



# CITY OF HOUSTON

**Sylvester Turner**

Mayor



HOUSTON AIRPORT SYSTEM

George Bush Intercontinental ~ William P. Hobby ~ Ellington Airport

Mario C. Diaz  
Director of Aviation

October 25, 2023

**SUBJECT:** Addendum No. 5

**REFERENCE:** Invitation To Bid (ITB) for the IAH Integrated Coordination Center at George Bush Intercontinental Airport; Solicitation No. H06-IAHICC-2024-004; Project No. 793

**To:** All Prospective Bidders:

This Addendum is issued for the following reasons:

**I. Add** the following pages with the attached documents as outlined below.

1. Sheet 10
2. Sheet 10.1
3. Sheet 10.2
4. Sheet 10.3

**II. Replace** the following pages with the attached document outlined below:

1. Pages 907-923 Document 274100 – Audio Visual System.

**III. To Respond to the following Questions.**

1. **Question:** We realizes that the RFI deadline has passed but we believe there is a missing Div. 27 specification. 1-Spec 274100 Audio Video Systems section 1.1 Scope Summary, subsection G References mentions spec 270000 Communications as being included as part of this specification. However, specification 270000- Communications does not appear to have been provided. Please provide this document.

**Response:** HAS did not issue a 270000 spec and reference to it can be omitted from the 274100.

2. **Question:** On page A612 you have to replace letters on the monument wall with others that match. I need to know:
  - a. The height of the other letters
  - b. The depth
  - c. The font
  - d. The color
  - e. The material
  - f. Are they fabricated by routing or are they channel?

October 25, 2023  
IAH Integrated Coordination Center at George Bush Intercontinental Airport  
Solicitation No. H06-IAHICC-2024-004  
Project No. 793

g. Do they light up at night?

**Response:** Please see Sheet 10, Sheet 10.1, Sheet 10.2, and Sheet 10.3 attached to this Addendum.

When issued, Addendum shall automatically become part of the solicitation documents and shall supersede any previous specification(s) and/or provision(s) in conflict with the Addendum. Addendum will be incorporated into the Agreement as applicable. It is the responsibility of the bidder(s) to ensure that it has obtained all such letter(s). By submitting a bid on this project, bidder(s) shall be deemed to have received all Addendum and to have incorporated them into their bid.

If further clarification is needed regarding this solicitation, please contact Senior Procurement Specialist, David Martinez via email at [david.martinez@houstontx.gov](mailto:david.martinez@houstontx.gov).

DS  
DE

DocuSigned by:  
*Cathy Vander Plaats*  
02232028DE99414...

DS  
AL

Cathy Vander Plaats  
Aviation Procurement Officer  
Houston Airport System

CVP/dm

cc: Alfredo Oracion  
Dallas Evans  
Solicitation File

Attachments:

1. Sheet 10
2. Sheet 10.1
3. Sheet 10.2
4. Sheet 10.3
5. 274100 – Audio Visual System.



**INTEX UNITED WILL NOT BE RESPONSIBLE FOR ERRORS OR OMISSIONS AFTER YOUR SIGNATURE OF APPROVAL. PLEASE NOTE: PRODUCTION OF THIS ORDER WILL NOT START UNTIL ALL LAYOUTS ARE APPROVED. PROOFING IS DESIGNED TO REDUCE YOUR FINAL COST. PLEASE EXAMINE CAREFULLY FOR ANY ERRORS. SHOULD YOU REQUIRE A SPECIFIC COLOR PLEASE SELECT A PANTONE COLOR "PMS" VALUE OR COME BY OUR PRODUCTION LOCATION TO CHOOSE A SAMPLE COLOR.**

**NOTE**

1. BOTTOM COMPARTMENT CONSTRUCTED FROM ALUMINUM INTERIOR FRAME WITH 2" X 2" X 1/4" ANGLES AND COVERED WITH 1/8" THICK ALUMINUM PANEL FACES PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC".

2. TOP COMPARTMENT CONSTRUCTED FROM ALUMINUM INTERIOR FRAME WITH 2" X 2" X 1/4" ANGLES AND COVERED WITH 1/8" THICK ALUMINUM PANEL FACES PAINTED TO MATCH MATTHEWS PAINT MP-42359 "VINE CHARCOAL".

3. LOGO GRAPHICS PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC".

4. 1/2" THICK VERTICALLY BRUSHED ALUMINUM CUT LETTERS.  
FONT USED: ARIAL REGULAR & BOLD (ADDRESS)

5. 1/2" THICK ALUMINUM CUT LETTERS PAINTED MATTHEWS WHITE MP-N202.  
FONT USED: ARIAL BOLD

6. 1/8" THICK ALUMINUM REMOVABLE PANELS WITH 1" X 90" X 1/2" ALUMINUM EXTRUSSIONS FASTENED ONTO THE FACE. PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC" WITH TEXT AND GRAPHICS CUT WHITE OPAQUE VINYL APPLIED  
FONT USED: ARIAL REGULAR

7. 3000 PSI CONCRETE FOUNDATION WITH #5 REBARS ALL DONE BY OTHERS.

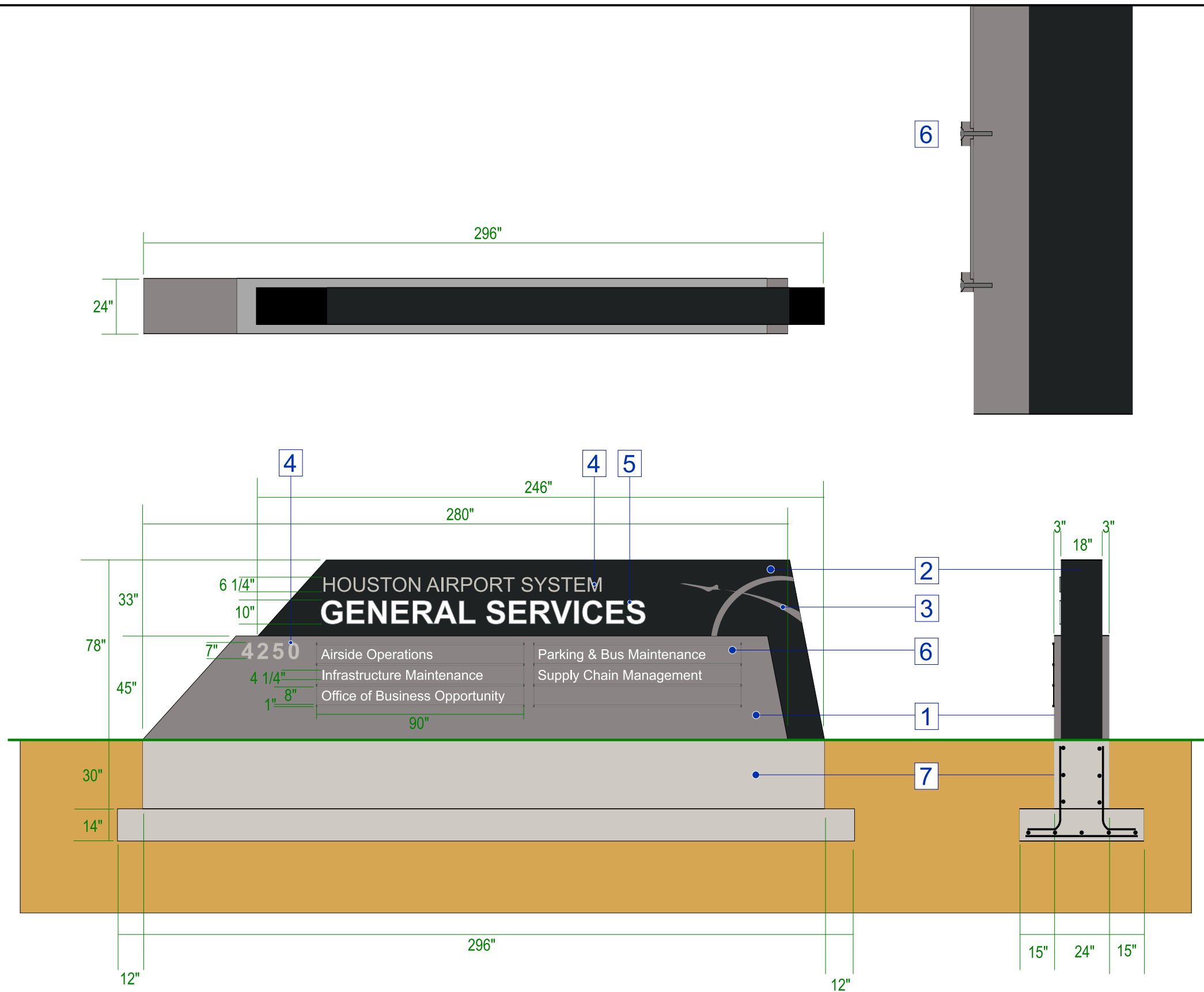
\*STRUCTURE MOUNTED TO THE CONCRETE WITH 1/2" QUICK BOLTS THROUGH MOUNTING BASE PLATE AT THE BOTTOM.

- MP-42359 - Vine Charcoal
- MP-28448 Umbra Gray Metallic
- MP-N202 Matthews White

**Date:**  
January 29, 2021  
**Drawing By:**  
G. Sredojevic  
**Work Order:**  
2145  
**Revision Date:**  
April 27 | May 03, 2021  
**Approved By:**

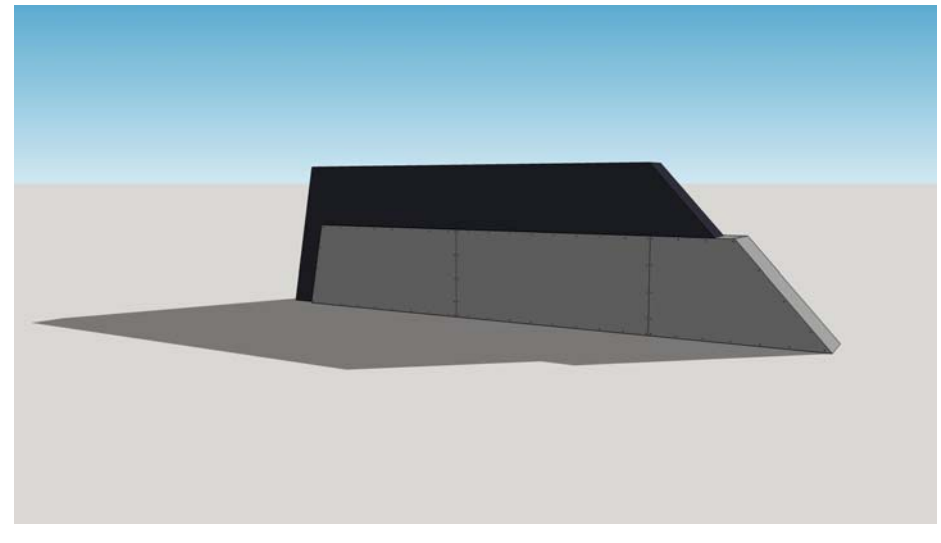
**Sign Type**  
**M**

STAMP:



MONUMENT SIGN - SINGLE-SIDED

Quantity - 1



### IntexUnited

12626 W. Bellfort Avenue  
Houston, TX 77099-4803  
Phone: 281.568.4000  
Fax: 281.568.0900

**Project Name:**  
George Bush Airport  
Vehicle Maintenance Facility  
**Location:**  
7800 Airport Blvd.  
Houston, TX 77061



**Scale:**  
6" = 1' - 0"  
**File Name:**  
Drawings \George Bush Airport  
\Vehicle Maintenance Facility  
\Shop Drawings\ 10-M.fs

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**Date:**  
January 29, 2021  
**Drawing By:**  
G. Sredojevic  
**Work Order:**  
2145  
**Revision Date:**  
n/a  
**Approved By:**

**Sign Type**  
**M**

STAMP:

MONUMENT SIGN - SINGLE-SIDED

Quantity - 1

SHEET: 10.1

**INTEX UNITED WILL NOT BE RESPONSIBLE FOR ERRORS OR OMISSIONS AFTER YOUR SIGNATURE OF APPROVAL. PLEASE NOTE: PRODUCTION OF THIS ORDER WILL NOT START UNTIL ALL LAYOUTS ARE APPROVED. PROOFING IS DESIGNED TO REDUCE YOUR FINAL COST. PLEASE EXAMINE CAREFULLY FOR ANY ERRORS. SHOULD YOU REQUIRE A SPECIFIC COLOR PLEASE SELECT A PANTONE COLOR "PMS" VALUE OR COME BY OUR PRODUCTION LOCATION TO CHOOSE A SAMPLE COLOR.**

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January 29, 2021  
**Drawing By:**  
G. Sredojevic  
**Work Order:**  
2145  
**Revision Date:**  
n/a  
**Approved By:**

**Sign Type**

**M**

STAMP:

SHEET:

10.2

1. FRAME STRUCTURE CONSTRUCTED FROM 2" X 2" X 1/4" ALUMINUM ANGLES.

2. 1/8" THICK ALUMINUM COVER PANELS, FACES PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC".

3. 1/8" THICK ALUMINUM COVER PANELS, FACES PAINTED TO MATCH MATTHEWS PAINT MP-42359 "VINE CHARCOAL".

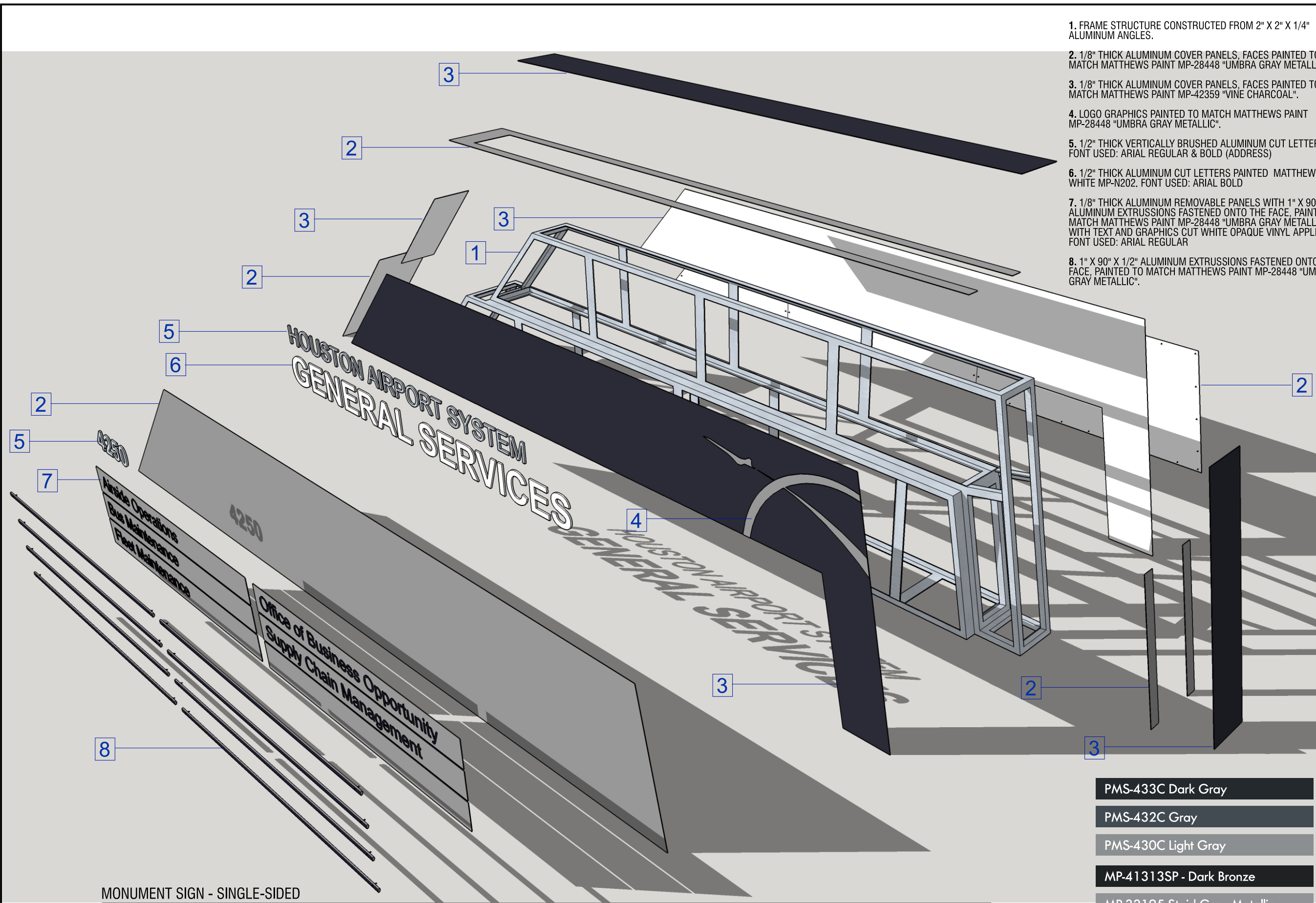
4. LOGO GRAPHICS PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC".

5. 1/2" THICK VERTICALLY BRUSHED ALUMINUM CUT LETTERS. FONT USED: ARIAL REGULAR & BOLD (ADDRESS)

6. 1/2" THICK ALUMINUM CUT LETTERS PAINTED MATTHEWS WHITE MP-N202. FONT USED: ARIAL BOLD

7. 1/8" THICK ALUMINUM REMOVABLE PANELS WITH 1" X 90" X 1/2" ALUMINUM EXTRUSIONS FASTENED ONTO THE FACE, PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC" WITH TEXT AND GRAPHICS CUT WHITE OPAQUE VINYL APPLIED. FONT USED: ARIAL REGULAR

8. 1" X 90" X 1/2" ALUMINUM EXTRUSIONS FASTENED ONTO THE FACE, PAINTED TO MATCH MATTHEWS PAINT MP-28448 "UMBRA GRAY METALLIC".



MONUMENT SIGN - SINGLE-SIDED

Quantity - 1

- PMS-433C Dark Gray
- PMS-432C Gray
- PMS-430C Light Gray
- MP-4131 3SP - Dark Bronze
- MP-32195 Staid Gray Metallic
- MP-N202 Matthews White

# IntexUnited

12626 W. Bellfort Avenue  
Houston, TX 77099-4803  
Phone: 281.568.4000  
Fax: 281.568.0900

**Project Name:**  
George Bush Airport  
Vehicle Maintenance Facility  
**Location:**  
7800 Airport Blvd.  
Houston, TX 77061



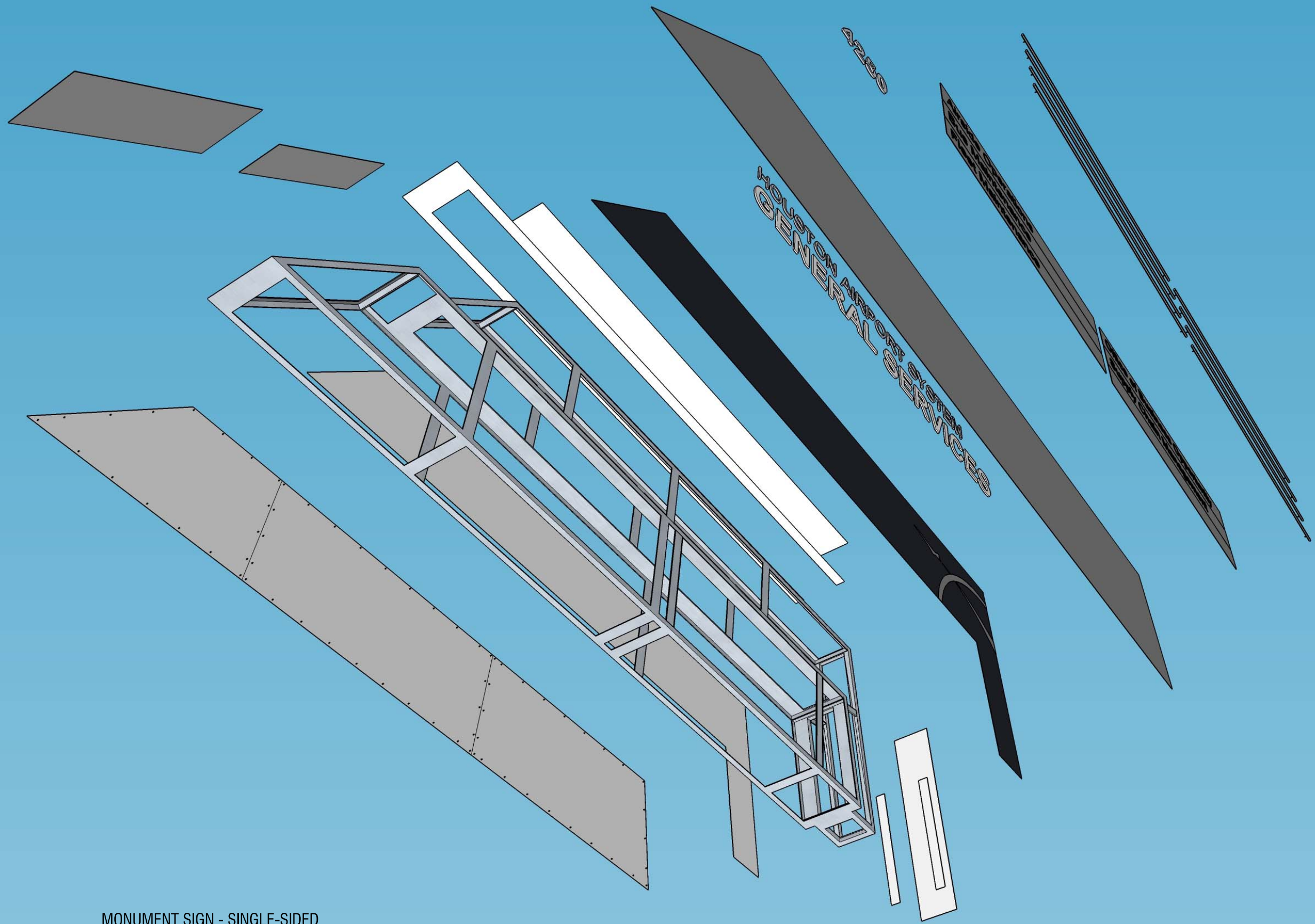
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**Approved By:**

**Sign Type** M

STAMP:



MONUMENT SIGN - SINGLE-SIDED

Quantity - 1

SECTION 274100 – AUDIO VIDEO SYSTEM

PART 1 - PROJECT GENERAL

1.1 SCOPE SUMMARY

- A. This section includes Specifications for Audio Video System (AVS) field devices, and system integration and programming as required by Owner.
- B. Work under this contract shall include the furnishing of materials, labor, tools, transportation services, etc., necessary to complete the installation of the audio/video systems and their related systems.
- C. Usage will be for City of Houston operational needs.
- D. These Specifications may include components that are not required. Use drawings to determine the quantities and parts to be installed. Include in the original bid, all equipment, software, cabling, connectors, etc., whether specified here or not, such that said bid fulfills the intent of these Specifications and renders these systems functional and fully operational.
- E. Contractor shall provide all required licenses.
  - 1. The Contractor shall be experienced in installation of similar or larger size and scope within the last three (3) years.
  - 2. The Contractor will have at least one member of the Project Management team CTS certified.
  - 3. Capabilities: The Contractor shall furnish, at the request of the Owner and to the satisfaction of the Owner, General Contractor and Consultant, information demonstrating that the Contractor has:
    - a. Satisfactory work in similar completed installations.
    - b. Adequate physical plant and staff to accomplish the work described herein.
    - c. Adequate financial condition for the commitments of the project.
  - 4. Product Dealership: If the Contractor is not an Authorized Dealer or franchised supplier for the manufacturer(s) of significant items in the audio system, the Contractor shall make provisions for the warranty repair and maintenance of that equipment through subcontracting arrangements with an Authorized Dealer or franchised supplier. This subcontractor arrangement shall be described on the Identification of Proposed Subcontractors Form and is subject to approval by the Owner, General Contractor, Architect and Consultant.
- F. Related Sections:
  - 1. Section 260100 General Electrical Requirements
  - 2. Section 260533 Raceways, Cable Trays, and Boxes
  - ~~3. Section 270000 Communications~~
  - 4. Section 271500 Horizontal Media Infrastructure
  - 5. Section 280507 Uninterrupted Power Supply Systems
  - 6. Section 28 13 00 Access Control System

G. References:

IAH Integrated Coordination Center  
Project No. PN793

**AUDIO VIDEO SYSTEM**

~~Section 270000 in its entirety shall be included as part of this specification.~~

1.2 DEFINITIONS

A. Definitions

1. Architect - RDLR
2. CONTRACTOR
3. CONSULTANT – PGA ENGINEERS
4. OWNER – CITY OF HOUSTON

B. Abbreviations

- |     |            |   |
|-----|------------|---|
| 1.  | ADA        | Americans With Disabilities Act   |
| 2.  | AEC        | Auto Echo Cancelation.  |
| 3.  | AFF        | Above Finished Floor  |
| 4.  | ANSI       | American National Standards Institute   |
| 5.  | AVCS       | Audio Video Control System  |
| 6.  | AVI        | Audio Visual Integrator   |
| 7.  | AVLAN      | Audio Visual Local Area Network   |
| 8.  | AVO        | Audio Visual Outlet   |
| 9.  | BLAN       | Business Local Area Network   |
| 10. | CCTV       | Closed Circuit Television   |
| 11. | DANTE      | Digital Audio Network Through Ethernet  |
| 12. | DSP        | Digital Sound Processor   |
| 13. | DTO        | Data Terminal Outlet  |
| 14. | EDID       | Extended Display Identification Data  |
| 15. | EIA        | Electronics Industries Alliance   |
| 16. | FPD        | Flat Panel Display  |
| 17. | HDBT       | HDBaseT (Video Standard)  |
| 18. | HDCP       | High-bandwidth Digital Content Protection   |
| 19. | HDMI       | High-Definition Multimedia Interface  |
| 20. | IDF        | Intermediate Distribution Frame   |
| 21. | IEEE       | Institute of Electrical and Electronic Engineers  |
| 22. | ISO        | International Organization for Standardization  |
| 23. | LAN        | Local Area Network  |
| 24. | Multi-path | The possible multiple routes of a single source of RF energy due to reflection, refraction, or diffraction. |
| 25. | NEC        | National Electrical Code  |
| 26. | NEMA       | National Electrical Manufacturing Association   |
| 27. | POE        | Power Over Ethernet   |
| 28. | RU         | Rack Unit (1.75") of vertical space in an AV Rack   |
| 29. | UL         | Underwriters Laboratories American National Standards Institute:  |
| 30. | UPS        | Uninterruptible Power Supply  |
| 31. | VOIP       | Voice over Internet Protocol.   |

C. Project Record Documents

1. O&M Manual -This manual shall contain detailed instructions on how to perform regular and preventive maintenance on all components of the AVS that can be performed by Owner's staff. One hard copy and one reproducible/electronic copy shall be provided. Manual shall include:



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- a. Description of unit and component parts, including complete nomenclature and commercial number of all replaceable parts.
  - b. Operating procedures: Include start-up; break-in; routine and normal operating instruction; regulation, control, stopping, shutdown and emergency instructions; and special operating instructions as applicable.
  - c. Maintenance procedures: Include routine operations; guide to trouble shooting; servicing; description of sequence of operation; as-installed control diagrams; as installed color-coded piping and wiring diagrams; and a list of spare parts and recommended quantities to be maintained in storage on-site.
  - d. Include trouble-shooting guide for repairs that can be performed by Owner's staff.
  - e. Include manufacturer's product data with each sheet annotated to clearly identify data applicable to installation and delete references to inapplicable information.
  - f. Supplement product data with drawings as necessary to clearly illustrate relations of component parts of equipment and systems.
  - g. Include copy of each manufacturer's warranty and give information sheet for proper procedures in event of failure and instances that may affect validity of warranties.
2. As-built documentation. Notes shall be kept during initial installation and shall be made a permanent part of the installation manual pages as required. Provide Owner with a hard copy set of drawings and an electronic file showing any modifications or clarifications not present on original Contract Drawings including equipment field wiring diagrams, electrical circuitry and service schematics.
  3. Contractor shall also deliver to Owner copies of all licenses, registrations, documentation, disks and other media as may have been included with those commercially available software packages provided with system. In addition, Contractor shall ensure that all licenses, registrations and warranties have been transferred to Owner prior to final software turnover.

1.3 COORDINATION

- A. Refer to General or Special Conditions.
- B. Refer to Division 26, Electrical Work
- C. Refer to Division 27, Telecommunications
- D. Refer to Division 28 (Electronic Safety and Security)

1.4 QUALITY ASSURANCE

- A. Contractor Qualifications:
  1. The contractor must be certified by the manufacturer of the products to be installed adhere to the engineering, installation and testing procedures, and utilize the authorized manufacturer components and distribution channels in provisioning this Project. Submit manufacturer certification as part of Submittals 1.4 above.
  2. All members of the installation team must be certified by the manufacturer(s) as having completed the necessary training to complete their part of the installation.
  3. Contractor shall provide five references for projects of approved equivalent scope, type and complexity of work completed within the last five years.
- B. Equipment and materials supplied shall be a standard product of manufacturers regularly engaged in the manufacture and installation of an AVS and shall be the manufacturer's latest

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**AUDIO VIDEO SYSTEM**

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 of Houston or Owners Representative.
- D. 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.
- E. Owner/Architect/Engineer 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.
- F. UL Compliance: Provide products that are UL-classified and labeled.

1.5 TRAINING

- A. Training: The Contractor shall provide one technician with thorough knowledge of the installed system for no less than 4 hours of user training. It shall include basic room operation, system care, and troubleshooting as a minimum requirement.
- B. First Major Use: The Contractor shall provide one technician with thorough knowledge of the installed system for first major uses of the completed system as determined by the Consultant.

1.6 SCOPE OF WORK

- A. The Contractor shall provide Audiovisual System(s) compatible with the Owner's communications systems (i.e. telephone, video, and computer systems) and operations.
- B. The Contractor shall provide equipment that, where required, shall conform to the applicable requirements of the Underwriters Laboratories, Inc., local codes, the National Electrical Code and any other governing codes. Such items shall bear a label or mark indicating their conformance to the above requirements.
- C. The Contractor shall provide complete and operational system(s) configured and installed for user-friendly operation and low maintenance. Provide for reprogramming of the remote control software two (2) times, as directed by the Owner or Consultant, before Final Acceptance. Provide for two (2) level adjustments of the Audio System(s), as directed by the Owner or Consultant, before Final Acceptance. On-site factory technical support shall be provided, if necessary, to assure performance.
- D. The Contractor shall restore all finish hardware to original condition including painting, ceiling modifications, and attachments as specified in Division 09 Finishes.

IAH Integrated Coordination Center  
Project No. PN793

**AUDIO VIDEO SYSTEM**

- E. Installation work shall be in compliance with all applicable standards and all governing codes and regulations of the authorities having jurisdiction and the Contract Documents.
- F. The Contractor shall validate exact location and installation of the equipment, power, conduit, and raceway systems.
- G. All software affiliated with the equipment, including but not limited to, the audio DSP, Control System, etc. is the property of the Owner and will be provided for archival purposes at project acceptance.
- H. The Contractor shall supply all control software, programming service codes, programming notes, files interactive source codes, all media and associated software, touch panel design, all passwords, licenses, dangles and “keys” or other associated control or programming items at no additional cost to the Owner at commissioning.
- I. If utilizing / integrating existing audio DSP and/or Control Systems into the project is necessary for a functional system, it will be the responsibility of the contractor to modify the existing code / DSP files.

**PART 2 - PRODUCTS**

**2.1 ALTERNATE ACCEPTABLE PRODUCTS**

- A. Alternate Manufacturers: Products manufactured by the listed Alternate Acceptable Manufacturers for each category are acceptable as follows:
  - 1. The video, audio, and control performances of the alternate product meet or exceed the performances of the ‘basis of design’ product.
  - 2. The functionality and features of the alternate product meets or exceeds the functionality of the ‘basis of design’ product.
  - 3. The number and type of inputs and outputs of the alternate product meets or exceeds the required number and type as shown on the drawings.
  - 4. If space is critical, the size of the alternate product does not exceed the size of the ‘basis of design’ product.
  - 5. The color of the alternate product meets the requirements of the project.
- B. Acceptance of Alternate Product: The final acceptance of the alternate product is the sole discretion of the Consult and/or Owner.
  - 1. Contractor shall submit manufacturer’s data or spec sheet to Consultant for final approval of any alternate products.

**2.2 MICROPHONES**

**A. CEILING ARRAY MICROPHONE**

- 1. Basis of Design: Shure MX920
  - a. Element: 8 “Lobe,” Multi-element array.
  - b. Pattern: Variable
  - c. Dimension: 24”x24” for Standard Ceiling Tile direct replacement.
  - d. Mount: Furnish with standard mount kit.

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**AUDIO VIDEO SYSTEM**

- e. Color: By Owner (TBD)
- 2. Approved Substitute
  - a. Clear One
  - b. Sennheiser.

**B. TERMINAL PA MICROPHONE PAGING STATION**

- 1. Basis of Design: QSC Q-SYS PS-1650
  - a. Element: Handheld push-to-talk microphone.
  - b. Programable Buttons: 16
  - c. Power: IEEE 802.3af Power Over Ethernet (15.4W) or +24V DC
  - d. Mount: Fits into a standard triple-gang U.S electrical box.
- 2. NO Approved Substitute
- 3. Programming Requirements.
  - a. Full Integration with exiting IAH PA System.
  - b. Coordinate specifics with HAS Technology.

**2.3 LOUDSPEAKERS**

**A. 70V Ceiling Speakers**

- 1. Basis of Design: JBL Control 26CT
  - a. Driver: Two; 6.5" Low with A 3/4" Hi
  - b. Freq. Range: 75 Hz – 20 kHz
  - c. Power Handling: 150W Program, 75 Pink noise.
  - d. Mount: Furnish with standard mount kit.
  - e. Color: By Owner (TBD)
- 2. Approved Substitute
  - a. SoundTube
  - b. Tannoy

**B. WALL SPEAKERS**

- 1. Basis of Design: JBL Control HST
  - a. Driver: Three; 2 x 5.25" Low with a 3/4" Hi
  - b. Freq. Range: 50 Hz – 20 kHz
  - c. Power Handling: 100W Program, 75 Pink Noise.
  - d. Mount: Shipped With Wall Mount.
  - e. Color: By Owner (TBD)
- 2. Approved Substitute
  - a. SoundTube
  - b. Tannoy

**2.4 AMPLIFIER**

**A. 70V AMPLIFIER TYPE 1 >=200W**

- 1. Basis of Design: XPA U 2002 SB
  - a. Channels: One, Or Two Channels Bridged.
  - b. Minimum Power: 200 Watts Per Channel Per 70.7- Volt Load
  - c. Minimum Headroom: 20% Of Total
- 2. Approved Substitute

IAH Integrated Coordination Center  
Project No. PN793

**AUDIO VIDEO SYSTEM**

- a. Crown
- b. QSC
- c. Lab Gruppen

B. 70V AMPLIFIER TYPE 2 <=100W

- 1. Basis of Design: Extron MPA 601
  - a. Channels: One
  - b. Minimum Power: 60 Watts Per Channel Per 70.7- Volt Load
  - c. Minimum Headroom: 20% Of Total
- 2. Approved Substitute (MUST FIT IN WALL BACKBOX)
  - a. Crown
  - b. QSC
  - c. Lab Gruppen

2.5 AUDIO DIGITAL SIGNAL PROCESSOR

A. SELF CONTAINED UNIT

- 1. Basis of Design: QSC 110F
  - a. Microphone / Line Level Inputs: 8 Channels
  - b. Line Level Outputs: 8 Channels
- 2. Approved Substitute
  - a. Biamp Tesira
  - b. BSS
  - c. Clear One

B. NETWORK AUDIO DEVICE

- 1. Basis of Design: SHURE ANI4 or approved equal.
  - a. DANTE Inputs: 1
  - b. Line Level Outputs: 4 Channels

2.6 VOIP GATEWAY

- 1. Basis of Design: Valcom 9972 no approved equal.
  - a. Input: CISCO call manager input via IP
  - b. Output: Balanced Line Level Audio
- 2. Power Supply: Valcom VP-624D no approved equal.
  - a. Voltage: 24 Volts
  - b. Amperage: 600mA

2.7 VIDEO MATRIX SWITCHER

A. SELF CONTAINED UNIT

- 1. Basis of Design: Crestron HD-MD4X1-4KZ-E
  - a. HDMI Inputs: 4
  - b. HDMI Outputs: 1
  - c. Analog Audio Outputs: STEREO L/R.

IAH Integrated Coordination Center  
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**AUDIO VIDEO SYSTEM**

2. Approved Substitute
  - a. AMX
  - b. Extron

2.8 VIDEO MEDIA CONVERTERS

A. HDMI / DisplayPort over CAT6 TRANSMITTER

1. Basis of Design: EXTRON DTP SERIES or approved equal.
  - a. HDMI Inputs: 1
  - b. RJ45 Outputs: 1
  - c. Minimum Resolution : 4K
2. Form Factors: Should match installation location.
  - a. Furniture / IDF: Standard
  - b. Wall: Wall Plate / Decora style
  - c. Floor Boxes / Poke Throughs : Floor Box style.

B. HDMI / DisplayPort over CAT6 RECEIVER

1. Basis of Design: EXTRON DTP SERIES or approved equal.
  - a. RJ45 Inputs: 1
  - b. HDMI Outputs: 1
  - c. Minimum Resolution : 4K
2. Form Factors: Should match installation location.
  - a. Furniture / IDF: Standard

C. 3G- SDI MEDIA CONVERTER

1. Basis of Design: Blackmagic or approved equal.
  - a. Input: SD/HD/3G-SDI Input
  - b. Output: 1 x HDMI Type A Output
  - c. Video Rates: DCI 2K SDI In/Out | 1080p60 HDMI Out

D. POTS RJ11 OVER SINGLEMODE FIBER CONVERTER / EXTENDER PAIR

1. Basis of Design: CTC Union FRM220-FXO-FXS-SC030
  - a. Electrical Interface: RJ11
  - b. Optical Interface: Single Mode Fiber
2. NO APPROVED EQUAL.

2.9 FLAT PANEL DISPLAY

A. LED DISPLAY

1. Basis of Design: NEC: 55"
  - a. Type: 55" LED Display
  - b. Aspect Ratio: 16:9

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- c. Native Resolution: 3840 x 2160 “4K” (2160P)
- d. HDMI Inputs: 1
- e. DVI-D Inputs: 1
- f. HDBaseT Inputs: 1
- g. LAN Port: 1
- h. RS-232 Ports: 1
- 2. Approved Substitute
  - a. Panasonic
  - b. Planar
  - c. Samsung

2.10 VIDEO WALL

A. FUNCTIONAL REQUIREMENTS

- 1. Basis of Design: Haivision or approved equal.
  - a. Video Wall System shall provide full scalability with the ability to handle unlimited inputs and outputs.
  - b. Video Wall System shall provide a feature-rich platform with multi-user, multi-display, multi-room, and multi-site capabilities, out of the box, without additional programming.
  - c. Video Wall System shall help customers create a true Global Common Operating Picture with the ability to stream content over WAN/LAN in real-time.
  - d. Video Wall System shall be designed with a web-based user interface for easy access from anywhere.
  - e. Video Wall hardware and software shall be specifically designed for mission-critical 24/7/365 operations.
  - f. Video Wall System shall run on a Windows 10 system for optimized security and administration.
  - g. Video Wall System shall run on an architecture designed to support unlimited input and output content requirements along with accelerated graphics processing and massive resolutions.
  - h. Video Wall System shall be able to stream virtually any kind of IP and baseband content.
  - i. Video Wall System shall provide users with total control of how they want the content to appear with features including z-ordering, opacity, borders, and more.
  - j. Video Wall System shall be designed so users only need minimal training for administration and use of the system.
  - k. Video Wall System shall be made in the USA and implemented at more than 800 locations across the US and internationally.
  - l. Video Wall System provider shall have experience with every branch of the US Armed Forces and across multiple markets including federal government, financial services, healthcare, higher education, logistics, public safety, sports, technology, utilities, and more.

**B. FEATURE REQUIREMENTS**

1. Basis of Design: Haivision or approved equal.
  - a. Video Wall Management Software shall support a server specifically designed to stream up to four concurrent web applications or one locally installed application into a centralized view on a video wall.
  - b. Video Wall Server shall give users the flexibility to stream up to four concurrent web applications or one locally installed application per server into a centralized view
  - c. Video Wall Server shall allow users to easily navigate web-based applications on their video wall with familiar browser functionality including back, forward, refresh, and home buttons, in addition to other embedded KVM capabilities.
  - d. The Video Wall Server's web browser stream shall be available to be viewed on "n" number of instances of Chrome v79 and above without limitation to number of concurrent users.
  - e. Video Wall Management Software shall allow users to create an unlimited number of unique behaviors with unlimited complexity (steps) within the system including multiple processor and displays.
  - f. Video Wall Management Software shall allow users to schedule the initiation of behaviors by the day, hour, and minute in the local time zone.
  - g. At a minimum, the following actions shall be accessible to any user, in any combination in the system when creating a behavior: Audio Mute, Audio Source, Audio Volume, Camera Movement Stop, Camera Panning, Camera Tilting, Camera Zooming, Clear Wall, Delay, Device Command (i.e., send an ONVIF PTZ camera to a pre-saved preset), Rotate Between Layouts, and Replace Asset.
  - h. Video Wall Management Software shall allow users to easily enable/disable encoders and decoders in the video wall system.
  - i. Device control menu shall be accessible without leaving the video wall content management screen.
  - j. Video Wall Management Software shall allow for grouping assets into a new composite asset content source with no limitation on the number of sources being combined.
  - k. Video Wall Management Software shall allow users to create and recall clocks showing time and/or date based on 27 available UTC time zones within the user interface.
  - l. Video Wall Management Software shall allow users to recall saved clocks through the asset menu tray.
  - m. Video Wall Management Software shall support an unlimited number of layouts.
  - n. Video Wall Management Software shall allow any user to save a new layout to the system.
  - o. Video Wall Management Software shall allow any user to custom name new layouts and rename existing layouts.
  - p. Video Wall Management Software shall allow users to merge displays from the same video wall processor into one, large canvas.
  - q. Video Wall Management Software shall allow users to merge the processing power from multiple video wall processors into one, large canvas.
  - r. Video Wall Management Software shall allow users to mirror content streams to two displays – keeping one active and the other as a hot backup.
  - s. Video Wall Management Software shall have a responsive, browser-based user interface that is accessible from all locations identified by the customer.
  - t. Video Wall Management Software shall provide the ability to drag & drop content placement from the asset menu tray directly to a graphical representation of the video wall(s) and connected displays.



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- u. Video Wall Management Software shall allow users to control multiple video walls and auxiliary displays with a single user interface and a single processor.
- v. Video Wall Management Software shall allow for any content sources to be placed across one or more displays using grid snapping
- w. Video Wall Management Software shall be subdivided into the follow grid sections:
  - 1) 2x2 resulting in (4) 960 x 540 pixel sections within a single 1920 x 1080 resolution area.
  - 2) 3x3 resulting in (9) 640 x 360 pixel sections within a single 1920 x 1080 resolution area.
  - 3) 4x4 resulting in (16) 480 x 270 pixel sections within a single 1920 x 1080 resolution area.
  - 4) 5x5 resulting in (25) 384 x 216 pixel sections within a single 1920 x 1080 resolution area.
- x. The remote connection shall allow for soft KVM control of the host content source.
- y. Video Wall Management Software shall allow for full system backup and restore to a previous configuration through a utility located within the user interface.
- z. Video Wall Management Software shall allow for desktop streaming – adding a user’s desktop (with or without Internet access) or single application to the user interface for display on the video wall, while retaining KVM control.
- aa. Video Wall Management Software shall enable IP-based streaming, allowing users to add and recall IP-based sources through the asset menu tray.
- bb. Video Wall Management Software shall allow for control over panning, tilting, and zooming of IP-based camera sources supporting ONVIF protocol standards.
- cc. Video Wall Management Software shall allow users to use input card encoding to stream any input asset connected to a video processor across the customer’s network without the need for a separate encoder.
- dd. Video Wall Management Software shall allow users to view the exact content in live mode – the same view that line-of-sight viewers of video wall see in real-time from the user interface.
- ee. Video Wall Management Software shall provide the ability for live preview in real-time and exact line-of-sight depiction of any video wall or connected display through the user interface.
- ff. Video Wall Server shall give users the flexibility to stream up to four concurrent web applications or one locally installed application per server into a centralized view.
- gg. The Video Wall Server shall be in the form of a Windows 10-based appliance dedicated to processing URL-originated content (websites).

C. VIDEO WALL PROCESSOR

- 1. Basis of Design: Haivision or approved equal.
  - a. Video Processor shall be designed for a broad range of networked and traditional video wall environments, including medium to large control rooms, data visualization centers, and more.
  - b. Video Processor shall support up to 48 HD displays (or 12 4K displays) and capture content from up to 16 HD (or 16 4K) HDMI sources.
  - c. Video Processor shall support IP video streaming, enabling it to capture and/or stream up to 64 HD (or 16 4K) IP video sources simultaneously.
  - d. Video Processor shall display content in virtually any signal format – digital or analog, physical or IP – and from nearly any device, including workstations, laptops, tablets, cameras, cable boxes, and more.
  - e. Video Processor shall include built-in device control and automation control for external devices, like audio systems, VTC, and cable boxes, from the same interface used to control the video wall.

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- f. Video Processor shall be able to decode and display streamed content from any IP video source.
- g. Video Processor shall allow users to simply drag and drop content onto their video wall.
- h. Video Processor shall allow users to instantly encode and stream a content source, or even an entire video wall, to specific users and display systems across a secure network.
- i. Video Processor shall allow users to control multiple video walls simultaneously - even systems with different display types or aspect ratios.
- j. Video Processor shall allow users to control different video walls as a single system or managed separately.
- k. Video Processor shall have the following maximum concurrent H.264 encodes and decodes:
  - 1) Up to 8 x 4K (3840x2160) 60Hz
  - 2) Up to 8 x 4K (3840x2160) 60Hz
  - 3) Up to 16 x 4K (3840x2160) 30Hz
  - 4) Up to 32 x HD (1920x1080) 60Hz
  - 5) Up to 64 x HD (1920x1080) 30Hz or numerous SD IP channels
- l. Video Processor shall have the following maximum outputs:
  - 1) Up to 12 x 4K (3840x2160) 60Hz
  - 2) Up to 48 x HD (1920x1080) 60Hz\*
  - 3) Standard Output Format – DisplayPort
  - 4) Additional Output Formats Supported – DVI, HDMI
- m. Video processor shall have the following maximum inputs:
  - 1) Up to 16 x (4096x2160) 60Hz\*\*
  - 2) Up to 16 x (4096x2160) 30Hz
  - 3) Up to 16 x (3840x2160) 60Hz\*\*
  - 4) Up to 16 x (3840x2160) 30Hz Up to 16 x (2560x1600) 60Hz
  - 5) Up to 16 x (1920x1080) 60Hz
  - 6) Standard Input Format – Mini HDMI
  - 7) Additional Input Formats Supported – Digital: HDMI, DisplayPort, DVI, 3G-SDI
- n.

**D. VIDEO WALL DECODERS**

- 1. Basis of Design: Haivision
  - a. Multi-Channel IP Decoder shall be ideal for supporting control rooms, conference rooms, and other environments where augmenting the video wall system with HD IP video is required.
  - b. IP Decoder shall enable high-performance, low-latency IP decoding and display for full-HD video.
  - c. When paired with an IP Encoder and a video wall processor, the IP Decoder shall enable a scalable AV/IP system on the customer's network.
  - d. IP Decoder shall be easily managed using the video wall control platform.
  - e. IP Decoder shall enable instant viewing and displaying of IP streams on a video wall in real-time like any other content source.
  - f. IP Decoder shall make it easy to route the decoder content to an encoder so content from any input source can be sent to any video wall processor or display on a customer's network.
  - g. IP Decoder shall leverage low-latency H.264 video compression, an efficient compression format that delivers high-quality video while using less bandwidth than competing formats.

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E. VIDEO WALL ENCODERS

1. Basis of Design: Haivision
  - a. Multi-Channel IP Encoder shall be ideal for enterprise organizations that need to share large volumes of content, or any team that needs to augment their video wall system with IP video sources.
  - b. IP Encoder shall be able to stream low-latency 4K video and include zero-latency HDMI loop-outs.
  - c. When paired with an IP Decoder and a video wall processor, the IP Encoder shall enable a scalable AV/IP system on the customer's network.
  - d. IP Encoder shall be easily managed using the video wall control platform.
  - e. IP Encoder shall be able to stream up to four 4K input sources per unit, reducing the amount of hardware needed to support the customer's AV/IP network.
  - f. IP Encoder shall provide four HDMI loop-outs for sending unaltered, zero-latency video from workstations to desktop monitors with no additional hardware.
  - g. IP Encoder shall simply connect with workstations to start streaming them to a video wall. Once installed on the network, the units shall be automatically detected by the video management software and displayed on the video wall.
  - h. IP Encoder can easily route content to a decoder, so content from any input source on the customer's network can be sent to any video wall processor or display.
  - i. IP Encoder shall leverage low-latency H.264 video compression, an efficient compression format that delivers high-quality video while using less bandwidth than competing formats.
  - j. IP Encoder can simply connect to content sources and stream them directly to a video wall processor without the need for an IP Decoder.

F. VIDEO WALL DISPLAYS

1. Basis of Design: Haivision CineView Series
  - a. Screen Size: 55"
  - b. Aspect Ratio: 16:9
  - c. Native Resolution: 1920 x 1080
  - d. Bezel Size: Less than .1mm

2.11 VIDEO CONFERENCE CAMERAS

A. PTZ CAMERA

1. Basis of Design: Sony SRG-X120
  - a. Type: HD PTZ Camera
  - b. Optical Zoom: 12X
  - c. Native Resolution: 1080p
  - d. SDI PORTS: 1
  - e. HDMI OUTPUTS: 1
  - f. LAN Port: 1, POE+
  - g. RS-422 Ports: 1
2. Approved Substitute
  - a. Panasonic
  - b. Vaddio

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2.12 VIDEO CONFERENCING

A. ALL IN ONE VIDEO CONFERENCING BAR

1. Basis of Design: LOGITECH RALLY BAR or approved equal.
  - a. Camera: Integrated 4K PTZ
  - b. Microphones: Integrated Beam-Forming array.
  - c. Content Input: HDMI
  - d. Conferencing Solution: Microsoft Teams

B. VIDEO CONFERENCING BAR TOUCH PANEL or approved equal.

1. Basis of Design: LOGITECH TAP
  - a. Power: POE
  - b. Content Input: HDMI
  - c. Conferencing Solution: Microsoft Teams

C. A/V VIDEO CONFERENCE BRIDGE

1. Basis of Design: Extron MediaPort200
  - a. HDMI Inputs: 1
  - b. HDMI Loop Outputs: 1
  - c. USB Port: 1
  - d. LAN Port: 1
  - e. Balanced Stereo Audio Inputs: 1
  - f. Balanced Stereo Audio Outputs: 1
  - g. Microphone Input
  - h. RS-232 Ports: 1
2. Approved Substitute
  - a. Vaddio

2.13 HARDWARE

A. Ceiling Box

1. Basis of Design: FSR CB 22P
2. Approved Substitute
  - a. Chief
  - b. Middle Atlantic

B. Floor Box

1. Basis of Design: Wiremold Evolution Series
  - a. Capacity: As required.
2. Approved Substitute
  - a. FSR

C. Wall Box

1. Basis of Design: Chief PAC 526
2. Approved Substitute
  - a. FSR

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. All devices and components shall be compatible and installed in accordance with contract drawings, manufacturer's instructions and approved submittal data.
- B. The Contractor shall install all system components including furnished equipment, and appurtenances in accordance with the manufacturer's instructions, and adjustments required for a complete and operable system.
- C. Adjust all cameras to specified resolution for area of install. Make all necessary adjustments to obtain clear, crisp images and desired field of view to the Owners Representative's satisfaction. It is the responsibility of the contractor to select camera lenses as necessary to obtain required field of view. No additional funding shall be provided for additional lens.
- D. Coordinate with Owners Representative for all system programming requirements. Obtain a printout of all programming prior to system check out and final acceptance inspection.
- E. Install the initial system, setup parameters, and program all system components as necessary for proper operation. Submit all programming on electronic media to the Owner.
- F. Install all Point-to-Point wiring with appropriate terminal connections for every wire and component termination so that all connections are mechanically and electrically secure.
- G. Install field wiring in continuous lengths, without splices.
- H. Verify upon job completion that all wiring and terminations are clearly labeled using the City of Houston standards to identify the wire and terminal.

3.2 PRODUCT HANDLING

- A. The Contractor shall be responsible for any and all loss or damage in the shipment and delivery of all material until transfer of title to the City.

3.3 HARDWARE INSTALLATION

- A. The Contractor shall obtain written permission from the City before proceeding with any work which requires cutting into or through any part of the building structures such as, but not limited to, girders, beams, concrete, carpeted or tiled floors, partitions or ceilings. The Contractor shall also consult with the Owner's Representative before cutting into or through any part of the building structures where fireproofing or moisture proofing could be impaired.
- B. The Contractor shall take all steps necessary to ensure that all public areas remain clear or are properly marked during installation or maintenance.
- C. The Contractor shall develop a detailed network map to be utilized as a road map during the implementation of the LAN. This map shall show all segments, all interconnects between segments and all active network devices. This network map shall not include the individual nodes interconnected to each concentrator, but will have the modules, interfaces, protocols, addresses and other identifying features for each concentrator and other active device.

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- D. The Contractor shall also develop a Cable Plant interconnectivity chart showing all fiber patch panels and individual identifiers for each fiber associated with the interconnectivity of each network device.
- E. Prior to installing Wireless Access Points, conduct and document an RF site survey to determine the maximum operating range between an AP (fixed location) and mobile stations for a specified transmit power level. Survey shall also identify holes of coverage due to multi-path, interference sources, and interference from other wireless installations.
- F. The contractor shall place materials only in those locations that have been previously approved. The Owner's Representative shall approve any other locations, in writing.

3.4 SYSTEM STARTUP

- A. The Contractor shall not apply power to the system until after:
  - 1. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
  - 2. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
  - 3. System wiring has been tested and verified as correctly connected as indicated.
  - 4. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
  - 5. The Owner's Representative have approved the installation.
- B. Satisfaction of the above requirements shall not relieve the contractor of responsibility for incorrect installations, defective equipment or collateral damage as a result of contractor's deficient work/defective equipment.

3.5 ACCEPTANCE TESTING

- A. The contractor shall develop and execute an onsite acceptance-testing program.
- B. The plan shall address all requirements identified in this specification and test all contractor supplied cabling and hardware components. The plan shall follow accepted industry testing practices and have a method of independent verification described.
- C. Any specified item that does not satisfy the requirements of this specification shall be replaced, upgraded, or added by the contractor as necessary to correct the noted deficiencies. After correction of a noted deficiency, re-testing shall be performed to verify the effectiveness of the corrective action.

3.6 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 the Owner's Representative prior to installation.**

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END OF SECTION 274100