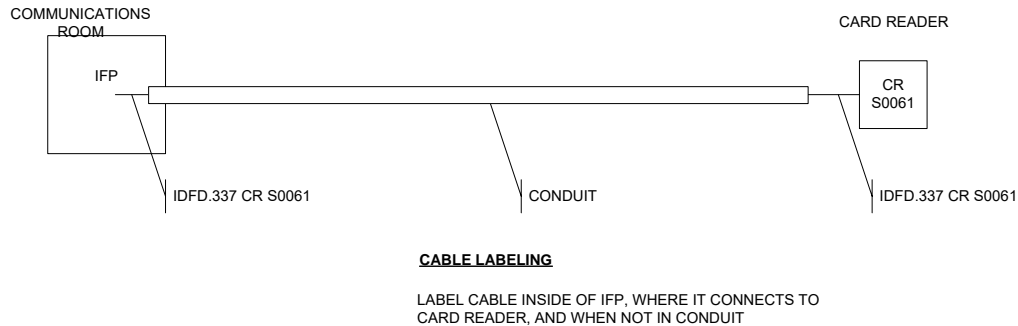
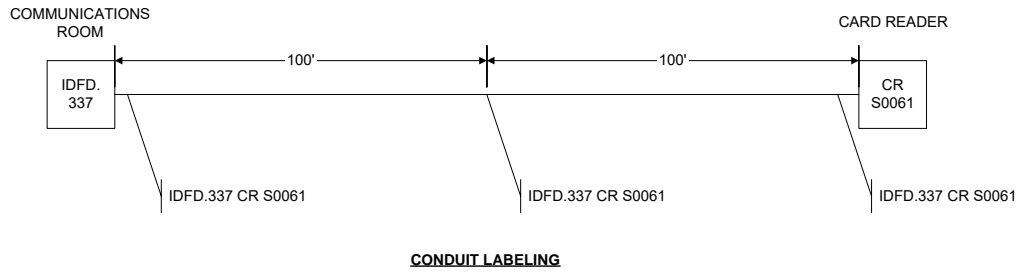
- A. The contractor shall develop and execute an onsite acceptance-testing program.
- B. The contractor shall coordinate with HAS Technology the input of GIS Locations for all devices into the ArcGIS System used by HAS. The contractor shall reference the HAS ArcGIS Device Location Spreadsheet "Exhibit B" as a reference for the data needed for each device installed.
- C. 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.
- D. 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.

3.7 IDENTIFIERS, LABELS AND LABELING SYSTEM

- A. Label each card reader on the card reader spacer. Label shall be permanently engraved on a Lexan back plate. The label shall include the card reader number. Coordinate with HAS for sample.
- B. Submit Shop Drawing showing Lexan back plate details.

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3.8 CABLE AND CONDUIT LABELING:



3.9 RECORD DRAWINGS

- A. Site Prints: Maintain a set of clearly marked black-line prints of the Construction Documents 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 Construction Documents 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 shall be referenced by at least two permanent structure points.
- B. Upon completion of work, incorporate into AutoCAD and/or Revit (latest release) all marks from site prints and produce two bound sets of draft Record Drawings for use and verification during acceptance testing. The draft Record Drawings shall utilize the latest Architectural background drawings and shall incorporate all modified drawings as outlined in Article 1.04 of this Section, or any other drawings which were developed during the installation process. Any changes to the required Record Drawings as a result of acceptance testing shall be redlined on these sets as required. As-builts to include but not limited to HAS' naming conventions, card readers, cameras, door numbers per layer, per floor. Submitted in latest Auto-CAD version.

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- C. Upon completion of acceptance testing, incorporate into CAD and/or Revit files (latest release) all marks from the site prints, including any revisions made to the drawings outlined in Section 1.4 (Submittals) of this Section. Produce one set of clean Record Drawings on vellum and a minimum of four (4) USB flash drives as a complete set of Record Drawings.

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EXHIBIT A

AOC Security Schedule

| CONSTRUCTION DRAWINGS | | | | | | | | | | | | | HOUSTON AIRPORT SYSTEM | | | | | | | | | | | |
|-----------------------|----------------|-----------------------------|---------------|-------------------------------|----------------------------------|------------------|-------------------|-------------------|----------------|----------|-----------|--------|------------------------|----------------|-------------------|-------------|-------------|-------------|----------------------|-----------------------------|--------------------------|----------------------|-----------------------------|-------|
| ITEM NO. | CARD READER ID | CARD READER NAME | ASSOC CCTV ID | AC CABLE TERMINATION LOCATION | MOUNT DETAIL (RE: T-403 666 SER) | CARD READER TYPE | DOOR HARDWARE SET | PROWATCH PANEL ID | PANEL POSITION | COMMENTS | CARD TYPE | DOOR # | DWG # | CLEARANCE CODE | SECURITY PRIORITY | FLOOR LEVEL | PORTAL TYPE | PORTAL NAME | DEVICE ID (PROWATCH) | ROOM LOCATION | CCTV ID (MAXPRO) PRIMARY | LOCATION DESCRIPTION | CCTV ID (MAXPRO) ALTERNATES | NOTES |
| 1 | CR1001AB | ADMIN MAIN ENTRY DOOR | S3002 | MDF-L30 | L1-2 | RK60 | 804 AT | L30-1 | 2B | | | A130A | T-107 | | | 1 | Door | | | ADMIN MAIN ENTRY DOOR | | | | |
| 2 | CR1002 | MDF-L30 ROOM | S3003 | MDF-L30 | L1-1 | RK60 | C207 | L30-1 | 2A | | | A133A | T-107 | | | 1 | DF | | | MDF-L30 ROOM | | | | |
| 3 | CR1003 | HANGAR BAY 2 SE ROLL-UP | S3007 | MDF-L30 | L1-5 | RK60 | 001 | L30-1 | 3A | | | 102K | T-106 | | | 1 | OHD | | | HANGAR BAY 2 SE ROLL-UP | | | | |
| 4 | CR1004 | GSE SE ROLL-UP 1 | S3101 | DF-L31 | L1-5 | RK60 | 001 | L31-1 | 2A | | | G101J | T-106 | | | 1 | OHD | | | GSE SE ROLL-UP 1 | | | | |
| 5 | CR1005 | GSE SE ROLL-UP 2 | S3105 | DF-L31 | L1-5 | RK60 | 001 | L31-1 | 2B | | | G101G | T-105 | | | 1 | OHD | | | GSE SE ROLL-UP 2 | | | | |
| 6 | CR1006 | GSE SOUTH ROLL-UP 3 | S3109 | DF-L31 | L1-5 | RK60 | 001 | L31-1 | 3A | | | G101E | T-105 | | | 1 | OHD | | | GSE SOUTH ROLL-UP 3 | | | | |
| 7 | CR1007 | GSE SOUTH DELIVERY DOOR | S3111 | DF-L31 | L1-4 | RK60 | 735 | L31-1 | 3B | | | G101D | T-104 | | | 1 | DOOR | | | GSE SOUTH DELIVERY DOOR | | | | |
| 8 | CR1008 | GSE WEST ROLL-UP 4 | S3113 | DF-L31 | L1-5 | RK60 | 001 | L31-1 | 4A | | | G101A | T-104 | | | 1 | OHD | | | GSE WEST ROLL-UP 4 | | | | |
| 9 | CR1009 | HANGAR BAY 1 SW ROLL-UP | S3204 | DF-L32 | L1-5 | RK60 | 001 | L32-1 | 2A | | | 101F | T-104 | | | 1 | OHD | | | HANGAR BAY 1 SW ROLL-UP | | | | |
| 10 | CR1010 | CIRCULATIO N SOUTH ROLL-UP | S3203 | DF-L32 | L1-5 | RK60 | 001 | L32-1 | 2B | | | E101D | T-109 | | | 1 | OHD | | | CIRCULATIO N SOUTH ROLL-UP | | | | |
| 11 | CR1011 | CIRCULATIO N SOUTH DELIVERY | S3202 | DF-L32 | L1-4 | RK60 | 735 | L32-1 | 3A | | | E101C | T-109 | | | 1 | DOOR | | | CIRCULATIO N SOUTH DELIVERY | | | | |
| 12 | CR1012 | DF-L31 ROOM | S3110 | DF-L31 | L1-1 | RK60 | C207 | L31-1 | 4B | | | G103A | T-105 | | | 1 | DF | | | DF-L31 ROOM | | | | |
| 13 | CR1013 | DF-L32 ROOM | S3201 | DF-L32 | L1-1 | RK60 | C201 | L32-1 | 3B | | | E121A | T-108 | | | 1 | DF | | | DF-L32 ROOM | | | | |
| 14 | CCM-L30-01 | ADMIN SOUTH EVAC | S3004 | MDF-L30 | L1-3 | N/A | 725 | L30-1 | 9-1 | | | A140A | T-107 | | | 1 | EVAC | | | ADMIN SOUTH EVAC | | | | |
| 15 | CCM-L30-02 | HANGAR BAY 2 EAST EVAC | S3006 | MDF-L30 | L1-3 | N/A | 725 | L30-1 | 9-2 | | | 102L | T-106 | | | 1 | EVAC | | | HANGAR BAY 2 EAST EVAC | | | | |
| 16 | CCM-L30-03 | HANGAR BAY 2 MECH YD EVAC | S3008 | MDF-L30 | L1-3 | N/A | 725 | L30-1 | 9-3 | | | 102J | T-106 | | | 1 | EVAC | | | HANGAR BAY 2 MECH YD EVAC | | | | |
| 17 | CCM-L31-01 | GSE SE EVAC1 | S3102 | DF-L31 | L1-3 | N/A | 725 | L31-1 | 9-1 | | | G101K | T-106 | | | 1 | EVAC | | | GSE SE EVAC1 | | | | |

* Exhibit A to be submitted by contractor per paragraph 1.4, F.

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SECTION 28 20 10 - EXIT ANTI-BACKFLOW SYSTEM (EABS)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes all materials and labor required for the installation, testing, commissioning, and documentation of Exit Anti-Backflow System as shown on the Drawings and specified herein.

1.3 SYSTEM DESCRIPTION

- A. Exit Anti-Backflow System (EABS) shall be installed in the locations as indicated with the intent to prevent or deter persons from entering into a secured exit-way from the wrong direction. System shall utilize CCTV cameras and software-based video analysis to detect wrong-way motion, sound an alarm, initiate visual signals, capture image of person(s), digitally record and store alarm events and send an alarm signal to the ACS in order to prohibit entry to the secured area. The Exit Anti-Backflow System shall utilize all commercial off the shelf (COTS) equipment for all active electronic components, and all Exit Anti-Backflow System equipment shall be furnished by the Exit Anti-Backflow System manufacturer as a complete and tested system from the factory. All components required for Exit Anti-Backflow System shall be furnished and tested by the Exit Anti-Backflow System manufacturer in order to assure system compatibility, and a complete and functional Exit Anti-Backflow System.

1.4 RELATED SECTIONS

1. Division 28 Specification – “Automated Access Control System”.
2. Division 28 Specification – “Closed Circuit Television System”.

1.5 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1.6 SHOP DRAWINGS

- A. Product Data: Submit manufacturer’s data on Exit Anti-Backflow System components including, but not limited to, electrical specifications, mechanical specifications, rough-in information, engineered wiring diagrams and instructions for installation, operation and maintenance, suitable for inclusion in maintenance manuals.
- B. Shop Drawings: Provide Shop Drawings showing equipment locations and arrangements.
- C. Assembly drawings: Provide assembly drawings with location and dimensions shown.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Intent: The intent of this Section is to require complete documentation of the Exit Anti-Backflow System for the purpose of system operation and maintenance during and after the warranty period. It is intended that the operation and maintenance manuals be exhaustive in the coverage of the system to the extent that they may be used as the sole guide to the troubleshooting, identification and repair of defective parts.
- B. Scope: The Contractor shall provide six (6) complete drawing books and maintenance and operation manuals on the completed system. These manuals shall include basic wiring diagrams, schematics, and functional details. It is required that everything in the system be neatly labeled and easily identifiable. The Contractor shall provide one (1) set of all Drawings as reproducible, and where the Drawings are CAD generated, provide the drawing files in machine-readable CAD format. The preferred CAD package is AutoCAD. Provide one (1) set of all schedules and tables in machine-readable text format.
- C. Maintenance Manual Requirements: The maintenance manual requirement of this section is in addition to Shop Drawing requirements. Maintenance manuals and drawing sets shall be compiled after system fabrication and testing, and shall incorporate any changes made after Shop Drawing submittal. The maintenance manuals and drawing books shall be permanently bound in hard plastic covers.
- D. Maintenance Manuals, Manufacturer's Literature: Provide manufacturer's standard literature, covering all equipment included in the system. The maintenance manuals shall contain specifications, adjustment procedures, circuit schematics, component location diagrams, and replacement parts identification. All references to equipment not supplied on this Project shall be crossed out.
- E. Drawing Books: All Drawings developed specifically for this Project shall be reduced to 11" X 17", folded and bound with hard plastic covers. The Drawings shall be easily readable after reduction, even if this requires Drawings to be broken into multiple sheets. Under no circumstances shall text be smaller than 1/16-inch after reduction. Provide component identification and cross reference on the Drawings to allow the maintenance department to understand the function of each item (the block diagram), find the room where the device is mounted (Contract Document Plans), find its location in a rack (arrangement drawings), find how it is wired (wiring diagrams), and its detailed Specifications (vendor data sheets), and how to repair it (spare part lists). Include the following drawings as a minimum:
1. Arrangement Drawings: Provide Drawings showing the physical arrangement of all Exit Lane equipment and components.
 2. Spare Parts Lists: Submit cost lists of manufacturers recommended spare parts to maintain the equipment with a minimum of down time. This list shall include part names, part numbers, and source for additional purchase. The parts list shall be cross-referenced to the manufacturer's literature and the product data.
 3. Special Tools List: Submit a list of special tools required to maintain the Exit Anti-Backflow System. Include on the list the name, part number, and source for all special tools.

4. Special Test Equipment List: Submit a list of special test equipment required to prove that all components of the system are functioning per Specification.

1.8 INTELLECTUAL PROPERTY

- A. Patents: Should patented articles, methods, materials apparatus, etc., be used in this Work, the Contractor shall acquire the right to use the same. The Contractor shall hold the Airport and its agents harmless for any delay, action, suit, or cost growing out of the patent rights for any device on this Project.
- B. Copyrights: Should copyrighted software be used in this Work, the Contractor shall acquire the right to use the same. The Contractor shall hold the Airport and its agents for any delay, action, suit, or cost growing out of the copyrights for any software on this Project.
- C. License to use: All software required for the complete operation of the equipment as specified herein shall be delivered with either full Ownership transferred to the Airport or a License to use at this site, including the right to make back-up copies.

1.9 WARRANTY

- A. Period: The Contractor shall warranty all labor, workmanship, and materials for a period of one (1) year from the date of final acceptance. Should a failure occur to the equipment within the first year, the Contractor shall provide all labor and materials necessary to restore the system to the condition required for the final test and acceptance for this Contract, at no cost to the Airport.

1.10 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Exit Anti-Backflow System manufacturers shall be regularly engaged in manufacture of Exit Anti-Backflow Systems, systems components and accessories, of types, capacities and characteristics required herein, whose products have been in satisfactory use in similar service for not less than five (5) years. The Exit Anti-Backflow System manufacturer must show proof of at least ten (10) functional Exit Anti-Backflow System installations of similar size and scope that they have provided within the last five years.
- B. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical components and accessories.
- C. UL Compliance and Labeling: Provide equipment, which is UL-listed and labeled.

1.11 CODES AND STANDARDS

- A. All applicable local codes and HAS Design Standards, refer to the Architectural Plans.

1.12 REFERENCES

- A. The publications listed below form part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only. 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 date of Contract unless the Document is shown dated.

1. Conflicts: Between referenced requirements and Contract documents: Comply with the one (1) establishing the more stringent requirements.
2. References:
 - a. UL - Underwriters Laboratory.
 - b. Federal Aviation Administration.
 - c. TSR 1542 – Airport Security.
 - d. TSR 1544 – Aircraft Operator Security.
 - e. TSR 1546 – Foreign Air Carrier Operator.
 - f. TSR 1548 – Indirect Air Carrier Security.
 - g. ANSI – American National Standards Institute.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Factory Assembly: All necessary components for a complete and fully functional system, including, but not limited to computers, software, monitors, keyboard, mouse, digital recording equipment, user interface, system printer, uninterruptible power supply (UPS), etc., shall be mounted and installed in a standard EIA equipment rack pre-wired, finished with filler panels and front/ rear locking doors, factory tested and furnished with identified terminals for landing field device wiring (from cameras, audio/visual devices, optional remote monitors, optional ancillary systems interface, etc.)
- B. Delivery: Deliver Exit Anti-Backflow System properly packaged in factory fabricated type containers.
- C. Handling: Handle equipment and components carefully to avoid breakage, impact, denting and scoring finishes. Do not install damaged equipment. Replace and return damaged units to equipment manufacturer.

1.14 SEQUENCING AND SCHEDULING

- A. Coordination: Coordinate with other Work, including electrical wiring Work, as necessary to interface installation of Exit Anti-Backflow System with the ACS and CCTV System installation.
- B. Sequencing: Sequence Exit Anti-Backflow System Installation Work with other Work to minimize possibility of damage and soiling system during remainder of construction period.

PART 2 PRODUCTS

2.1 GENERAL

- A. Power: Equipment shall operate on 120-VAC. Any special power treatment required, such as filtering or spike elimination that may be required for proper operation and protection of the system, shall be provided with the system.
- B. Backup Power: Equipment shall be supplied from an active online UPS system. The UPS shall provide back up power for a minimum of fifteen (15) minutes.

2.2 MANUFACTURERS

- A. General: Subject to the requirements of the quality assurance specifications, provide all equipment of like kind by a single qualified Exit Anti-Backflow System manufacturer.
 - 1. CheckVideo, LLC – ExitSentry by Tyco (Basis of Design)
 - 2. Dormakaba – Exit Breach Control
 - 3. Securenet, Inc.
 - 4. Or Pre-Approved Equal

2.3 SYSTEM CONTROLS AND FUNCTIONS

- 1. System Controls – The system controls shall be able to be remote from the actual detection unit to allow the equipment to be located in the Security Screening Checkpoint areas. The equipment located remotely shall be capable of viewing alarm events, seeing video from the area, and resetting the equipment either from the checkpoint or locally at the controlled point.
- 2. Any critical system operation buttons shall have protective guards to prevent the accidental pressing of a button. The Exit Anti-Backflow System shall not require computer training or skills for basic operation. The system shall also provide the capability of adding an optional Remote Command Terminal (RCT), which includes an LCD monitor and custom color-coded mini-control keyboard/mouse for remote monitoring and control of the Exit Anti-Backflow System system. The RCT shall have all the same reporting video and control capabilities that are available at the primary system's operator interface. The RCT shall require one CAT-5E cable for connection from KVM Extender to the system Central Control Rack, and the maximum cable distance shall be 800'.
- 3. System Requirements: The system shall detect persons or objects that pass through the alarmed area in the disallowed direction, regardless of the amount of traffic moving the correct direction in the exit lane. The following features shall be included in the system:
 - a. Pre-alarm: The system shall have a pre-alarm function that will warn people to stop before entering the alarm area. The pre-alarm is intended to reduce the number of nuisance alarms. Upon pre-alarm, an audible announcement will be played warning people that they are about to violate the area. The announcement shall be included as a part of the system, but must be able to be changed easily. The pre-alarm shall extend out in front of the actual alarm zone (minimum length

of 8 feet).

- b. Alarm: The system shall alarm upon detecting a person or object passing through the alarm zone in the disallowed direction. The allowed directions of travel shall be configurable on the system. The size of the alarm zone shall be configurable (minimum of 12' length). The system shall include a masking function to allow definition of the alarm zone from the head-end without requiring the adjustment of equipment.
- c. Computer Video Loop Play/Record: Upon alarm, the system shall display a video loop comprised of captured images from before and after the alarm event. The times or frames from before and after the alarm event shall be configurable. The video loop shall be able to be stopped and the frames shall be viewable individually. The frames shall be printable using a printer included as a part of the system. The Exit Anti-Backflow System shall maintain at least 2000 uncompressed video loops (six second loop) at 15 fps and will time/date stamp in the system log.
- d. DVR Recording: The Anti-Backflow System system shall utilize a digital video recorder (DVR) independent of the system computer. That shall record 24 hours, 30-day archive at 15 fps with time/date stamp. The cameras shall be recorded in a video quad view with 4 cameras shown on the screen. The DVR shall be capable of exporting video clips to other media.
- e. System Logging: The system shall log all events that occur on the system. This log shall record all events that occur on the system including, but not limited to, alarms, logins to configurations, alarm resets, and the alarm frame stored along with the alarm event record. The log shall keep a maximum of 5000 records.
- f. System Configuration Utility: The system shall contain a configuration utility. The utility shall be password protected. There shall be 2 levels of password protection (Supervisor and Administrator). The log-ins shall determine the access possible for the system. All log-ins and access levels shall be configurable by a person with the highest level log-in access. The utility shall be able to view alarm events and logging, enter configuration screens to edit the parameters noted in the above sections, and shall be able to add and delete users and change access levels.
- g. Video Diagnostics: The system shall incorporate AlarmView diagnostic utility that automatically records the detection cameras alarm frame and its specific alarm analysis data. It includes a time/date stamp per alarm and maintains up to 2000 alarms of frame/data per detection camera. All Anti-Backflow System cameras are monitored for "Lost Video" detection and will display a message for the specific camera that has the lost video condition.

2.4 SYSTEM TECHNICAL PARAMETERS

- A. Equipment: The system active equipment shall be comprised of industrial quality Commercial-Off-The-Shelf equipment for all active electronic components. The equipment shall not be proprietary.

- B. Motion Detection: The system shall be capable of detecting an object the size of a standard sized baseball (2.9" diameter) minimum. Detection object height and width depends on alarm detection zone.
- C. Inputs/Outputs: The system dedicated outputs to operate remote strobe units and audible system field devices. The system has inputs for external controls to Alarm Reset, Bypass mode and Night mode the system. The system has outputs for external controls for the following conditions; Alarm (latching or momentary), Pre-Alarm (momentary) and Saturation (momentary). All inputs and outputs are in the normally open condition. Typical system interfaces are ACS, CCTV and door control.
- D. System Video: The video from Anti-Backflow System cameras shall be capable of being tied into a CCTV system to allow distribution or remote viewing of cameras. Also, the system shall be able to output the system video and the quad view recorded by the DVR to the CCTV system. All equipment shall be included to allow the output of the video signals in standard CCTV formats.
- E. Remote Access: The system shall be remote accessible via network modem (not a dial-up modem) to allow configuration changes to the system remotely. The modem shall be external type modem with a power switch so that the modem can be powered off under normal conditions to prevent unauthorized access to the system. All remote access shall be logged in the logging function of the system.
- F. Adaptable: The Exit Anti-Backflow System shall be adaptable and capable of being relocated and re-installed in a different location with modified dimensions within system limitations. The system shall accommodate the new location through reconfiguration of the system software and a minimum amount of additional hardware providing the new location is suitable for Exit Anti-Backflow technology.

PART 3 – EXECUTION

3.1 INSTALLATION OF EXIT ANTI-BACKFLOW SYSTEM

- A. General: The Contractor shall investigate the site and become thoroughly familiar with the facility. The Contractor shall plan the Exit Anti-Backflow System installation such that the Exit Anti-Backflow System is installed on a satisfactory, computer-generated schedule developed between contractor and the Airport representative. Furnish and install equipment in locations as noted on plan or from direction by the Airport representative.
- B. Manufacturer's Instructions: Install Exit Anti-Backflow System in accordance with equipment manufacturer's written instructions.
- C. Lighting: Lighting source should provide illumination uniformly maintained to be greater than an average of 25-foot/candles at floor level in the detection zone. Uniform ambient light levels must be maintained in this area. All artificial light sources shall be diffused to prevent "hot spots" glare from reflective surfaces and or shadows within the exit lane. There shall be no direct sunlight within detection zones.
- D. Glass Walls: Should glass walls be utilized to establish boundaries of this area, film glass with less than 5 percent light transmittance and less than 15 percent light reflectance inside the exit

lane should be installed to prevent effects of direct light at this area and to eliminate moving objects being viewed outside of the exit lane.

3.2 INSTALLATION OF BASIC IDENTIFICATION

- A. Identification: Install identification on junction boxes, conductors, and termination blocks related to the installation.

3.3 ADJUSTING AND CLEANING

- A. Field Adjustments: Set field-adjust system components as recommended by manufacturer.
- B. Touch-Up Work: Touch-up scratched and marred surfaces to match original finishes; remove dirt and construction debris.

3.4 SYSTEM TESTING

- A. Test Exit Anti-Backflow System, including all described subsystems and components to the minimum test requirements of manufacturer and TSA/FAA guidelines. Provide a mechanical and electrical system test as recommended by manufacturer.
- B. Problem Correction: Any problems encountered including damage to Airport owned equipment during this test will be documented and brought to the attention of Engineer and corrected at Contractor's expense. The Contractor shall promptly correct all problems encountered, providing field service personnel appropriately trained for the types of problems encountered.
- C. Test Documentation: The Contractor shall supply forms to be used during these tests for authorization and initialing by the Airport and the Contractor. This form shall clearly define the items tested, leaving room for the date, equipment designation, and initials. All Exit Anti-Backflow System functions shall be demonstrated to ensure operation as required by these Specifications and Drawings.

3.5 TRAINING

- A. Provide manufacturer system operation and administration/ maintenance training for the Airport's personnel. Two (2) categories of system training shall be provided. System operational training shall be provided for a minimum of four (4) operations personnel and administration/maintenance training for a minimum of three (3) maintenance personnel. Training shall be provided during evening working hours, with specific days, work shifts, and hours for training to be selected by the Airport. Training sessions and intervals shall be as follows:
- B. The Contractor shall provide seven (7) sets of system operations manuals for Exit Anti-Backflow System operation training. Provide training materials for each attendee to use at each training session and keep for reference. Provide three (3) copies of each piece of training material used at each session and three complete sets of system keys to the Airport at the completion of training.

3.6 ACCEPTANCE

- A. Acceptance will be withheld until the successful completion of the following:

1. Acceptance of all submittals.
2. Delivery of final documentation (including as-built documents).
3. Successful testing.
4. Successful demonstration, including equipment operation, training and documentation review.

END OF SECTION

SECTION 28 23 00 VIDEO SURVEILLANCE CONTROL AND MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 PROJECT SCOPE SUMMARY

- A. Provide all labor, materials, appliances, tools, equipment, facilities, and services necessary for and incidental to performing all operations of this Section, complete, as shown on the Design Drawings or specified herein. Work includes, but is not limited to, the following:
1. Furnish, install, integrate, configure, and commission;
 - a. IP Cameras – New cameras and replacement cameras shall utilize Systimax CAT6 network cabling (color green). Cabling shall be routed by conduit (1" min.) to the nearest existing cable tray for termination on the HAS network switch at the associated IDF as indicated on the drawings. Camera power shall be "Power over Ethernet" (POE) provided by an existing or new network switch as indicated on the drawings.
 - b. Equipment Cabinet – Provide new equipment cabinet, 208VAC@30A 3-Phase electrical circuits, cable management, and other accessories as required indicated on the drawings and specified in this manual.
 - c. Servers – Provide Blade Camera Servers and Database Servers in equipment cabinets in quantities as indicated on the drawings and specified in this manual. Servers shall include all Operating Systems, Software, and interconnect cabling required for a 100% fully functional System.
 - d. Storage Arrays - Provide Storage Arrays in equipment cabinets in quantities as indicated on the drawings and specified in this manual. Arrays shall include all Operating Systems, Software, and interconnect cabling required for a 100% fully functional System.
 2. Cameras shall be mounted, oriented, and adjusted to provide the best field of vision possible using the least amount of accessory equipment. All camera installations shall be done in such a manner as to maximize aesthetics, equipment, environmental protection, and equipment vulnerability.
 3. Unless otherwise specified, the finish and color of all cameras and housings shall be as provided by the manufacturer. Exact installation location for each device may require coordination with the HAS Representatives.
 4. Provide a transition plan based on areas of work or phases to migrate existing cameras from the existing digital recording system to the new digital recording system. The plan shall have the ability to control, monitor and retrieve live and stored video from either system such that they will both be functional simultaneously. Once the new system is commissioned and accepted by the owner, the existing system shall be decommissioned. The Transition Plan shall be submitted for approval prior to execution.

1.2 SECTIONS INCLUDES

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- A. This section includes specifications for the installation video surveillance control and management system.
- B. This section includes the performance standards, components, and installation configurations to install new High Definition and/or Megapixel Cameras, replace some of the existing analog cameras with new High Definition and/or Megapixel Cameras, replace the existing Digital Recording System, and decommission the existing Digital Recording System. The work will be performed at George Bush Intercontinental Airport (IAH).
- C. The Video Surveillance System (VSS) components shall include IP High Definition and IP Megapixel Cameras, MaxPro NVR (NVR) Recording Platform, MaxPro Video Management System (VMS), blade Database Servers, blade Camera Servers, and NVR Video Storage Arrays.
- D. Software licensing for the new cameras and new servers shall be included. Provide an additional 5% additional camera licenses for future use. Quantity of 5% refers to 5% of existing plus new cameras.
- E. The video monitoring and retrieval components shall be integrated with the Airport Operations Center (AOC). Operators in the AOC shall have the ability to view and retrieve video from any camera connected to the system, in accordance with these specifications, unless otherwise specified in the Design Drawings. Alarm events on the Access Control System (ACS) shall be integrated with NVR cameras as defined by the Houston Airport System.
 - 1. Provide for adequate time in your proposal to integrate every existing and new camera with the Access Control System for Alarm Video Call Up, PTZ Presets, and MaxPro Configuration Arrangements
 - 2. Also include Database Conversion for every existing and new camera as required.
 - 3. Request for additional funding for system integrations after project award will be denied.
- F. Provide all labor, materials, equipment, services, etc., necessary to furnish, install, integrate, configure, and commission a complete system to but not limited to:
 - 1. Cameras, housings, lenses, and associated equipment.
 - 2. Video system cabling and conduit.
 - 3. Blade Camera Servers with required software.
 - 4. Video Storage Arrays.
 - 5. Database and Video Management Software.
 - 6. Other associated equipment, as defined within this section.
- G. All IP Cameras shall conform to the ONVIF or PSIA specification to provide a common protocol for the exchange of information between network video devices including automatic device discovery, video streaming, intelligence metadata and compatibility with the HAS "Honeywell" recording system.
- H. These Specifications may include components that are not required. Use drawings to determine the quantities to be installed. Include in the original bid, all equipment, software, cabling, connectors, transformers, relays, etc., whether specified here or

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not, such that said bid fulfills the intent of these Specifications and renders these systems functional and fully operational.

1.3 REFERENCES

- A. Related Sections: The references and standards listed herein shall be considered part of this specification. Bidder and Contractor shall conform to the following references and standards:
1. Section 270526: Telecommunication Grounding and Bonding
 2. Section 270528: Interior Communication Pathways
 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 273226: Ring-Down Emergency Telephone
 10. Section 281300: Access Control System
 11. Section 282300: Video Surveillance Control and Management System
- B. Open Network Video Interface Forum (ONVIF) Ver. 2.10, or latest revision.
- C. Physical Security Interoperability Alliance (PSIA) Ver.1.0, IP Media Device specification, or latest revision.
- D. ANSI/TIA/EIA-250-C-1990 Electrical Performance for Television Transmission Systems, or latest revision.
- E. ANSI/ TIA-568-C.0 Generic Telecommunications Cabling for Customer Premises, or latest revision
- F. ANSI/ TIA-568-C.1 Commercial Building Telecommunications Standard, or latest revision
- G. ANSI/ TIA-568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard, or latest revision
- H. ANSI/ TIA-568-C.3 Optical Fiber Cabling Components, or latest revision
- I. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces, or latest revision
- J. ISO/IEC 11801 International Generic Telecommunications Cabling Standards, or latest revision.
- K. National Electric Code (NEC), 2017, or latest revision.
- L. Institute of Electrical and Electronic Engineers (IEEE), or latest revision.
- M. BICSI, Telecommunications Distribution Methods Manual (TDMM), latest revision

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- N. BICSI, Electronic Safety and Security Design Reference Manual (ESSDRM), 2nd Edition.
- O. Conflicts:
 - 1. Between reference requirements and contract documents: Comply with the one establishing the more stringent requirements.

1.4 SUBMITTALS

- A. Shop Drawings and Product Data of the following apparatus, giving full fitness and other pertinent facts, shall be submitted and approved before equipment is ordered, built, or installed, including:
- B. Manufacturers Data: Submit product literature for each piece of equipment. Literature to include:
 - 1. Catalog information for all devices and equipment.
 - 2. ONVIF/PSIA Certificate of Conformity for all IP Video Cameras and Recording Software
 - 3. Complete wiring (data and low voltage power) point-to-point diagrams for all systems and subsystems devices to be included with Operations and Maintenance (O&M) Manual.
 - 4. Panel diagrams (elevation view) showing configurations of all control equipment, power supplies, input/output devices.
 - 5. Functional block diagrams showing integrated relationship of all equipment, cabling, and termination points on one drawing.
- C. Any work which deviates from the drawings or specifications are considered alternates and must be submitted following section 01 33 00.
- D. Materials installed or work performed without approval shall be done at the risk of the Contractor and the cost of removal of such material or work which is determined to be unsatisfactory for any reason shall be at the expense of this Contractor.
- E. AOC Security Schedule in Excel (See Exhibit A).
- F. List of HAS naming conventions for logical devices and CCTV names (i.e. Facility (C), Geo (N), Level (1) = CNE-1001).and associated devices.
- G. Site Acceptance Test (SAT) Plan
- H. Test Equipment Calibration Certificates
- I. Test results
- J. Spare parts list and quantities
- K. Warranty list with equipment make, model, serial number, commission date, warranty start date, and warranty end date. Also include RMA Procedure and contact information for warranty claims.

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- L. Schedule of Unit Price Values.
- M. As-builts to include but not limited to HAS' naming conventions, card readers, cameras, door numbers per layer, per floor. Submitted in latest Auto-CAD version.

1.5 QUALITY ASSURANCE

- A. Follow Appendix B of National Electrical Code.
- B. Assure that the "as installed" system is correct and complete per construction documents: including engineering drawings, manuals, and operational procedures in such a manner as to support maintenance and future expansion of the system.
- C. 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. ALL work shall be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC standards and codes.
 - 3. 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.
 - 4. 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.
 - 5. 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.
 - 6. The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.
 - 7. 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.
 - 8. The contractor who is installing the cabling infrastructure shall have the following Systimax iPatch/imVision certifications:
 - a. SP/ND3360 - SYSTIMAX SCS 360 Solutions
 - b. SP/ND3321 - SYSTIMAX SCS Design & Engineering
 - c. SP/ND3361 - SYSTIMAX SCS Installation and Maintenance
 - d. SP/ND5510 - SYSTIMAX SCS Certified iPATCH Support Specialist (CISS)
 - 9. Cable splicing personnel shall have a minimum of five years splicing experience and shall have completed a minimum of five major splicing projects.
 - 10. 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.

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- D. HAS retains the right to 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 the expense of the contractor.

1.6 SHIPPING AND HANDLING

- A. Follow Section 01 45 00.
- B. Clearly mark containers "For Security Material Only".

1.7 TRAINING

- A. Provide training sessions as follows:
 - 1. Administrator Training – 1 session, 8 hours per session.
 - 2. User Level Training Classes – 3 sessions, 4 hours per session

1.8 UNIT PRICING

- A. Reference 00 41 00

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All products shall be procured not earlier than 6 months prior to installation as required to ensure delivery of current technology. Contractor shall warrant that all products will be supported by the contractor and manufacturer for a minimum time period as follows:
 - 1. All Cameras shall carry a minimum 3-year, complete warranty from date of commission. No charge shall be made to HAS for a warranty claim within the 3-year warranty period.
 - 2. All Servers and Server Equipment shall carry a minimum 5-year, complete warranty from date of commission. No charge shall be made to HAS for a warranty claim within the 5-year warranty period.
- B. Unless otherwise noted, all materials and equipment shall be new, of the type, capacity, and quality specified and free from defects. Material shall bear the label of or be listed by the Underwriters' Laboratories (U.L.) unless of a type for which label or listing service is not provided.
- C. All equipment listed in this specification may not be required. It is the Contractors responsibility to determine exact equipment and quantities from the drawings and their site survey.
- D. For compatibility and ease of installation, materials shall be of same brand or manufacturer throughout for each class of material or equipment, wherever possible.

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- E. All enclosures for all equipment shall be of metal throughout the system unless noted otherwise.

2.2 MANUFACTURERS

- A. The following CCTV manufacturers have been approved for use on this project. However, cameras shall be provided by a single manufacturer, once determined, to maintain architectural and maintenance continuity. The contractor must provide a separate price for each camera solution (4 separate solutions) based one of the listed manufacturers in a manner that all functional requirements are met and to ensure compatibility with the HAS recording system manufactured by "Honeywell". HAS will have the final approval on the manufacture selected.
- B. Unless otherwise noted in the Specifications, no substitutions will be accepted.
 - 1. Camera part numbers are listed in Section 2.4 below to establish a baseline product and not necessarily required.
 - 2. ONVIF/PSIA conformance is required for all IP cameras.
 - 3. All IP cameras shall have a minimum of two, H.264 video streams.
 - 4. A single manufacture is required for all cameras except 360-degree cameras.
 - 5. CCTV Components:
 - 6. Cameras shall be products by AXIS, unless otherwise noted.
 - 7. Camera lenses shall be products of AXIS, unless otherwise noted.
 - 8. Camera housings shall be products of AXIS, unless otherwise noted.
 - 9. Camera power supplies shall be products of Altronix or approved equal.
- C. Video Streamers (Encoders)
 - 1. Where required video streamers shall be products of Axis or approved equal.
- D. 360 Cameras
 - 1. Cameras shall be products of Honeywell HFD6GR1 – 6MP IR Fisheye or equivalent with HAS Prior Approval.
- E. NVR Storage and Retrieval System:
 - 1. Servers shall be products of Dell or approved equal.
 - 2. Storage arrays shall be products of Dell or approved equal.
 - 3. NVR and VMS software shall be products of Honeywell, latest release.

2.3 USER INTERFACE SOFTWARE:

- A. Contractor shall provide and install latest release of Honeywell MaxPro NVR (NVR) server application and Honeywell MaxPro VMS on all new servers and workstations. Contractor must also provide any ancillary software required such as database applications, client applications, utility applications, backup applications, fault tolerance, and fail over applications, etc. necessary for complete operation and maintenance.
- B. Contractor is responsible to furnish, install and/or upgrade server and workstation operating systems compatible with the NVR/VMS application where required.

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- C. NVR/VMS must support H2.64, MPEG-4 and MJPEG video compression algorithms.

2.4 CAMERAS

- A. High Definition IP Cameras Model Numbers:

| MFG | TYPE | DESCRIPTION | MODEL/PART# |
|------------|-------------|--------------------|---|
| AXIS | 1 | (HD IP Fixed Int) | P3245-LV 1080P |
| Honeywell | 2 | (HD IP Fixed Int) | Honeywell H3W4GR1 |
| AXIS | 3 | (HD IP Fixed Ext) | P3245-LVE 1080P |
| Honeywell | 4 | (HD IP Fixed Ext) | Honeywell H4W4GR1 |
| Honeywell | 5 | (HD IP PTZ Ext) | HDZ302LIW outdoor PTZ 30X |
| AXIS | 6 | (HP IP PTZ Ext) | Q6075-E outdoor PTZ 32X |
| AXIS | 7 | (HD IP PTZ Int) | M5525-E inside/outside 10X |
| Honeywell | 8 | (HD 360) | HFD6GR1 indoor/outdoor Fisheye IR IP camera |
| AXIS | 9 | (HD 180) | P3807-PVE |

2.5 CAMERA POWER SUPPLIES

- A. All IP Cameras will be power via a "Power over Ethernet" (POE) network switch in the IDF as indicated on the drawings.
- B. Outdoor power supplies shall be housed in a NEMA-4 rated enclosure, with integral transformer and fused power supply board, or PoE Injector.
- C. All power supply enclosures shall contain:
1. Key lock
 2. Tamper switch
 3. Tamper switch control wire to access control field panel in IDF room
 4. Programming for tamper switch inputs to access control system

2.6 POE+ ETHERNET EXTENDER

- A. Reference 27 21 00

2.7 POE+ ETHERNET INJECTOR

- A. Reference 27 21 00

2.8 UTP BALUN

- A. UTP balun authorized for installations when cable distance is greater than 100 meters, but less than 300 meters.

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- B. Balun shall be installed in IDF and at camera location.
- C. Provide power supply as required.
- D. Submit shop drawing for approval prior to installation.
- E. Product: NitekVB31AT or equal.

2.9 ELECTRICAL REQUIREMENTS

- A. Unless otherwise noted on the Design Drawings, terminate all equipment for this system to the new power supplies provided as part of this contract or the existing power supplies as shown on the drawings. Items requiring 120/208 VAC power as shown on the drawings shall be provided as part of this project and installed in accordance with Division 26.
- B. Check the adequacy of all existing power and wiring before making final connections and applying power to the equipment. If such wiring/service is not proper and/or adequate, notify the City and/or the City Engineer in writing, requesting specific correction of same. Should the Contractor fail to provide proper notification of wiring inadequacies to the City and/or the City Engineer, he shall be bound to correct problems from such inadequacies with no cost to the City

2.10 SPARE PARTS

- A. Provide 5% spare cameras of each type used with a minimum 1 of each type.
- B. Provide 10 camera power supplies.
- C. Provide 5% extra IP Camera Licenses

PART 3 - EXECUTION

3.1 CAMERAS

- A. Digital cameras and/or streamers (encoders) shall be configured according to the following criteria:
 - 1. Video Display:
 - a. Live Viewing @ 15fps
 - 2. Image Size/Compression:
 - a. Standard Definition: (704x480, 4CIF)
 - b. High Definition: (1920x1080)
 - c. H.264 low compression
 - 3. Background Recording:

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- a. Background recording on ALL cameras 24 hours per day 7 days per week @ 5fps
 - b. Retain all background recordings on-line for 30 days (720 hours)
 4. Alarm/Event Recording:
 - a. 25 event-activated recordings per camera per day
 - b. Event-activated recording rate @ 10fps
 - c. 60 seconds of pre-event record; 60 seconds post-event record
 - d. Retain all stored video from every camera on-line for 30 days (720 hours)
 5. User-Activated Recording:
 - a. 2 user-activated recordings per camera per day. If user activated recordings for the day are unused, they will be banked for future use if required.
 - b. User-activated recording rate @ 10fps
 - c. 60 seconds of pre-event record; 60 seconds post-event record
 - d. Retain all stored video on-line for 30 days (720 hours)
- B. Install cameras as shown on the Design Drawings. Wall or ceiling mounts shall be anchored/braced as required, at a height which shall allow for camera repositioning. Coordinate mounting heights and views with the City and/or the City Engineer.
- C. All exposed video cabling from wall to camera shall be neatly dressed and wrapped in black spiral plastic sheath.
- D. Label all cameras with VSS ID as programmed into the HAS software system. Label shall be minimum 14pt font. Use 3-layer engraved Lexan label for all interior cameras. Use metallic die-tapped label for exterior cameras. Label shall be permanently affixed adjacent to the VSS housing. The label shall be visible and may not be attached to the camera housing.
- E. Label all new and existing VSS conduits in accordance with section 27 05 53. For existing conduits, labels are required at conduit ends and junction boxes only.
- F. Label all new and existing VSS cables. Labels shall be vinyl wrap around heat shrink type that will not fade with minimum 8pt font. Cables shall be labeled inside each junction box, enclosure and at each end.
- G. Label all VSS equipment following in accordance with this section.
- H. Provide final termination of power to camera as required, and/or control cables, and terminate at the VSS monitoring equipment locations as designated by the Design Drawings. Inspect, test, and clean all camera equipment after installation.
- I. In order to ensure a complete, functional Dome, for bidding purposes, where information is not available from the Owner upon request, the worst-case condition shall be assumed.
 1. Interfaces shall be coordinated with the Owner's representative, where appropriate.
 2. All necessary backboxes, racks, connectors, supports, conduit, cable, and wire must be furnished and installed to provide a complete and reliable Dome

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- installation. Exact location of all boxes, conduit, and wiring runs shall be presented to the Owner for approval in advance of any installation.
3. All conduit, cable, and wire shall be installed parallel and square with building lines, including raised floor areas. Conduit fill shall not exceed forty percent (40%). All wires shall be gathered and tied up to create a neat and professional installation as determined by the HAS inspector.
 - J. Provide for one adjustment after installation for each camera and lens as a part of the Bid and ensure that the cable guidelines are followed to allow maximum distance for relocation if necessary.
 - K. Coordinate with Owner to obtain inspection and approval of all cable raceway prior to installation of cable.

3.2 VIDEO DISTRIBUTION QUALITY ASSURANCE

- A. Contractor shall test the video distribution channel from every new analog camera to the input of the streamer, distribution amplifier, or fiber modem (see figure).



Figure 3.2A

- B. A handheld video signal generator and waveform/vector/picture monitor shall be purchased, used to test all video channels, and turned over to the airport maintenance division when complete.
 1. Handheld NTSC signal generator – Tektronix TSG95 or equal
 2. Handheld waveform monitor – Tektronix WFM90D or equal
- C. The following test parameters shall be used to qualify the installation of the new camera and CCTV cable.
 1. Adjust camera to optimal setting and observe peak-to-peak IRC level at the output of the camera. Record this as Level 1 on spreadsheet. Use UTP balun if applicable.
 2. Connect coaxial cable at camera and record peak-to-peak IRC level at end of coaxial transmission line in IDF closet as shown in figure 3.2A. Record this as Level 2 on spreadsheet. Use UTP balun if applicable.
 3. Determine % loss with the following formula:

$$\%Loss = 1 - \left(\frac{Level2}{Level1} \right)$$

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4. If % Loss is greater than 20%, the installation is unacceptable. Contractor shall determine discrepancy and retest with Airport representative present.
 5. Submit table indicating test results for approval. If test results fail, contractor is responsible to do whatever steps are required to rectify the problem at their expense.
- D. Contractor shall test the video distribution channel (Category 6 Ethernet Cable) from every new IP camera to the input of the network switch in the IDF using a certified Category 6 Test Device.
1. Submit table indicating test results for approval. If test results fail, contractor is responsible to do whatever is required to rectify the problem at their expense.
- 3.3 VIDEO STREAMERS (applies to analog cameras only)
- A. 4 Fixed cameras may be installed per Honeywell HVE4.
 - B. Label all cables according to camera ID.
- 3.4 ACCEPTANCE TESTING AND COMMISSIONING
- A. On-Site Acceptance Testing and Commissioning Service:
1. Prepare the Acceptance Test Format for acceptance by the City and/or the City Engineer prior to commencement of acceptance testing. At a minimum, test must include: Camera views and NVR settings.
 2. Perform these on-site acceptance tests with witness by the City and/or the City Engineer, providing all personnel and equipment necessary to perform these tests.
 3. The Contractor shall coordinate with HAS Technology the input of GIS Locations for all devices into the ArcGIS System used by HAS. The contractor shall reference the HAS ArcGIS Device Location Spreadsheet "Exhibit B" as a reference for the data needed for each device installed.
 4. Provide a hard copy of all system points tested, as well as a letter certifying 100% completeness and operation of this system, with each device listed and the results of its operational testing (passed or failed).
 5. Upon completion of testing, the Contractor and the City and/or the City Engineer shall sign the Acceptance Test forms documenting system completion and acceptance. If acceptable by the City and/or the City Engineer, minor discrepancies will be resolved under project warranties.
- 3.5 COMMISSIONING SERVICES
- A. Program system and perform all required operational checks to ensure that the system is functioning in full accordance with these Specifications.
 - B. System programming should be complete meeting all user-defined requirements at time of system acceptance. Provide configuration, programming and optimization as follows:

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1. Coordinate with designated HAS AOC personnel to confirm programming requirements for all new cameras. Programming shall include:
 - a. On-screen camera call-up ID and name.
 - b. Up to three (3) pre-set pre-position and "home" position(s) for all motorized cameras.
 - c. Association of alarm events generated by ProWatch (including AVPS and RDTs) with one or more cameras as required to initiate any or all of the following actions:
 - 1) Automatic execution of a pre-position command of one or more cameras.
 - 2) Automatic display of one or more cameras, each on a designated monitor.
 - 3) Automatic adjustment of recording frame rate from background rate to alarm rate for each of the cameras receiving alarm events.
 - 4) Automatic display of a plan drawing (refer to "graphic display configuration below for additional details) which indicates the physical location of the camera(s) and associated alarm device(s).
2. Coordinate with designated HAS AOC personnel to configure:
 - a. Background recording frame rate
 - b. Alarm recording frame rate
 - c. Pre and post alarm recording duration
 - d. Record resolution
 - e. Display resolution
3. Optimize distribution of video input signals among co-located camera servers to maximize storage and network efficiency.
4. Documentation: Provide Excel file that reflects the following information for each camera:
 - a. Camera display name
 - b. Streamer location (IDF room number)
 - c. Streamer blade number
 - d. Streamer port number (for 4 port streamer blades)
 - e. Network switch port number (IDF)
 - f. Camera server location (MDF)
 - g. Network switch port number (MDF)
 - h. Camera server number Background recording frame rate
 - i. Alarm recording frame rate
 - j. Pre and post alarm recording duration
 - k. Record resolution
 - l. Display resolution
 - m. Associated ProWatch alarm input name(s)
5. Commissioning:
 - a. Utilizing Excel file described in Paragraph 4 above, participate with designated HAS AOC personnel during commissioning to confirm accurate and complete compliance with all requirements described in Paragraphs 1 through 4 above.

- b. Coordinate with Contractor field personnel during commissioning to identify and document any deficiencies (including those associated with field installation).
- c. Prepare punch list to reflect all deficiencies following each commissioning session
- d. Participate with designated AOC personnel to confirm correction of each deficiency.
- e. Obtain signed acceptance from designated AOC personnel for each camera following correction of any deficiencies.

EXHIBIT A

AOC Security Schedule

| CONSTRUCTION DRAWINGS | | | | | | | | | | | | | HOUSTON AIRPORT SYSTEM | | | | | | | | | | | |
|-----------------------|----------------|----------------------------|---------------|-------------------------------|----------------------------------|------------------|-------------------|-------------------|----------------|----------|-----------|--------|------------------------|----------------|-------------------|-------------|-------------|-------------|-----------------------|----------------------------|--------------------------|----------------------|-----------------------------|-------|
| ITEM NO. | CARD READER ID | CARD READER NAME | ASSOC CCTV ID | AC CABLE TERMINATION LOCATION | MOUNT DETAIL (RE: T-403 666 SER) | CARD READER TYPE | DOOR HARDWARE SET | PROWATCH PANEL ID | PANEL POSITION | COMMENTS | CARD TYPE | DOOR # | DWG # | CLEARANCE CODE | SECURITY PRIORITY | FLOOR LEVEL | PORTAL TYPE | PORTAL NAME | DEVICE ID (PROWATCH) | ROOM LOCATION | CCTV ID (MAXPRO) PRIMARY | LOCATION DESCRIPTION | CCTV ID (MAXPRO) ALTERNATES | NOTES |
| 1 | CR1014/B | ADMIN MAIN ENTRY DOOR | S3002 | MOF-L30 | L1-F | RK40 | 804 AT | L30-1 | 2B | | | A130A | T-107 | | | 1 | Door | | | ADMIN MAIN ENTRY DOOR | | | | |
| 2 | CR1002 | MOF-L30 ROOM | S3003 | MOF-L30 | L1-F | RK40 | C207 | L30-1 | 2A | | | A133A | T-107 | | | 1 | IDF | | | MOF-L30 ROOM | | | | |
| 3 | CR1003 | HANGAR BAY 2 SE ROLL-UP | S3007 | MOF-L30 | L1-F | RK40 | 001 | L30-1 | 3A | | | 102K | T-106 | | | 1 | OHD | | | HANGAR BAY 2 SE ROLL-UP | | | | |
| 4 | CR1004 | GSE SE ROLL-UP 1 | S3101 | DF-L31 | L1-F | RK40 | 001 | L31-1 | 2A | | | G101J | T-106 | | | 1 | OHD | | | GSE SE ROLL-UP 1 | | | | |
| 5 | CR1005 | GSE SE ROLL-UP 2 | S3105 | DF-L31 | L1-F | RK40 | 001 | L31-1 | 2B | | | G101G | T-105 | | | 1 | OHD | | | GSE SE ROLL-UP 2 | | | | |
| 6 | CR1006 | GSE SOUTH ROLL-UP 3 | S3109 | DF-L31 | L1-F | RK40 | 001 | L31-1 | 3A | | | G101E | T-105 | | | 1 | OHD | | | GSE SOUTH ROLL-UP 3 | | | | |
| 7 | CR1007 | GSE SOUTH DELIVERY DOOR | S3111 | DF-L31 | L1-F | RK40 | 735 | L31-1 | 3B | | | G101D | T-104 | | | 1 | DOOR | | | GSE SOUTH DELIVERY DOOR | | | | |
| 8 | CR1008 | GSE WEST ROLL-UP 4 | S3113 | DF-L31 | L1-F | RK40 | 001 | L31-1 | 4A | | | G101A | T-104 | | | 1 | OHD | | | GSE WEST ROLL-UP 4 | | | | |
| 9 | CR1009 | HANGAR BAY 1 SW ROLL-UP | S3204 | DF-L32 | L1-F | RK40 | 001 | L32-1 | 2A | | | 101F | T-104 | | | 1 | OHD | | | HANGAR BAY 1 SW ROLL-UP | | | | |
| 10 | CR1010 | CIRCULATION SOUTH ROLL-UP | S3203 | DF-L32 | L1-F | RK40 | 001 | L32-1 | 2B | | | E101D | T-109 | | | 1 | OHD | | | CIRCULATION SOUTH ROLL-UP | | | | |
| 11 | CR1011 | CIRCULATION SOUTH DELIVERY | S3202 | DF-L32 | L1-F | RK40 | 735 | L32-1 | 3A | | | E101C | T-109 | | | 1 | DOOR | | | CIRCULATION SOUTH DELIVERY | | | | |
| 12 | CR1012 | IDF-L31 ROOM | S3110 | DF-L31 | L1-F | RK40 | C207 | L31-1 | 4B | | | G103A | T-105 | | | 1 | IDF | | | IDF-L31 ROOM | | | | |
| 13 | CR1013 | IDF-L32 ROOM | S3201 | DF-L32 | L1-F | RK40 | C201 | L32-1 | 3B | | | E121A | T-108 | | | 1 | IDF | | | IDF-L32 ROOM | | | | |
| 14 | CCM-L30-01 | ADMIN SOUTH EVAC | S3004 | MOF-L30 | L1-F | N/A | 725 | L30-1 | 9-1 | | | A140A | T-107 | | | 1 | EVAC | | | ADMIN SOUTH EVAC | | | | |
| 15 | CCM-L30-02 | HANGAR BAY 2 EAST EVAC | S3006 | MOF-L30 | L1-F | N/A | 725 | L30-1 | 9-2 | | | 102L | T-106 | | | 1 | EVAC | | | HANGAR BAY 2 EAST EVAC | | | | |
| 16 | CCM-L30-03 | HANGAR BAY 2 MECH YD EVAC | S3008 | MOF-L30 | L1-F | N/A | 725 | L30-1 | 9-3 | | | 102J | T-106 | | | 1 | EVAC | | | HANGAR BAY 2 MECH YD EVAC | | | | |
| 17 | CCM-L31-01 | GSE SE EVAC1 | S3102 | DF-L31 | L1-F | N/A | 725 | L31-1 | 9-1 | | | G101K | T-106 | | | 1 | EVAC | | | GSE SE EVAC1 | | | | |

* Exhibit A to be submitted by contractor per paragraph 1.4 E.

SECURITY SENSITIVE INFORMATION – LAW ENFORCEMENT CONFIDENTIAL. DO NOT PHOTOCOPY. THIS INFORMATION IS PROTECTED AGAINST DISCLOSURE BY THE PROVISIONS CONTAINED IN THE HOMELAND SECURITY ACT OF 2002, 49 U.S.C. 114(s), AND TSA'S REGULATION IMPLEMENTING THIS AUTHORITY, SET FORTH IN 49 CFR PART 1520.

SECTION 28 31 00 FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The contractor shall furnish and install a peer to peer, networked, LAN based 24 VDC, electrically supervised, analog "intelligent", fire alarm (and communication) system as specified herein and indicated on the drawings. This system shall include, but not be limited to, all control equipment, remote transponder panels, power supplies, signal initiating and indicating devices, conduit, wire fittings, and all other accessories required to provide a complete and operational system as herein specified.
- B. Network communications protocol shall be based on a standard, non-proprietary computer LAN technology. This technology must provide true peer to peer communication capability among all components of the network system for high security and reliability. Systems providing central point polling and processing or master/slave relationships shall not be acceptable.
- C. The initiating Device Circuit (IDC) shall be wired as style B. The Initiating Appliance Circuit (IAC) shall be wired as Style Y. The Signaling Line Circuit (SLC) shall be wired as Style 4.
- D. Work Included:
 - 1. Control Equipment.
 - 2. Power Supplies.
 - 3. Signal initiating.
 - 4. Signaling devices.

1.2 RELATED SECTIONS

- A. Section 26 05 33.19 – Conduit For Electrical Systems.
- B. Section 26 05 19 – Low-Voltage Electrical Power Conductor and Cables.

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NFPA 72 - National Fire Alarm Code.
- C. NFPA 101 - Life Safety Code.
- D. UL 38 - Manual Alarm Stations.
- E. UL 217 - Smoke Detectors - Single/Multiple Station.
- F. UL 228 – Door Holder-Closers.
- G. UL 268 - Smoke Detectors - Systems.

- H. UL 268A – Duct Smoke Detectors.
- I. UL 464 – Audible Signaling Appliances.
- J. UL 521 - Heat Detectors.
- K. UL 864 – Control Panels.
- L. UL 1638 – Visual Signaling Appliances.
- M. Local and State Building Codes.

1.4 SUBMITTALS

- A. Furnish shop drawings indicating conduit and cable sizes and routing. Include zone designations. Provide complete floor plans indicating all device locations. Provide riser diagram, indicating risers and interface with other systems.
- B. Furnish product data including all individual devices dimensions and installation.
- C. Furnish complete sequence of operation, alarm, signal and control zones and interface with other systems.
- D. Indicate all detection, monitoring, and signal zones.
- E. Furnish sample of proposed graphic and text automation.

1.5 QUALITY ASSURANCE

- A. Provide an equipment supplier that is an authorized and designated representative of the Fire Alarm Manufacturer to sell, install, and service the proposed manufacturer's equipment. Verify the equipment supplier has technical factory training specifically for the system proposed.
- B. The installing contractor and equipment supplier shall be licensed by the State Fire Marshall to sell, install, and service fire alarm systems.
- C. Provide staff installation superintendents who are licensed by the State Fire Marshall's office for such purpose and under whose supervision installation, final connections, and testing will be performed.
- D. The equipment supplier to be actively engaged in the business of selling, installing, and servicing fire alarm systems for at least seven (7) years and have a minimum of ten (10) such installations in operation.
- E. Provide an equipment supplier with 24 hour, 365 days per year emergency service with qualified and state licensed service technicians.

1.6 COORDINATION

- A. Coordinate all requirements surrounding installation of the fire alarm system with all trades including, but, not exclusive of the elevator system, electrical system, sprinkler system, access control security system, and HVAC/controls system. Provide adequate coordination to insure proper installation and interface to all peripheral items required to interact with the fire alarm and communication system to provide a complete, functional and completely supervised life safety system.
- B. Provide two (2) male/female modular telephone jacks at Digital Alarm Communicator Transmitter (DACT) for connection to telephone system.

1.7 NETWORK COMMUNICATION

- A. The network communication protocol shall utilize non-proprietary LAN technology incorporating a non-collision, token-passing protocol for high reliability. Systems utilizing collision recovery software will be deemed unacceptable.
- B. Network systems shall be inherently regenerative with high speed data communication of 156 KBPS minimum to insure timely and accurate transmission of system status with minimal delay.
- C. Each network node (fire alarm panel, annunciator, computer, etc.) shall store its own program locally and communicate equally with all other nodes in the network. Failure of any node will not affect any other node or communications among surviving nodes. Upon line fault(s), each node shall immediately regenerate communication with the largest group of nodes still intact with the respective node(s). Regeneration shall not require pre-designation or programming. Total network annunciation, within the regenerated network(s) shall be maintained.
- D. Minimum network capacity shall be at least 100 nodes and provide 200,000 points of detection or more. There shall be no limit as to the type, mix, or quantity of any node type (as long as total network capacity is not exceeded). The proposed networked system shall have a 20% expansion capacity for future consideration and use.
- E. Network wide annunciators or computer shall function as network nodes and not be physically dependent upon availability of fire alarm panel nodes. Network annunciation may be fully field programmable as to which network activities the units will perform and annunciate. All annunciators and/or computer terminals on the network shall be capable of full designated annunciation. Each annunciation unit must be fully capable of annunciating and controlling ALL network points and activity (if selected). Annunciators with limited capacities of annunciation less than the entire network (including expansion) capacity shall be unacceptable. Network shall support multiple network annunciators as may be required.
- F. System network shall provide the capability to integrate across the network conventional fire alarm control systems via independent sub-networks in order to provide expanded monitoring capacity.

- G. Each node shall be so designed to act as a network data repeater to reshape and regenerate data signals in order to insure adequate signal strength over extended media lengths. Each node shall also incorporate electromagnetic isolation from the network media. Dedicated repeaters shall be available where needed, to extend physical media lengths or distances.
- H. The network shall be available for use with either wire or fiber optic media paths or both. System shall accommodate wire media of 24 AWG with no shield required.
- I. Network communications path shall be available in style 4 or style 7.
- J. Network or node programming shall not require programmed node to be taken off-line or disrupt normal node routines. Programming shall not require chip replacement or re-burns as herein specified. Network wide programming shall be capable of being accomplished from any remote command center or network annunciator location.
- K. Peer to peer cooperative control by event capability shall allow nodes to initiate output and control functions based on input received from other nodes on the network. This interactive control shall NOT be dependent on a central processing computer or host panel. Each node shall store its own program in non-volatile memory.

1.8 SYSTEM OPERATION

- A. Verification Sequence
 1. If an intelligent smoke detector senses a trouble level of smoke, provide for the interface module to automatically initiate a "check" mode. Provide a minimum of four consecutive samples of the prospective detector. Upon completion of the consecutive smoke trouble conditions, the detector is considered "checked" and the system goes directly into an alarm mode.
 2. Provide alarm verification, as field programmed, to initiate the verification sequence after the above "check" procedure. Provide a field programmable delay period (0-50 seconds) before proceeding to resample the detector. Initiate all alarm sequences specified if three or more samples verify an alarm condition still exists. Log in memory the number of verification events that have occurred for each selected device.
- B. Alarm detection Sequence
 1. Upon detection by any initiating device, flash the system common alarm LED on the CPU module and sound the internal audible trouble device. Acknowledging the alarm condition silences the audible trouble device and causes the flashing common alarm LED to illuminate steady.
 2. Indicate all applicable information on an 80 character display associated with the alarm condition including: zone, device type, device location, and time of alarm.
 3. Any remote annunciator LED's associated with the alarm point illuminate as herein specified.

4. Relay the alarm signal to the remote DACT.
 5. Execute all automatic events programmed to the alarm point and activate the associated indicating devices and/or outputs.
 6. Sound alarm tones. Generate multiple distinct digital messages as predetermined by event initiated programs.
 7. Activate all audible/visual alarm devices.
 8. Deactivate AHU's and FCU's.
- C. Trouble Detection Sequence
1. Upon trouble detection, flash the system trouble LED on the CPU module and sound the internal audible trouble device. Acknowledging the trouble condition silences the audible trouble device and causes all trouble LED's to illuminate steady.
 2. Indicate all applicable information on an 80 character display associated with the trouble condition and its location.
 3. Provide priority for unacknowledged alarms / messages over any trouble displays and priority precedence on the annunciator.
 4. Illuminate any remote trouble annunciators LED's as herein specified.
- D. Auxiliary and Remote
1. Maintain in operation all designated "non-silenceable" auxiliary control functions, even upon silencing of audible alarms, until such time as the control panel is cleared and reset manually (i.e. fan control outputs, central station interface, elevator recall interface, etc.).
 2. Provide annunciator(s) that duplicate the control panel alarm status indicators for selected system zones/points and annunciate any system trouble conditions as herein specified.

1.9 MAINTENANCE SERVICE

- A. Provide continued program of system maintenance in compliance with NFPA 72.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

The basis of design shall be Notifier. If manufacturer is not provided please provide unit with equal specifications with the following manufacturers.

- A. Honeywell.
- B. Simplex Grinnell.

2.2 FIRE ALARM CONTROL PANEL

- A. Provide a control panel modular in design utilizing distributed solid state, field programmable microprocessors. Provide capacity for the required active detection and output points with space for use and expansion. Provide hinged

- door with key lock and a transparent window for viewing all alarm/trouble indicators and LCD annunciator.
- B. Provide programmable non-volatile RAM memory. Provide capability to communicate with monitor and control all other modules in the panel via internal serial communications techniques. Provide detection upon removal, disconnection or failure of any control panel module.
 - C. Maintain all custom time or control-by-event programs for specified events in non-volatile memory. Provide for no program loss, if system primary and secondary power failure occurs.
 - D. Provide a real-time clock circuit to execute custom line control programs and time/date stamp system events.
 - E. Provide touchpad controls and indicators for use by the system operator to program all control panel and system parameters. Provide custom display of alpha numeric labels for all intelligent detectors, zones, and addressable modules. Store label information in non-volatile memory.
 - F. Provide an 80 character alpha numeric liquid crystal display (LCD). Provide light emitting diodes (LED's) for AC power, system alarm, system trouble, display trouble and disable.
 - G. Provide a keypad with capability to control all system functions, status readouts, manual control action, and entry of any alphabetic or numeric information. Include means to enter multiple five-digit passwords to prevent unauthorized manual control or programming from the keypad. Provide multiple levels of password protection.
 - H. Provide interface for supervised remote LCD annunciators.
 - I. Provide for monitoring and controlling of each loop of intelligent detectors and addressable modules. Include an independent microprocessor control capable of alarm detection with automatic default mode if a failure occurs in the system central processor unit, internal connections, or other modules.
 - J. Provide for receiving digital/analog information from an intelligent detectors and process for this information to determine normal, alarm, trouble, and sensitivity conditions. Use analog information for automatic test and determination of maintenance requirements. Individually monitor all intelligent detectors for sensitivity variation and initiate a trouble condition should detector sensitivity "drift" toward either threshold or false alarming or non-alarming conditions. Monitor each detector's sensitivity, and if need be, electronically adjust the detector sensitivity as required for existing conditions within UL recommended limits.
 - K. Communicate continuously with each intelligent detector and addressable module on its loop and verify its proper function and individual status. Perform communication with up to 198 such devices per loop an average of every three seconds or less.
 - L. Control Switches

1. Acknowledge / step switch.
 2. Signal silence switch.
 3. System reset switch.
 4. System test switch.
 5. Lamp test.
- M. Non-Lock Walk Test: Provide a special non-lock "walk test" mode where each initiating device is manually placed in alarm. Pulse the system audible devices from the control panel on detection of each such alarm and automatically reset the panel, permitting a single serviceman to functionally test the entire system.
- N. Automatic Detector Test
1. Provide a special automatic detector test feature which permits reading and adjusting the sensitivity of all intelligent detectors from the main control panel. In addition, permit the functional testing of any intelligent detector or addressable interface device individually or by zone from the main control panel. Indicate the results of the test on the LCD display.
- O. System Diagnostics
1. Provide special software to detect, diagnose, and report failures and isolate such failures to a printed circuit board level. Periodically perform independent self test routines as a self operational /performance test for each module via its resident, independent processor. Report any irregularities via the LCD display and trouble indicators.
 2. Provide a lamp test function to test all system indicators including the LCD display and test the panel trouble device for proper operation.
 3. Provide a keyboard test function allowing the user to interactively confirm that all keys are functional and operating correctly.
 4. Provide independent timer software to detect and report failure of any microprocessor circuit, memory, or software. The function of this safeguard software/circuitry is to restart the respective processor and maintain proper operation of the system. In addition the master CPU has control over a hardware reset terminal which can perform a system-wide restart. Systems employing tape or disk drive rebooting will not be acceptable.
- P. Field Programming
1. Provide a 100 percent field programmable system without the need for external computers, PROM programmers, or replacement of memory IC's. Systems requiring factory programming / reprogramming or field replacement of IC memory chips will not be acceptable. All programming may be accomplished through the front control panel indicators and switches or via CRT/keyboard unit. Store all programs in non-volatile RAM memory.
 2. Secure programming with an appropriate, pre-selected, five digit password security code of the highest security level. Do not require the system to be taken off-line or prohibit the system from performing its normal operations and routines while in the system programming mode.

3. Initiate all programming functions via special system "prompting" menus via the system main CPU. Provide a means to "review" all programmed functions at any time subsequent to initialization.
4. Provide the capability to revise/change programmed functions or system expansion at anytime subsequent to initialization as described herein, without factory modifications or factory reprogramming. Field programming via the use of external computers may be considered provided programming can be accomplished on-site and the owner permanently furnished with required programming apparatus as part of this contract.

Q. Event History

1. Store a minimum of 400 system events in chronological order of occurrence. Include event history for all system alarms, troubles, operator actions (i.e acknowledge, silence, reset, program entry, etc.), unverified alarms, circuit/point alterations, component failures. Time and date stamp events and record and/or review without purging the history file. Store events in non-volatile buffer memory.
2. Automatically overwrite the oldest event(s) in memory beyond the initial 400 events.

R. Power Supply

1. Provide an integral power supply for the panel and all fire alarm peripherals. Provide all control panel and peripheral power needs with filtered power.
2. Design all power supplies to meet UL and NFPA requirements for power limited operation on all external signaling lines, including initiating circuits and indicating circuits. Provide UL listing for all power -limited circuit applications and use positive temperature coefficient devices for current limiting.
3. Provide input power rated at 120 volts, 60 hertz. Provide internal supervised batteries and automatic charger. Provide both positive and negative ground fault supervision, battery charger fail condition, AC power fail indicators. Provide supervision of modular expansion power supplies as may be required.
4. Power supply must be able to supply twenty percent (20%) excess power supply capacity to allow for future expansion.
5. Control Panel must be connected to primary and secondary power source.

2.3 DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT)

- A. Provide UL listed DACT adjacent to FACP. Provide all required equipment in accordance with NFPA 72 for remote central station reporting.
- B. Provide supervised connections from DACT to FACP. Provide modular telephone jacks for connections to telephone system.
- C. Provide alarm signal to fire department.

2.4 FIELD DEVICES

- A. Monitor Modules
 - 1. Provide addressable monitor modules where required to interface to contact alarm devices. Provide monitor modules to connect a supervised zone of conventional initiating devices (an N.O. dry contact device, including 4-wire smoke detectors) to an intelligent SLC loop. Mount in a 4 inch square electrical box. Wire each zone for Class B, field selectable.
 - 2. Provide address-setting means and store an internal identification code, which the control panel shall use to identify the type of device. No binary coding shall be required. Flash status/power LED under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel. The LED may be placed into steady illumination by the control panel, indicating that an alarm condition has been detected.
 - 3. Provide a magnetic test feature to field test the unit for functional operation. Provide an automatic test feature to permit functional testing of the device from the main control panel. Indicate results of the test on the LCD display.

- B. Control Modules
 - 1. Provide control/relay modules where required to provide audible alarm interface and/or relay control interface. Providing control modules to connect a supervised zone of conventional indicating devices (any 24 volt polarized audio/visual indicating appliance) to an intelligent loop. Mount in a standard 4 inch electrical box. Wire each zone Class B, field selectable. The control module may be optionally wired as dry contact (Form C) relay. Provide power for the relay actuation from the intelligent detector loop to reduce wiring connection requirements. Provide audiovisual power form a separate loop from the main control panel or from supervised remote power supplies.
 - 2. Provide address setting means and store an internal identification code which the control panel shall use to identify the type of device. No binary coding shall be required. Flash status LED under normal conditions, indicating that the control module is operational and in regular communication with the control panel. The LED may be placed into steady illumination by the control panel, indicating that an alarm condition has been selected.

- C. Remote LCD Annunciators
 - 1. Contractor shall install and annunciator in an open accessible area at or adjacent to the main ground level entrance to building.
 - 2. Provide supervised remote LCD annunciators. Provide field programmable annunciators to annunciate selected given points and/or zones. Configure each annunciator as remote system control and annunciator unit. Provide alarm and trouble LCD's per annunciated function.
 - 3. Provide a local alarm/trouble Piezo sounder and acknowledge/lamp test switch. Provide a common trouble LCD and on-line/pilot LCD indicators. Zone LCD indicators to flash upon receipt of alarm (or trouble) conditions and revert to steady state upon system or annunciator acknowledgement. Silence local sounder upon acknowledging.

4. Duplicate system control capability as follows: System acknowledge/trouble silence, signal silence, lamp test, system reset, signal silence LCD, and system alarm and trouble LCD's.
- D. Intelligent Photoelectric Smoke Detectors
1. Provide analog photoelectric smoke detectors. Provide detectors utilizing the photoelectric principal to measure smoke density and on command from the control panel, send data to the panel representing the ANALOG level of smoke density. Provide automatic sensitivity "drift" compensation to provide longer term stability and reliability. Provide a "maintenance alert" feature whereby the detector initiates a trouble condition should the units sensitivity approach the outside limits of the normal sensitivity window. Provide the detector with extensive RF and EMF noise reduction circuitry. Provide self compensating solid state LED light source and photosensitive circuitry.
 2. Provide a calibrated test method whereby the detectors will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself by activating the detector magnetic test switch, or may be activated remotely on command from the control panel.
 3. Provide address-setting means and store an internal identification code for each detector, which the control panel can use to identify the type of detector.
 4. Provide dual alarm and power/status LED's. Flash status LED's under normal conditions, indicating that the detector is operational and in regular communication with the control panel. Both LED's may be placed into steady illumination by the control panel, indicating that an alarm condition has been detected and verified. Provide an output connection in the base to connect an external remote alarm LED.
 5. Provide semi-flush ceiling mounted, modular detector head with twist-lock base. Provide in smooth attractive white finish, and back-sealed against dirt, vermin, and back pressure. Provide with fine mesh insect/contaminate screen. Provide UL listing with respective control panel.
- E. Intelligent Thermal Detectors
1. Provide analog thermal detectors. Provide detectors utilizing dual electronic thermostats to measure temperature levels in its chamber and on command from the control panel, send data to the panel representing the analog temperature level.
 2. Provide a calibrated test method whereby detectors will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself, by activating a magnetic switch, or may be activated remotely on command from the control panel.
 3. Provide address-setting means and store an internal identification code for each detector, which the control panel can use to identify the type of detector.
 4. Provide dual alarm and power/status LED's. Flash status LED's under normal conditions, indicating that the detector is operational and in regular communication with the control panel. Both LED's may be placed into steady illumination by the control panel, indicating that an

- alarm condition has been detected. Provide an output connection in the base to connect an external remote alarm LED.
5. Provide semi-flush, ceiling mounted, modular detector head with twist-lock base. Provide in smooth attractive white finish.
- F. Intelligent Duct Detectors
1. Provide duct mounted intelligent photoelectric smoke detectors. Provide detectors operating on the same principles and exhibiting the same basic characteristics as area type intelligent smoke detectors. Provide units capable of interchanging /accepting either photoelectric or ionization type sensors. Provide detectors operating in air velocities of 300 FPM to 4,000 FPM without adverse effects on detector sensitivity. Provide detectors which interface directly to the system without interface zone modules.
 2. Provide a noryl molded plastic enclosure with integral conduit knockouts. Provide housing with gasket seals to insure proper seating of the housing to the associated ductwork. Provide sampling tubes that extend a minimum of 75% across the width of the duct. Provide porosity filters to reduce sensor/chamber contamination. Provide with integral SPDT auxiliary control.
- G. Addressable Manual Pull Stations
1. Provide dual action type manual pull stations. On command from the control panel, send data to the panel representing the state of the manual station.
 2. Provide address-setting means and store an internal identification code, which the control panel can use to identify the type of device. Flash status LED's under normal conditions, indicating that the manual station is operational and in regular communication with the control panel. The LED may be placed into steady illumination by the control panel, indicating that an alarm condition has been initiated via the station.
 3. Provide semi-flush mounted stations on standard electrical box. Construct of hi-impact red molded Lexan with instructions for station operation in raised white letters.
- H. Strobes
1. Provide flush wall mounted visual alarm devices operable on 24 volts DC, utilizing a high intensity solid state xenon strobe tube to comply with ADA and NFPA. Connect strobe lights to supervised circuits.
 2. Provide Lexan cover for strobes in corridors, restrooms, and other areas subject to damage.
- I. Electronic Horn/Strobes
1. Provide solid state electronic audible alarm devices operable at 24 volts and polarized supervised. Provide temporal audible tones. Electro-mechanical solenoids or contacts will not be acceptable.
 2. Provide visual alarm devices integral with audible alarm devices, operable on 24 volts DC, utilizing a high intensity solid state xenon strobe tube producing 15/75 candela and 110 candella. Connect strobe lights to supervised circuits.
 3. Provide flush mounted, molded of high-impact red thermo plastic.

- 4. Provide lexan cover for horn/strobes in corridors, restrooms, and other areas subject to damage.
- J. Water Flow Detectors: provide interface to monitor water flow detectors.
- K. Supervisory Valves: Provide interface to monitor supervisory valves on each fire protection piping valve.
- L. Auxiliary Relays: Provide relays for ventilating and air handling control and interface. Provide heavy duty type rated up to 10 amps at 24 volts DC. Provide with NEMA I dust cover assembly and SPDT contacts.
- M. All notification devices shall be provided with xenon strobe, compliant with current ADA requirements.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Only basic equipment devices have been shown on the contract drawings. Specific wiring between equipment/devices has not been shown. It is the contractor responsibility to submit for approval the complete engineered system configuration and layout showing all devices, wiring, conduit, and locations along with other required information as specified herein.
- B. Field program all devices into software zones for the purpose of general area identification (i.e., floor, wing, etc.) and annunciation. Provide for each device to also be separately annunciated including exact location and device type.
- C. Verify interface requirements for other systems and devices.
- D. Obtain authorization from building officials having jurisdiction.
- E. Each monitoring device shall be assigned its own digital address on the SLC.
- F. All visual notification devices must be synchronized to prevent an effective flash rate of greater than one hertz in any space.

3.2 CABLE INSTALLATION

- A. Provide cable in accordance with NFPA 72, NFPA 70, and local codes. Provide cable sizes conforming to manufacturer's recommendations.
- B. Provide twisted/shielded type cable to guard against outside RF and EMF interference and induced noise.
- C. Provide limited energy FPLP cable (plenum rated) run open in return air ceiling plenums provided cable is UL listed to UL Test 910 for such applications, is of the low smoke producing fluorocarbon type, and complies with NFPA 70, Article 760-4(d) if so approved by the local authority having jurisdiction. Support with J-hooks or D-rings with supports 5'-0" on center.

- D. Install all cable in conduit where exposed or in non-accessible ceiling plenums, chases and wall cavities.
- E. Connect all cable in a supervised fashion per NFPA requirements such that any wiring disarrangement will initiate the appropriate trouble signals via the main control panel per NFPA and UL requirements. Intelligent loops may be T-trapped/branch wired due to inherent dynamic supervision.
- F. Minimize wiring splices. Where required, make in designated terminal boxes or at field device junction boxes. Do not transpose color coded wiring.
- G. Label cable at terminations and pull boxes, junction boxes, and outlet boxes.

3.3 INSTALLATION

- A. Provide system grounding.
- B. Provide dedicated 20 amp, 120 volt circuits to control panel transponders, and remote power supplies.
- C. Provide interfaces to other systems and devices furnished under other divisions and sections.
- D. Provide the services of a manufacturer's representative to instruct Owner in the operations and maintenance of the systems.

3.4 INTERFACE WITH OTHER WORK

- A. Coordinate requirements surrounding installation of the fire alarm system with all trades including, but, not exclusive of the elevator system, electrical system, sprinkler system, and HVAC/controls system. Provide adequate coordination to insure proper installation and interface to all peripheral items required to interact with the fire alarm and communication system to provide a complete and functional life safety system.
- B. Central station connection and service provided by Owner.

3.5 FIELD QUALITY CONTROL

- A. Provide services of manufacturer's representative to instruct Owner's personnel in system operation and maintenance.
- B. Perform the final control panel connections and supervise testing of the system by a state licensed factory trained technical representative of the manufacturer. It shall be subject to the approval of the responsible engineer and owner. Upon completion of the acceptance tests, the owner and/or his representatives shall be instructed in the proper operation of the system.
- C. Functionally test each and every device for proper operation and response. Test each circuit in system for wiring supervision to insure proper wiring installation. Any items found not properly installed or non-functioning shall be replaced or repaired and retested. All testing shall be supervised by a licensed fire alarm superintendent.

- D. Provide complete written report on functional test of entire system. Test and report shall verify function of each device in system, operation of all auxiliary control functions, and proper operation of main fire alarm control panel. Provide copy of test report with maintenance manuals. Test report shall be signed and dated by licensed fire alarm superintendent responsible for supervising final system test and checkout.
- E. Test the system in presence of local authorities having jurisdiction.

END OF SECTION 28 31 00