City of Houston - Department of Aviation – Infrastructure Division

PROJECT MANUAL

IAH TERMINAL A SIGNAGE & WAYFINDING
GEORGE BUSH INTERCONTINENTAL AIRPORT

HAS PROJECT No.: 762A
CIP No.: A-0599.01

VOLUME NO.* 3 *OF* 3 *VOLUME

Divisions 02 through 16

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PART 1 – GENERAL

1.01 SUMMARY

A. This specification describes the structural repair/patching of interior and/or exterior vertical or overhead surfaces with a polymer-modified, portland cement mortar.

B. Refer to drawings for locations where exterior signs are to be removed and or replaced, the exterior driveway columns will require an skim coating to match the existing surface, which is Sika Quick Smooth Finish or Precast Exposed Stone Finish.

1.02 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have receivced product training by a manufacturer's representative.

C. Install materials in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer’s name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 45ºF (5ºC) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.

1.05 SUBMITTALS

A. Submit two copies of manufacturer’s literature, to include: Product Data Sheets, and appropriate Material Safety Data Sheets (MSDS).

1.06 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Smoth Trowell Finish Columns: **SikaTop 123 Plus**, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

B. Precaset Exposed Stone Finish: **Sikadur-31 Hi-Mod Gel**, as manufactured by Sika Corporation. Where patching is required, including replacement of exposed stone, the contractor shall submit matching stone and epoxy material to adhere the stone to the panels for a finish to match the existing pattern and color.

2.02 MATERIALS

A. Polymer-modified Portland cement mortar:

1. Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives.
    a. pH: 4.5-6.5
    b. Film Forming Temperature: 73°F max.
    c. Tear Strength: 950-psi min.
    d. Elongation at Break: 500% min.
    e. Particle Size: less than 0.1 micron
2. Component A shall contain an organic, penetrating corrosion inhibitor which has been independently proven to reduce corrosion in concrete via ASTM G3 (half-cell potential tests). The corrosion inhibitor shall not be calcium nitrite, and shall have a minimum of 5 years of independent field testing to document performance on actual construction projects.
3. Component B shall be a blend of selected portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability, and an organic accelerator.
4. The materials shall be non-combustible, both before and after cure.
5. The materials shall be supplied in a factory-proportioned unit.
6. The polymer-modified, portland cement mortar must be placeable from 1/8” to 1-1/2” in depth per lift for vertical applications and 1/8” to 1” in depth for overhead applications.
7. Provide a clear sealer to match the existing sealed finish.

B. Cement Epoxy:

1. Sikadur 31, Hi-Mod Gel, is a 2-component, 100% solids, solvent-free, moisture-tolerant, high-modulus, highstrength, structural epoxy paste adhesive. It shall conform to the current ASTM C-881, Types I and IV, Grade-3, Class-B/C and AASHTO M-235 specifications.

C. Rocks for Precast patching:

1. Submit rock samples to match existing exposed preacast rock panels.

2.03 PERFORMANCE CRITERIA

A. Typical Properties of the mixed polymer-modified, portland cement mortar:

1. Working Time: Approximately 15 minutes
2. Finishing Time: 20 - 60 minutes
3. Color: concrete gray

B. Typical Properties of the cured polymer-modified, portland cement mortar:

1. Compressive Strength (ASTM C-109 Modified)
   a. 1 day: 3500 psi min. (24.1 MPa)
   b. 7 day: 6000 psi min. (44.8 MPa)

   c. 28 day: 7000 psi min. (48.3 MPa)
2. Flexural Strength (ASTM C-293) @ 28 days: 2000 psi (13.8 MPa)
3. Splitting Tensile Strength (ASTM C-496) @ 28 days: 900 psi (6.2 MPa)
4. Bond Strength (ASTM C-882 Modified) @ 28 days: 2200 psi (15.2 MPa)
5. The portland cement mortar shall not produce a vapor barrier.
6. Density (wet mix): 132 lbs. / cu. ft. (2.2 kg/l)
7. Permeability - AASHTO T-277 @ 28 days Approximately 500 Coulombs

NOTE: TESTS ABOVE WERE PERFORMED WITH THE MATERIAL AND CURING CONDITIONS @ 71^{O}F – 75^{O}F AND 45-55% RELATIVE HUMIDITY.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare concrete substrate to obtain a surface profile of +/- 1/16” (CSP 5 or greater as per ICRI Guidelines) with a new exposed aggregate surface. Area to be patched shall not be less than 1/8” in depth.

B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel with 2 coats of Sika Armatec 110 EpoCem as per the technical data sheet. (See Spec Component SC-201-0699)

3.02 MIXING AND APPLICATION

A. Mechanically mix in an appropriate sized mortar mixer or with a Sika mud paddle and low speed (400-600 rpm) drill. Pour approximately 4/5 gal Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining Component A to mix for desired consistency. Should smaller quantities be needed, be sure the components are measured in the correct ratio and that the Component B is uniformly blended before mixing the components together. Mix only that amount of material that can be placed in 10 - 15 minutes. Do not retemper material.

B. Placement Procedure: At the time of application, the substrate shall be saturated surface dry with no standing water. Mortar must be scrubbed into substrate filling all pores and voids. While the scrub coat is still plastic, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet use Sika Armatec 110 EpoCem in lieu of scrub coat. (See spec component SC-200-0699) After filling, consolidate then screed. Allow mortar to set to desired stiffness then finish with trowel for smooth surface. Wood float or sponge float for a rough surface. Areas where the depth of the repair area to sound concrete is greater than 1-1/2", the repair shall be made in lifts of 1-1/2" maximum thickness. The top surface of each lift shall be scored to produce a rough surface for the next lift. The preceding lift shall be allowed to reach final set before applying fresh material. The fresh mortar must be scrubbed into the preceding lift.

D. As per ACI recommendations for portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water or a water-based* compatible curing compound. Moist curing should commence immediately after finishing and continue for 48 hours. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing cover with insulating material. Setting time is dependent on temperature and humidity.

*Pretesting of curing compound is recommended.

E. Adhere to all procedures, limitations and cautions for the polymer-modified portland cement mortar in the manufacturers current printed technical data sheet and literature.

3.05 CLEANING

A. The uncured polymer-modified portland cement mortar can be cleaned from tools with water. The cured polymer -modified portland cement mortar can only be removed mechanically.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION 03730

SECTION 099113 - EXTERIOR 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 exterior substrates:

1. Concrete.
2. Steel and iron.
3. Galvanized metal.
4. Portland cement plaster (stucco).
5. Gypsum board.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Sustainable Design Submittals:

1. Provide VOC content data substantiating zero VOC content.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps 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: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 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 percent, but not less than 5 gal. of each material and color applied.

1.6 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.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Large Ground Level Exterior Concrete Bollards
c. Provide 3 options as directed by the architect; including a two-color option.

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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.
3. All storage areas on HAS property must be in locations approved and designated by the HAS project manager.

1.8 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 in snow, rain, fog, or mist; 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide paint from one of the following approved manufacturers:
1. Benjamin Moore & Co.
2. PPG Architectural Coating
3. Sherwin Williams Company

B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. It is the responsibility of the bidder to insure the proper primer, paint and preparation are applied on each substrate receiving paint.

C. Provide materials that comply with minimal to zero VOC limits. Minimum Standards to comply with South Coast Air Quality Management District Rule 1168.

D. Colors: As indicated in a color schedule.

E. Application Coats: Schedule indicates primer and top coats for uncoated substrates. The painting contractor shall apply at least 2 coats on previously painted stucco and gypsum board substrates so that prior colors are not perceptible thru the new paint, if the prior paint color is perceived thru the new paint, the painting contractor shall apply new coat(s) at their cost. Exterior concrete and steel shall be prepped and stripped back to the raw substrate material.

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 paints 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.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Portland Cement Plaster: 12 percent.
3. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove signage, 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.

2. It is the intent of the documents that signage be removed and painted behind the sign and reapplied.

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.

E. Exterior Concrete Driveway Column Substrates (ADD ALTERNATE SCOPE):
1. Base bid is to paint the columns: Remove release agents, curing compounds, efflorescence, and chalk.
2. Add Alternate Scope: At the contractor’s option, chemically peal or sandblast columns to remove paint in order apply the specified concrete skim coat. Preparation must not impact the public’s safety at the driveway area or impact the airfield in any way.

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 3 (power tool cleaning)

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. 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 by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Plastic Trim & Guard Rail Fabrication 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 recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
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 undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. 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 to view:
    a. Uninsulated metal piping.
    b. Pipe hangers and supports.
    c. Metal conduit.
    d. Plastic conduit.

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 EXTERIOR PAINTING SCHEDULE

A. Products listed are shown as Sherwin Williams Products; provide these or comparable products by one of the two approved manufacturers listed above.

B. Concrete & Portland Cement Plaster (Stucco), Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex, exterior, MPI #3: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
b. Intermediate Coat: Latex, exterior, satin, (Gloss Level 3-4), MPI #15: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
c. Topcoat: Latex, exterior, satin, (Gloss Level 3-4), MPI #15: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
d. Top coats to contain a mildewcide paint additive as approved by the architect.

A. Concrete Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Paint 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.

A. CMU Substrates (if required):

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior: S-W PrepRite Block Filler, B25W25, at 75 to 125 sq. ft. per gal (1.8 to 3.1 sq. m per l).
b. Intermediate Coat: Latex, exterior, Satin, (Gloss Level 3-4), MPI #15: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat..

c. Topcoat: Latex, exterior, satin, (Gloss Level 3-4), MPI #15: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
d. Top coats to contain a mildewcide paint additive as approved by the architect.

B. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, water-based, anti-corrosive for metal, MPI #107: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
a. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
b. Topcoat: Light industrial coating, exterior, water based, eggshell, (Gloss Level 3), MPI #161: S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils dry, per coat.

C. Ferrous Metal, Galvanized-Metal (Specifically the tube steel - metal guardrails at the drive way retaining walls):

1. Hi- Solids Polyurethane Industrial Coating System:

a. Prime Coat: Primer, as recommended by the manufacturer.
b. Intermediate Coat: Sherwin Williams Hi-Solids Polyurethane, Part S B65-300 Gloss Series – White – Protective and Marine Coatings.
c. Topcoat: Sherwin Williams Hi-Solids Polyurethane, Part S B65-300 Gloss Series – White – Protective and Marine Coatings

D. Plastic Trim Fabrication Substrates: Including architectural PVC, plastic, and fiberglass items.

1. Latex System:

a. Prime Coat: Primer, bonding, water-based, MPI #3: S-W PrepRite ProBlock Latex Primer/Sealer.
b. Intermediate Coat: Latex, exterior, flat, (Gloss Level 1), MPI #10: S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.
c. Topcoat: Latex, exterior, satin, (Gloss Level 3-4), MPI #15: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

E. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Primer, bonding, water-based, MPI #3: S-W PrepRite ProBlock Latex Primer/Sealer.
b. Intermediate Coat: Latex, exterior, satin, (Gloss Level 1), MPI #10: S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils wet, 1.2 mils dry, per coat.
c. Topcoat: Latex, exterior, satin, (Gloss Level 3-4), MPI #15: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

d. Top coats to contain a mildewcide paint additive as approved by the architect.

END OF SECTION 099113

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 [interior substrates:

1. Concrete.
2. Steel and iron.
3. Galvanized metal.
4. Plastic.
5. Gypsum board.
6. Plaster.
7. Plastic Laminate.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Sustainable Design Submittals:

1. Provide VOC content data substantiating zero VOC content.

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. Apply coats on Samples in steps 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: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 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 percent, but not less than 5 gal. of each material and color applied.

1.6 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.

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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.

1.8 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide paint from one of the following approved manufacturers:
1. Benjamin Moore & Co.
2. PPG Architectural Coating
3. Sherwin Williams Company

B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Provide materials that comply with minimal to zero VOC limits. Minimum Standards to comply with South Coast Air Quality Management District Rule 1168.

D. Colors: As indicated in a color schedule.

E. Application Coats: Schedule indicates primer and top coats for uncoated substrates. The painting contractor shall apply at least 2 coats on previously painted stucco and gypsum board substrates so that prior colors are not perceptible thru the new paint, if the prior paint color is perceived thru the new paint, the painting contractor shall apply new coat(s) at their cost. Interior & Exterior concrete and steel shall be prepped and stripped back to the raw substrate material.

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 paints 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.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMUs): 12 percent.
3. Gypsum Board: 12 percent.
4. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems 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.

2. It is the intent of the documents that signage be removed and painted behind the sign and reapplied.

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.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds 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 3. (power tool cleaning)

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. 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 by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

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 occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Other items as directed by Architect.

2. 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. Products listed are shown as Sherwin Williams Products; provide these or comparable products by one of the two approved manufacturers listed above.

B. 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.
a. Intermediate Coat: 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.
b. 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.

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.

C. 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.

D. 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: 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.
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.

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.

E. Metal Substrates (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.

2. 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.

3. 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.

F. Gypsum Board & Gypsum Plaster 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, 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
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.

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.

G. Plastic:

1. Institutional Low-Odor/VOC Latex System MPI INT 6.8F:

a. Prime Coat: Primer, bonding, solvent based, MPI #69.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1 - Flat), MPI #143.

d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3 - Eggshell), MPI #145.

H. Plastic Laminate – Wall Panels
1. Prime: Insulex/stix SXA-110 bonding primer
a. Finish: 2-coats V341 pre-catalyze acrylic

END OF SECTION 099123

SECTION 101404 – WAYFINDING SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies terminal exterior and interior identification, informational, regulatory and directional signs as indicated in the project sign type drawings. Provide all documentation, engineering, materials and labor as necessary for the fabrication and installation of the specified sign program.

1.2 APPLICABLE STANDARDS AND PUBLICATIONS - Unless otherwise noted, utilize the most recent publications of the referenced standards and publications.

A. International Building Code, With Houston Amendments

B. ATBCB Design Guidelines for Signage in relation to the Americans With Disabilities Act

C. Uniform Sign Code

D. American National Standards Institute (ANSI)

E. American Society for Testing & Materials (ASTM)

F. 49 U.S.C Section 5323, SAFETEA-LU Section 3023 – Buy America

G. All other applicable local, state and federal codes and standards.

1.3 CONTRACTOR QUALIFICATIONS

A. It is required that the sign contractor currently and regularly manufactures and installs sign programs similar to that specified in this project with a minimum of five years of experience.

1.4 QUALITY ASSURANCE

A. The sign contractor is responsible for the quality of all materials and workmanship required for execution of the work specified in this section, whether executed by their own firm or firms subcontracting of supplying on their behalf. Sign contractor is responsible for providing their subcontractors with all pertinent project documents, information and coordination.

1.5 SUBMITTAL REQUIREMENTS

A. Shop Drawings – Provide shop drawings indicating the manufacture and installation details of all sign types including but not limited to sign structures, footings, mounting, attachments, typography, layouts, lighting, colors and finishes. Where applicable, provide stamped structural engineered drawings and calculations, by a Texas licensed engineer, for all structural sign elements.

B. Samples – Provide – 8" x 10" samples of each color and material finish in quantities called for in this specification, until final approval is received.

C. Typography – Provide plots of complete character sets of each specified font at 3" cap height.

D. Manufacturer's Data – Provide manufacturer's specifications, data, installation details, maintenance instructions and other information for complete products specified within this section.

1.6 PERMITS

A. It is required that the selected sign fabricator obtain all necessary permits for the fabrication and installation of this sign program from Houston Airport System (HAS).

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide graphics elements as completed units produced to the greatest extent possible by a single manufacturer, including necessary and incidental mounting accessories, fittings and connectors.
   1. Contractor Responsibility - The sign contractor, by commencing work on this section, assumes overall responsibility in assuring that materials, components, assemblies and installations as shown or required as a part of the work within this section or other related sections complies with the requirements of the contract documents and as a part of the warranty of the work. The contractor shall further warrant, that all components specified or incidentally required are compatible with each other and adjoining installation conditions, that there are no conditions which will cause materials or assemblies to perform to their full life expectancy, that materials are compatible to adjoining substrates, finishes, materials and work by other trades, and that the individual parts and overall systems are effectively integrated and correct.
   2. Interpretations of Contract Drawings - Do not scale drawings for dimensions. Use only written dimensions provided on drawings, unless they are discrepancies found. Contractor is responsible for verifying all dimensions and conditions shown on drawings. The Designer is to be notified of any discrepancy in drawings or conditions requiring changes or that prevent a proper installation of the graphics elements.
   3. Site Conditions - Most of this sign project scope involves removing and changing out of graphics of existing sign elements in the terminal. Contractor to coordinate with existing conditions and documents. Field inspection and measurements must be done by the contractor for all elements in this project to insure the scope is clear and the approach taken

to retrofit these signs will assure customer service will not be adversely affected during the installation of these elements or the gate number change when airlines commence their operations.

2.2 STANDARDS

A. Typography
   1. Refer to Graphics Standards Sheet in Sign Type Drawings.
   2. Pedestrian Wayfinding Fonts
      a. ClearviewText Medium – All standard wayfinding word messages
      b. ClearviewOne Book Condensed – All supplemental wayfinding word messages (i.e. via, to, etc.)
   3. Letter Spacing
      a. Utilize letterspacing as indicated in sign type drawings. Provide full size samples of layouts for sign types specified in submittal section of this specification.

B. Colors (Note: PMS = Pantone Matching System; all paint, film and digitally printed colors to be perfectly matched to PMS colors as listed here)
   1. Branded Terminal/Parking Garage Wayfinding Identification and Symbol Backgrounds:
      a. Terminal A/Parking A = PMS 349C
      b. Terminal B/Parking B = PMS 2597C
      c. Terminal C/Parking C = PMS 300C
      d. Terminal D/Parking D = PMS 187C
      e. Terminal E/Parking E = PMS 1655C
   2. Global Watermark Accent Graphics:
      a. Terminal A = PMS 349C
      b. Terminal B = PMS 2597C
      c. Terminal C = PMS 300C
      d. Terminal D = PMS 187C
      e. Terminal E = PMS 1655C
   3. Inter-Terminal Train Area Identification and Symbol Backgrounds:
      a. Primary ID color = PMS 3965C
      b. Global Watermark Accent Graphics = PMS 3975C
   4. Wayfinding Sign Face Backgrounds = PMS 433C
   5. Divider Line/Supplemental Background Graphics = PMS 432C
   6. Wayfinding Message Text/Universal Symbol Artwork = White
   7. Exposed/Decorative Mounting Hardware = match MAP paint #413425SP
   8. Safety Red = PMS 186C
   9. Warning Yellow = PMS 116C

C. Finishes
   1. Standard paint finishes to be satin sheen (Matthews Acrylic Polyurethane or Owner Owner approved equal)

2.3 SIGN TYPES

A. Refer to sign type drawings located on drawing sheets 1-13 thru 2-51 for specifications and information on individual sign types.

2.4 MATERIALS

A. Aluminum
1. Sheet and Plate - Utilize domestically sourced 6061 alloy, ASTM B221 unless otherwise notified, or other alloy is required to fulfill performance requirements. Utilize sizes, alloys, tempers and gauges as necessary to fulfill performance requirements, and to provide proper characteristics for fabrication, assembly and finishing as called for in the contract documents.
2. Extrusions and Tubing - Utilize domestically sourced 6061 alloy, ASTM B221 unless otherwise notified, or other alloy is required to fulfill performance requirements. Utilize sizes, alloys, tempers and gauges as necessary to fulfill performance requirements, and to provide proper characteristics for fabrication, assembly and finishing as called for in the contract documents. Minimum wall thickness is .125 inch unless otherwise specified.
3. Where attaching aluminum components to steel, provide coating or other barrier between metals to prevent galvanic oxidization.

B. Steel
1. Structural Tubing - Utilize domestically sourced sizes, alloys, tempers and gauges as necessary to fulfill performance requirements and to provide proper characteristics for fabrication, assembly and finishing as called for in the contract documents.
2. Sheet and Plate - Utilize domestically sourced sizes, alloys, tempers and gauges as necessary to fulfill performance requirements, and to provide proper characteristics for fabrication, assembly and finishing as called for in the contract documents.
3. Structural Assemblies - Fabricate and assemble in shop to the greatest extent possible, following AISC specifications.
4. Connections - Weld or bolt shop connections as called for in project documents or shop drawings. Bolt field connections unless welded connections are specifically called for in design or engineering specifications.
5. Welded Construction - Comply with AWS code for procedures, appearance, quality of welds and methods used in correcting welded work. Utilize only certified welders.
6. Galvanized Steel – Hot dipped galvanized after components have been cut to size.

C. Paint
1. Acrylic Polyurethane (Low VOC) - Multi-component catalytic opaque coating material consisting of pigmented base and activator. Follow manufacturer's specifications for ingredient ratios, surface preparation, priming, application methods, drying and handling of finishes.
2. Paint finish shall be smooth and consistent, free of surface imperfections, orange peel texture, scratches, gouges, drips, bubbles, uneven coating application, overspray or other surface imperfections.
3. Utilize Matthews Satin MAP or Owner Owner approved equal.
4. Surface coatings are to be compatible with adhesives and other materials utilized to apply graphics or other elements to their surface, with no discoloration or other deterioration.
5. Provide MAP graffiti resistant satin clear coat on all sign surfaces.

D. Fasteners
   1. Unless otherwise specified, utilize stainless steel fasteners for mechanical connections. Upon installation, paint finish any exposed fasteners to match surrounding finish.

E. Foam Tape
   1. Double sided acrylic adhesive closed cell urethane foam tape, 3M Series A20, #4016 or equal. Preparation of sign and mounting surface and installation techniques to be in accordance with manufacturer's specifications.
   2.

F. Silicone Sealant
   1. Clear silicone based commercial grade adhesive as manufactured by General Electric. Preparation of sign and mounting surface and installation techniques to be in accordance with manufacturer's specifications.

G. Vinyl Graphics
   1. Utilize 3M vinyl products suitable for applicable installation surfaces.
   2. Subject to compliance with requirements, provide 3M Diamond Grade DG3 Series 4090 white reflective sheeting or Owner approved equal with digitally printed image. Colors and images vary, refer to sign type layouts. The digital print shall be protected by 3M ElectroCut film series 1170 clear UV protection film or Owner approved equal with a PMMA top film.
   3. Digital Image - The printing resolution shall be a minimum of 540 dots per inch (DPI). All numbers, letters, symbols and borders or backgrounds on signs shall be digitally printed (directly or through reverse image) before the sheeting is adhered to the panels, unless otherwise approved by engineer. Final signs to be printed with custom blue or gray as approved by owner.
   4. Digital Printing Process - The inkjet printer must be capable of printing with a resolution of 540 dots per inch on a media of 48 inches wide, at a minimum. Digital printing must be performed using an environmentally friendly, flexible, UV incandescent, curable ink. The overlaminate must be applied with the use of a laminator capable of heating to 170 degrees Fahrenheit with a nip pressure of 90 pounds per square inch. All digitally printing shall be done in a workmanlike manner and as recommended by the manufacturer of the reflective sheeting.
   5. Warranty - Image durability, special or custom colors that are used in the manufacturing of digitally printed graphics, which are not defined by ASTM D4965, must be warranted for a period of 8 years and shall not excessively fade, discolor, crack, peel, blister or lose reflectivity such that the signs become visually unsuitable for their intended purpose.

H. Painted Graphics
   1. Utilize correct paint products designed to adhere to the variety of installation surfaces occurring on this project.

I. Acrylic

J.
   1. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

PART 3 - EXECUTION

3.1 FABRICATION

A. Design, fabricate and install components to allow for expansion and contraction within a minimum of a 100-degree F temperature range, without causing excessive opening, buckling or overstressing of joints, adhesives, welds and fasteners.

B. Form work to specified sizes, shapes and profiles, with true curves, lines and angles. Provide necessary brackets, lugs and mounting points as required for assembly. Use concealed fasteners wherever possible.

C. Shop fabricate as much as is practical, minimizing field fabrication. Fasten joints flush to conceal attachments, or weld, grind smooth and finish joints where possible.

D. Shop and field assembled joints are to be true and tight, with minimal use of filling compounds. Finish hollow sign elements with matching material on all faces, tops, bottoms and ends, so that elements have the appearance of solid material.

E. Signs shall have a consistent, smooth surface, with even texture, straight edges and flat panel surfaces. Panel surfaces are to be flat and true with a maximum surface tolerance is 1/8 inch for 10 feet in length. Lines, joints and miters are to be smooth and sharp, with profiles accurate and ornament true to pattern.

F. Extruded members are to be free of extrusion marks.

G. Pre-drill holes for bolts and screws. Exposed ends and edges of panels are to be milled smooth with slightly eased edges.

H. All painted surfaces are to have proper surface preparation and priming prior to application of finish coatings. Finish is to be even with no light application allowing substrate or primer to show.

I. All moveable parts, including hardware are to be assembled and finished to allow for smooth operation without binding, deformation or distortion of adjoining members. All contact surfaces are to fit tight without forcing or warping components.

J. Shop Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fish-mouths.

3.2 INSTALLATION

A. Protect products against damage during field handling and installation. Protect adjacent existing materials, finishes and landscaping as necessary to prevent damage. Touch up exposed hardware to match color and finish of surrounding surface after installation.

B. Coordinate timing of installation work with HAS operations and project management to insure execution of work does not interfere with the smooth, normal operation of this facility.

C. Mount signs in proper alignment, level and plumb in accordance with the contract documents. Where not otherwise specified, signs shall be installed where best suited to provide a consistent appearance throughout the project.

D. Contractor shall own and be responsible for all signs that are damaged. lost or stolen while materials are on the job site, and until the final acceptance of the job by the owner.

E. Correct or remove signs or installation work deemed by the owner as unsafe immediately upon notification.

F. Upon completing installation, clean all sign surfaces and adjacent building surfaces affected by sign installation prior to calling for inspection. Replace any damaged landscaping materials to match condition prior to installation.

G. For all sign elements related to gate number changes, make sign face changes to reflect new gate numbering, then provide easily removable cover so that current gate numbers can be easily changed to new gate numbers on the date of the change.

H. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION