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SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
 - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized, unless otherwise indicated.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Framing and Furring:
 - a. Steel Stud Manufacturers' Association members.
 - b. Dietrich UltraSTEEL™ Framing.

2.2 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
 - 1. Depth: 2 inches, unless otherwise indicated.
- D. Furring Channels (Furring Members):
 - 1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base Metal Thickness: 0.0179 inch.
- E. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.027 inch (25 gauge or equivalent), or greater as required to comply with manufacturer's requirements for limiting heights and applied loads.
 - 2. Depth: As indicated on Drawings.
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - 2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Steel Network Inc. (The); VertiClip SLD Series.
 - 2) Superior Metal Trim; Superior Flex Track System (SFT).
- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing at all locations where wall-mounted accessories are shown and at Owner-installed visual display board locations.
 - 1. Minimum Base-Metal Thickness: 0.0312 inch.

- D. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
 - 1. Depth: 1-1/2 inches, unless indicated otherwise.
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 0.0179 inch.
 - 2. Depth: 7/8 inch.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Install sealer gaskets to isolate the underside of wall bottom track and the top of slab-on-grade at stud locations.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs as follows: 16 inches o.c., unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- D. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- E. Z-Shaped Furring Members:
 - 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

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SECTION 09 29 00**GYPSUM BOARD****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.
 - 2. Sound dampening board.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or plotchy surface contamination and discoloration.

PART 2 – PRODUCTS

2.1 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. G-P Gypsum.
 - b. Lafarge North America Inc.
 - c. National Gypsum Company.
 - d. USG Corporation.
- B. Type X:
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- C. Moisture- and Mold-Resistant Type: ASTM C1177/C 1177M. Non-combustible, moisture- and mold-resistant gypsum core with coated fiberglass mat facings.
1. Thickness: 5/8-inch thick.
 2. Long Edges: Tapered.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. G-P Gypsum Company; DensArmor Plus Abuse Guard Interior Drywall.
 - b. United States Gypsum Co.; FIBEROCK Brand Aqua-Tough Gypsum Panels.

2.2 SOUND DAMPENING MATERIALS

- A. Sound Deadening Board: Glass faced gypsum board with sound-absorbing viscoelastic polymer core.
1. Product: Subject to compliance with requirements, provide the following:
 - a. "QuietRock 528" by Serious Energy.
 2. Thickness: 5/8 inch thick.
 3. Tolerance: +/- 0.650-0.715".
 4. STC Rating: 50-58 (ASTM E90).
 5. Water Absorption: < 5% of weight (ASTM C630, ASTM C1396, ASTM C1658).
 6. Mold Resistance: 10, in a test as manufactured (ASTM D3273).
 7. Size: 48 by 96 inches.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Paper-faced galvanized steel sheet.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Glass-Mat Faced Gypsum Board: 10-by-10 glass mesh.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- D. Joint Compound for Glass-Mat Faced Gypsum Board Applications:
 - 1. Glass-Mat Gypsum Board: As recommended by board manufacturer.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
- E. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

PART 3 – EXECUTION

3.1 EXAMINATION

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- C. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- D. Form control and expansion joints with space between edges of adjoining gypsum panels.
- E. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: Vertical surfaces, unless otherwise indicated.
 - 2. Glass-Mat Interior Type: At Bathrooms.
 - 3. Sound Dampening Materials: Where indicated on Drawings.
- B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 2. LC-Bead: Use at exposed panel edges.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

3.6 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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SECTION 09 30 00**TILING****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. This Section includes the following:
 - 1. Interior wall and floor tile.
- B. Related Sections:
 - 1. Section 09 29 00 "Gypsum Board" for moisture- and mold-resistant gypsum board substrate.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on floor surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
- D. Product Certificates: For each type of product, signed by product manufacturer.
- E. Material Test Reports: For each tile-setting and -grouting product.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type from one source or producer.
 - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- D. Store liquid latexes in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range.

2.2 TILE PRODUCTS

- A. Porcelain Floor Tile: Flat tile, as follows:
 - 1. Composition: Porcelain.
 - 2. Module Size: As selected by Architect.
 - 3. Face: Plain with square or cushion edges.
- B. Wall Tile: Flat tiles, as follows:
 - 1. Module Size: As selected by Architect.
 - 2. Face: Plain with modified square edges or cushion edges.
 - 3. Finish: As selected by Architect.
- C. Wall Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as selected by Architect.
 - 1. Wainscot Cap: Surface bullnose, module size same as adjoining flat tile.
 - 2. External Corners: Surface bullnose, module size same as adjoining flat tile.
 - 3. Internal Corners: Field-buttet square corners.
- D. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as used for adjoining wall tile.
 - 1. One soap holder for each shower and tub indicated.
 - 2. Color and Finish: Match adjoining wall tile.

2.3 SETTING AND GROUTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A.
- B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

- C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
- D. High-Performance Tile Grout: ANSI A118.7.

2.4 MISCELLANEOUS MATERIALS

- A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.5 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units

taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- E. Grout tile to comply with requirements of the following tile installation standards:
 - 1. For ceramic tile grout (latex-portland cement), comply with ANSI A108.10.

3.4 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.5 TILE INSTALLATION SCHEDULE

- A. Interior Wall Installations:
 - 1. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.
 - a. Tile Type: As selected by Architect.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout: High-performance unsanded grout.

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SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

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. This Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch-long Samples of each type, finish, and color.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- D. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
- C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 1. International Building Code, 1621.1, and applicable requirements of ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9.6.
 2. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."
- D. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.2 MINERAL-BASE ACOUSTICAL PANELS:

- A. Manufacturers:
 - 1. Armstrong World Industries; "Dune" Item No. 1772 (Basis of Design).
 - 2. USG Corporation.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type III, mineral base with painted finish; Form 2.
 - 2. Pattern: CE.
- C. Color: White.
- D. Edge Detail: Square.
- E. Thickness: 5/8 inch.
- F. Size: 24 by 24 inches.
- G. LR: Not less than 0.80.
- H. NRC: Not less than 0.50.
- I. Fire Rating: Class A.

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- G. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
- H. Hold-Down Clips: At Exterior Drive-through, provide manufacturer's standard hold-down clips spaced 24 inches b.c. on all cross tees.

2.4 METAL SUSPENSION SYSTEM:

- A. Manufacturers:
 - 1. Armstrong World Industries, Inc.; "Prelude XL 15/16" Exposed Tee System" (Basis of Design)
 - 2. USG Corporation.

- B. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized-Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet hot-dip galvanized according to ASTM A 653/A 653M, with prefinished 15/16-inch- wide metal caps on flanges.
1. Structural Classification: Heavy-duty system.
 2. Face Design: Flush face.
 3. Cap Finish: Painted white.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers:
1. Armstrong World Industries, Inc.
 2. Chicago Metallic Corporation.
 3. USG Interiors, Inc.
- B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Provide perimeter trim, designed to fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
- C. Beam End Retaining Clips: As approved by authority having jurisdiction, provide beam end retaining clips for perimeter attachment of suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
1. ACM7 by USG.
 2. BERC-2 by Armstrong.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Standards for Ceiling Suspension Systems Requiring Seismic Restraint:
 - a. CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4."
 - b. IBC, 1621.1, and applicable requirements of ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9.6.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post installed mechanical

or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet . Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
- B. Related Sections:
 - 1. 09 30 00 Tiling

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by **Johnsonite, Inc.** or Architect approved comparable product.
- B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style: Style B, Cove.
- C. Thickness: 0.125 inch.
- D. Height: As indicated on Drawings.
- E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.
- F. Corners: Preformed.
- G. Colors: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION

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SECTION 09 90 00**PAINTING AND PROTECTIVE COATINGS****PART 1 – GENERAL****1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. American Water Works Association (AWWA):
 - a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines-Enamel and Tape-Hot-Applied.
 - b. C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - c. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
 - d. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
 2. Environmental Protection Agency (EPA).
 3. NACE International (NACE): RP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
 4. NSF International (NSF): 61, Drinking Water System Components Health Effects.
 5. Occupational Safety and Health Act (OSHA).
 6. The Society for Protective Coatings (SSPC):
 - a. P A 2, Measurement of Dry Coating Thickness with Magnetic Gages.
 - b. P A 3, Guide to Safety in Paint Applications.
 - c. SP 1, Solvent Cleaning.
 - d. SP 2, Hand Tool Cleaning.
 - e. SP 3, Power Tool Cleaning.
 - f. SP 5, White Metal Blast Cleaning.
 - g. SP 6, Commercial Blast Cleaning.
 - h. SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
 - i. SP 10, Near-White Blast Cleaning.
 - j. SP 11, Power Tool Cleaning to Bare Metal.

- k. SP 12, Surface Preparation and Cleaning of Metals Water Jetting Prior to Recoating.
 - l. SP 13, Surface Preparation of Concrete.
 - m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.
7. Master Painters Institute (MPI)

1.02 DEFINITIONS

A. Terms used in this section:

- 1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
- 2. FRP: Fiberglass Reinforced Plastic.
- 3. HCl: Hydrochloric Acid.
- 4. MDFT: Minimum Dry Film Thickness, mils.
- 5. Mil: Thousandth of an inch.
- 6. PDS: Product Data Sheet.
- 7. PSDS: Paint System Data Sheet.
- 8. PVC: Polyvinyl Chloride.
- 9. SFPG: Square Feet per Gallon.
- 10. SFPGPC: Square Feet per Gallon per Coat.
- 11. SP: Surface Preparation.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Data Sheets:
 - a. For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS form is appended to the end of this section.
 - b. For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
 - c. Technical and performance information that demonstrates compliance with Specification.
 - d. Furnish copies of paint system submittals to the coating applicator.
 - e. Indiscriminate submittal of only manufacturer's literature is not acceptable.

- f. Provide a cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - g. Printout of current "MPI Approved Products List" with the proposed product highlighted for those products specified in paragraph "Architectural Paint Systems and Application Schedule" herein (Section 3.12).
2. Detailed chemical and gradation analysis for each proposed abrasive material.
 3. Paint Color Schedule: List of paint colors selected (manufacturer, name and number) and corresponding locations of application.
 4. Samples:
 - a. Reference Panel:
 - 1) Paint & Coatings:
 - (a) Unless otherwise specified, before painting work is started, prepare samples as required in "Mockup" herein.
 - (b) Furnish additional samples as required until colors, finishes, and textures are approved.
 - (c) Approved samples to be the quality standard for final finishes.
- B. Informational Submittals:
1. Applicator's Qualification: List of references substantiating experience.
 2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 00 01, General Requirements.
 3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
 4. Manufacturer's written verification that submitted material is suitable for the intended use and is compatible with any other products applied to the same surface.
 5. Manufacturer's written instructions and special details for applying each type of paint and coating.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 5 years' experience in application of specified products.
- B. Regulatory Requirements:
 1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds (VOC).
 2. Perform surface preparation and painting in accordance with recommendations of the following:
 - a. Paint manufacturer's instructions.

- b. SSPC P A 3, Guide to Safety in Paint Applications.
 - c. Federal, state, and local agencies having jurisdiction.
- C. MPI Standards for Architectural Paint Systems:
- 1. Products listed in paragraph "Architectural Paint Systems and Application Schedule" (Section 3.12) shall comply with MPI Standards indicated and listed in current "MPI approved Products List".
 - 2. Preparation and workmanship of products listed in paragraph "Architectural Paint Systems and Application Schedule" shall comply with requirements in "MPI Architectural Painting Specification Manual".
- D. Mockup:
- 1. Apply benchmark samples 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.
 - 2. Unless noted otherwise, prepare minimum 8-inch by 10-inch sample with type of paint and/or coating and application specified on similar substrate to which paint and/or coating is to be applied.
 - a. Wall Surfaces: Provide samples on at least 100 sq. ft. of wall surface.
 - b. Doors: Provide full size samples for interior and exterior doors.
 - 3. If preliminary color selections are not approved, additional benchmark samples of additional colors selected by Architect shall be provided by the Contractor at no added cost to Owner.
 - 4. Final approval of color selections will be based on benchmark samples which shall serve as the quality standard for final finishes.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
- 1. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - a. Product name or title of material.
 - b. Product description (generic classification or binder type).
 - c. Manufacturer's stock number and date of manufacture.
 - d. Contents by volume, for pigment and vehicle constituents.
 - e. Thinning instructions.
 - f. Application instructions.
 - g. Color name and number.
- B. Shipping:

1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
 2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.
 3. Contractor shall repair damages that have occurred during transit, to the satisfaction of the Owner, or shall supply a replacement.
- C. Storage:
1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
 2. Primed surfaces shall not be exposed to weather for more than 2 months before being top coated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
 2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.
- B. Minimum of 5 years' verifiable experience in manufacture of specified product.
- C. Each of the following manufacturers is capable of supplying most of the paint products specified in paragraph "Architectural Paint Systems and Application Schedule" herein (Section 3.12):
1. Sherwin Williams.
 2. Tnemec.
 3. PPG Architectural Finishes.
 4. Benjamin Moore & Co.
 5. Rose Talbert Paints
- D. Acceptable manufacturers of other paints and/or coatings are as specified in Section 3.

2.02 ABRASIVE MATERIALS

- A. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

2.03 PAINT MATERIALS

A. General:

1. Manufacturer's highest quality products suitable for intended service.
2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

B. Products:

Product	Definition
Acrylic Latex	Single-component, finish as required.
Acrylic Latex (Flat)	Flat latex
Acrylic Sealer	Clear acrylic
Alkyd (Semigloss)	Semigloss alkyd
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil.
Alkyd Wood Primer	Flat alkyd
Bituminous Paint	Single-component, coal-tar pitch based.
Block Filler	Primer-sealer designed for rough masonry surfaces, 100% acrylic emulsion.
Coal-Tar Epoxy	Amine, polyamide, or phenolic epoxy type 70% volume solids minimum, suitable for immersion service.
DTM Acrylic Primer	Surface tolerant, direct-to-metal water borne acrylic primer.
DTM Acrylic Finish	Surface tolerant, direct-to-metal water borne acrylic finish coat.
Elastomeric Polyurethane	100% solids, plural component, spray applied, high build, elastomeric polyurethane coating, suitable for the intended service.
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry. Approved for potable water contact and conforming to NSF 61, where required.
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies

Product	Definition
	aggregated; aggregate may be packaged separately
Epoxy Primer-Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments.
Epoxy Primer-Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated.
Fusion Bonded Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service.
Fusion Bonded, TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating, or open gear grease as supplied by McMaster-Carr Supply Corporation., Elmhurst, IL; RL 736 manufactured by Amrep, Inc., Marietta, GA.
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat.
High Solids Polyurethane	Two-component, low VOC, aliphatic, acrylic polyurethane resin coating having a minimum of 65% volume solids; high gloss or semi gloss finish
Inorganic Zinc Primer	Solvent or water based, having 85% metallic zinc content in the dry film; follow manufacturer's recommendation for top coating.
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats.
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Rust-Inhibitive Primer	Single-package steel primers with anticorrosive pigment loading
Sanding Sealer	Co-polymer oil, clear, dull luster.
Silicone/Silicone Acrylic	Elevated temperature silicone or silicone/acrylic based.

Product	Definition
Stain, Concrete	Acrylic, water repellent, penetrating stain.
Stain, Wood	Satin luster, linseed oil, solid or transparent as required.
Varnish	Non-pigmented vehicle based on a variety of resins (alkyd, phenolic, urethane) in gloss, semigloss, or flat finishes, as required.
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required.

2.04 MIXING

- A. Multiple-Component Coatings:
1. Prepare using each component as packaged by paint manufacturer.
 2. No partial batches will be permitted.
 3. Do not use multiple-component coatings that have been mixed beyond their pot life.
 4. Furnish small quantity kits for touchup painting and for painting other small areas.
 5. Mix only components specified and furnished by paint manufacturer.
 6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.
- B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.05 SHOP FINISHES

- A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.
- B. Surface Preparation: Provide Contractor minimum 7 days' advance notice to start of shop surface preparation work and coating application work.
- C. Shop Coating Requirements:
1. When required by equipment Specifications, such equipment shall be primed, and finish coated in shop by manufacturer and touched up in field with identical material after installation.
 2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

2.06 ARCHITECTURAL PRODUCTS

The following is to be applied to all paint systems except where specifically noted otherwise herein and on the Drawings.

- A. Exterior Metal Primer: Primer, Epoxy, Anti-Corrosive, for Metal: MPI #101
- B. Exterior Wood Primer: Primer, Alkyd for Exterior Wood: MPI #5.
- C. Exterior Water-Based Paint: Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.
- D. Exterior Latex Paint: Exterior Latex (Semigloss) MPI #11 (Gloss Level 5).
- E. Interior Primers / Sealers: Interior Latex Primer/Sealer MPI #50.
- F. Interior Metal Primers:
 - a. Quick-Drying Alkyd Metal Primer MPI #76.
 - b. Waterborne Galvanized-Metal Primer: MPI #134.
- G. Interior Latex Paints:
 - a. Interior Latex (Eggshell) MPI #52 (Gloss Level 3).
 - b. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).
- H. Epoxy Coatings: Epoxy-Modified Latex, Interior, Gloss (Gloss Level 6) MPI #115.

PART 3 – EXECUTION

3.01 GENERAL

- A. Provide Contractor minimum 7 days' advance notice to start of field surface preparation work and coating application work.
- B. Perform the Work only in presence of Contractor, unless Engineer grants prior approval to perform the Work in Contractor's absence.
- C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Contractor.

3.02 EXAMINATION

- A. Factory Finished Items:
 - 1. Schedule inspection with Contractor before repairing damaged factory-finished items delivered to Site.
 - 2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.
- B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.
- C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent
 2. Masonry: 12 percent
 3. Wood: 15 percent
 4. Gypsum Board: 12 percent
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry. Commencement of coating application constitutes Contractor's acceptance of substrates and conditions.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering.
- E. Protect surfaces adjacent to or downwind of Work area from overspray.

3.04 SURFACE PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated in paragraph "Architectural Paint Systems and Application Schedule" (Section 3.12 herein).
- B. Metal Surface Preparation:
1. Where indicated, meet requirements of SSPC Specifications summarized below:
 - a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
 - b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.
 - c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.
 - d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.

- e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
 - g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
 - i. SP 12, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating: Surface preparation using high-pressure and ultrahigh-pressure water jetting to achieve specified surface cleanliness condition. Surface cleanliness conditions are defined in SSPC SP 12 and are designated WJ-1 through WJ-4 for visual surface preparation definitions and SC-1 through SC-3 for nonvisual surface preparation definitions.
2. The words "solvent cleaning," "hand tool cleaning," "wire brushing," and "blast cleaning," or similar words of equal intent in these Specifications or in paint manufacturer's specification refer to the applicable SSPC Specification.
 3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers' recommendations for wet blast additives and first coat application shall apply.
 4. Ductile Iron Pipe Supplied with Asphaltic Varnish Finish: Remove asphaltic varnish finish prior to performing specified surface preparation.
 5. Hand tool clean areas that cannot be cleaned by power tool cleaning.
 6. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.

7. Welds and Adjacent Areas:
 - a. Prepare such that there is:
 - 1) No undercutting or reverse ridges on weld bead.
 - 2) No weld spatter on or adjacent to weld or any area to be painted.
 - 3) No sharp peaks or ridges along weld bead.
 - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
8. Preblast Cleaning Requirements:
 - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
 - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
 - c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.
9. Blast Cleaning Requirements:
 - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
 - b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.
 - c. Use only dry blast cleaning methods.
 - d. Do not reuse abrasive, except for designed recyclable systems.
 - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
10. Post-Blast Cleaning and Other Cleaning Requirements:
 - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and

other areas where dust settling is a problem and wipe with a tack cloth.

- b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

C. Galvanized Metal Surface Preparation:

1. Prepare in accordance with ASTM D 6386 and recommended procedures from the American Galvanizers Association (AGA).
2. Notify galvanizer that steel will be painted.
3. Newly Galvanized Metal (48 hours or less since galvanizing):
 - a. Grinding: removed excess zinc, remove dross particles, bumps, runs and drips by hand grinder. If process removes too much zinc, surface must be repaired in accordance with ASTM A780.
 - b. Ensure surface is free of oil, grease, dirt and other organic materials. If it is not, see Partially Weathered for cleaning procedure.
 - c. Rinse thoroughly and dry.
 - d. Profile by sweep blasting at a maximum pressure of 40 psi, wash primer or acrylic pre-treatment. Take care not to damage the galvanized coating.
4. Partially Weathered Metal (2 days – 12 months from galvanizing):
 - a. Grinding as previously defined for Newly Galvanized Metal.
 - b. Clean surface of organic compounds and wet storage stain using alkaline solution or solvent cleaning.
 - c. Rinse thoroughly and dry.
 - d. Profile as previously defined for Newly Galvanized Metal.
5. The pressure of cleaning or rinsing performed must not exceed 1450 psi.
6. Apply paint or coating within 12 hours of drying.

D. Nonferrous Metal Alloy Surface Preparation:

1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.
2. Remove oil and grease by wiping or scrubbing surface with suitable solvent, rag, and brush. Use clean solvent and clean rag for final wiping to avoid contaminating surface.
3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.

E. Concrete Surface Preparation:

1. Do not begin until a minimum of 30 days after concrete has been placed, and longer if directed by product manufacturer.
2. Meet requirements of SSPC SP 13.
3. Adhere to manufacturer's recommendations for preparation of the concrete surface. Ensure surface is free from grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter.
4. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after preparation.
5. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.

F. Plastic Surface Preparation:

1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

G. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.
2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.
3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
 - a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
 - b. Brush-off blasting.
 - c. Water blasting.
4. Do not damage masonry mortar joints or adjacent surfaces.
5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.
6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.

7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.
- H. Wood Surface Preparation:
1. Replace damaged wood surfaces or repair in a manner acceptable to Contractor prior to start of surface preparation.
 2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.
 3. Round sharp edges by light sanding prior to priming.
 4. Filler:
 - a. Synthetic-based wood putty approved by paint manufacturer for paint system.
 - b. For natural finishes, color of wood putty shall match color of finished wood.
 - c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.
 - d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer's recommendations.
 - e. Use cellulose type putty for stained wood surfaces.
 - f. Ensure surfaces are clean and dry prior to painting.
- I. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.
1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.

3.05 SURFACE CLEANING

- A. Brush-off Blast Cleaning:
1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
 2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.
 3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.

4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
 5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
 6. Repair or replace surface damaged by blast cleaning.
- B. Solvent Cleaning:
1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
 2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

- A. General:
1. The intention of these Specifications is for new, interior and exterior masonry, concrete, and metal, surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.
 2. Apply coatings and paint in accordance with these Specifications and manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
 3. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
 4. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
 5. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.
 6. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
 7. Keep paint materials sealed when not in use.
 8. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.
- B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:
1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.

2. Prepare surface and apply primer in accordance with System No. 10 specification.
 3. Apply intermediate and finish coats of the coating system appropriate for the exposure.
- C. Porous Surfaces, Such as Concrete and Masonry:
1. Repairs shall be completed using products specified in Section 03 30 00 Cast-In-Place Concrete.
 2. Filler/Surface: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects that may inhibit or prevent adequate application of coating.
 3. Prime Coat: If it acceptable to the manufacturer, prime coat may be thinned to provide maximum penetration and adhesion. The reduction volume shall be determined by the manufacturer specific to the density and type of coating being applied. Reduction shall not be implemented if it voids the warranty of any product.
 4. Surface Specified to Receive Water Base Coating: For most applications, surface shall be damp just prior to application of coating, but free of running water. Verify this requirement with manufacturer for specified product.
- D. Film Thickness and Coverage:
1. Number of Coats:
 - a. Minimum required without regard to coating thickness.
 - b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
 2. Application Thickness:
 - a. Do not exceed coating manufacturer's recommendations.
 - b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
 3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
 - a. Perform with properly calibrated instruments.
 - b. Recoat and repair as necessary for compliance with Specification.
 - c. Coats are subject to inspection by Contractor and coating manufacturer's representative.
 4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
 5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
 6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 FIRE RATED ASSEMBLIES

- A. Permanently identify corridor partitions, smoke stop partitions, horizontal exit partitions, exit enclosures and fire walls. Above decorative ceiling line and in concealed spaces, apply a minimum one-inch wide red line interrupted at maximum 15-ft spacing with the wording "XX HOUR FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS" in 4-inch high letters with "XX" designating the appropriate hourly rating.

3.08 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke test procedure at any time and as often as Owner deems necessary during the period when paint is being applied.
1. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint.
- B. Testing:
- Testing is to be performed on the waterproof and anti-corrosion coatings applied to the interior surfaces of the Basins.
1. Thickness and Continuity Testing:
- a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC P A 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
- b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE RP0188.
- c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE RP0188.
- d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.
2. Testing Equipment:
- a. Provide magnetic type dry film thickness gauge to test coating thickness specified in mils, as manufactured by Nordson Corp., Anaheim, CA, Mikrotest.
- b. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Razor, San Gabriel, CA, Model M-I.

- c. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.
- C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.
- D. Unsatisfactory Application:
 - 1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
 - 2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
 - 3. Repair defects in accordance with written recommendations of coating manufacturer.
- E. Damaged Coatings, Pinholes, and Holidays:
 - 1. Feather edges and repair in accordance with recommendations of paint manufacturer.
 - 2. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather the edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
 - 3. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

3.09 MANUFACTURER'S SERVICES

- A. Coating manufacturer's representative shall be present at Site for the application of the waterproof and anti-corrosion coatings for the Basins as follows:
 - 1. On first day of application of any coating system.
 - 2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
 - 3. During thickness and continuity testing to verify conformance with project and manufacturer requirements.
 - 4. As required to resolve field problems attributable to or associated with manufacturer's product.
 - 5. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.10 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.

- B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.
- C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.11 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule and the environmental types defined in Section 01 00 01, General Requirements. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

- B. System No. 2 Submerged Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning	Prime in accordance with manufacturer's recommendations	
	Coal-Tar Epoxy	2 coats, 16 MDFT
	-OR- High Build Epoxy	2 coats, 16 MDFT

1. Use on the following items or areas:
- New metal surfaces located in submerged environment type.
 - New metal surfaces above maximum liquid surface that are a part of submerged equipment.
 - Submerged surfaces of metallic items, such as wall pipes, pipes, pipe sleeves, access manholes, gates, gate guides, thimbles, and structural steel that are embedded in concrete.
 - Interior surfaces of steel piping noted in the Piping Schedule.

- C. System No. 4 Galvanized Metal, Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
See Preparation section of this specification	Zinc-Rich Primer	1 coat, per mfr
	Top Coat - Acrylic Latex	1 coat, per mfr

1. Use on the following items or areas:

- a. Exposed new galvanized metal surfaces located in interior equipment room
- b. Exposed galvanized metal deck: exterior and interior.
- c. Exposed galvanized structural steel, including beams and columns of monorail and porch framing.
- d. Exposed galvanized steel stair and platform framing (exterior).
- e. Galvanized steel lintels.
- f. Galvanized exterior doors and frames.

D. System No. 5 Exposed Metal, Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer – Ferrous Metal	1 coat, 2.5 MDFT
	Polyethylene Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
 - a. Miscellaneous exposed new metal surfaces inside the 2nd level of the building.
 - b. Interior doors and frames.

E. System No. 6 Exposed Metal Atmospheric:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust Inhibitive Primer	1 coat, 2 MDFT
	Alkalyd Enamel	2 coats, 4 MDFT

1. Use on the following items or areas:
 - a. Exposed new metal surfaces including vents, exterior metal ductwork, flashing, sheet metalwork and miscellaneous architectural metal trim.
 - b. Apply surface preparation and primer to surfaces prior to installation. Finish coats need only be applied to surfaces exposed after completion of construction.

F. System No. 8 Buried Metal General:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near White Blast Cleaning	Coal-Tar Epoxy	2 coats, 125 microns each
	Coal-Tar Primer,	1 coat, per mfr

	Coal-Tar Enamel	2 coats hot applied per mfr
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1. Use on the following items or areas:
 - a. Buried, below grade portions of steel items, except buried stainless steel or ductile iron and the following specific surfaces:
 - 1) Fasteners and accessories of buried piping related items.

G. System No. 10 Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Nonferrous Metal Alloy Surface Preparation	Epoxy Primer-Other	As recommended by coating manufacturer Remaining coats as required for exposure

1. Use on the following items or areas:
 - a. Aluminum handrail, grating, panels, and miscellaneous components both interior and exterior.
 - b. After application of System No. 10, apply finish coats as required for exposure. For handrail apply per specifications herein. For other items apply per manufacturer recommendations.

H. System No. 11 Galvanized Metal Repair:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SPI) Followed by Hand Tool (SP 2), Power Tool (SP 3) or Brush off Blast (SP 7)	Organic Zinc Rich Primer	1 coat, 3 MDFT

1. Use on the following items or areas:
 - a. Galvanized surfaces that are abraded, chipped or otherwise damaged.

I. System No. 19 Concrete Tank Waterproof Coating:

Surface Prep.	Paint Material	Min. Coats, Wet Thickness
As specified by the manufacturer	CIM 61TN Epoxy Primer	2 coats, 5 mil (wet) – recoat w/in 48 hrs
	CIM 1000	2 coats, 60* mil (dry)

*Apply extra thickness at corners, intersections, angles and over joints.

1. Use on the following items or areas:
 - a. Walls and base slab of EQ Tank, MBR tanks, MBT tank, Digester tanks, grit system concrete tank, and splitter box.

J. System No. 20 Concrete Tank Anti-Corrosion Coating:

Surface Prep.	Paint Material	Min. Coats, Dry Thickness
As specified by the Manufacturer	Raven 405 System	3 coats min, 60 mil

1. Use on the following items or areas:
 - a. Top 4 ft. of Splitter Box, Anaerobic, Pre-Aeration Basins, Post Anoxic, and Membrane Basins walls.
 - b. Top 6 ft. of pre-anoxic walls
 - c. Underside of all concrete slabs and walkways over all Basins.
 - d. Coating of all exposed piping inside of all basins.
 - e. Headcell grit removal system. The horizontal surface (top of walls), the interior vertical surface to 1 foot below water line of concrete walls, interior walls of concrete trough to 1 foot below water line and top vertical surface.
 - f. The entire slab below the Headwork and the equipment pedestals

K. System No. 21 Decorative Abrasion Resistant Concrete Finish:

Surface Prep.	Paint Material	Min. Coats, Cover
Shot blast concrete as specified by manufacturer	Stontec UTF, by Stonhard Inc.	As specified by manufacturer

1. Use on the following items or areas:
 - a. Interior floors on 2nd floor of the building.

L. System No. 22 Decorative Abrasion Resistant Non-Slip Concrete Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
Shot blast concrete as specified by manufacturer	Stontec UTF with White Texture, by Stonhard Inc.	As specified by manufacturer

2. Use on the following items or areas:
 - a. Exterior concrete slab on 2nd level at top of stairs and at covered area between monorail bay and building CMU wall.

M. System No. 23 Chemical-Resistant Non-Slip Floor and Wall Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
Shot blast concrete as specified by manufacturer	Stonchem 830, by Stonhard Inc.	As specified by manufacturer

3. Use on the following items or areas:
 - a. Interior slab on grade and equipment slabs of the Equipment Room, sludge dewatering room and MCC Room.

- b. Lower 6 inches of all walls in the first floor Equipment Room, caustic and Alum containment area and MCC Room.

N. System No. 25 Exposed PVC (where applicable):

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface Preparation	Acrylic Latex Semigloss	2 coats, 320 SFPGPC

1. Use on the following items or areas:
- a. All exterior, exposed-to-view PVC and CPVC surfaces.

O. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete.

P. System No. 29 Fusion Bonded Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 7 MDFT

1. For steel pipe and fittings, meet all requirements of AWWA C213.
2. Use on the following items:
- a. Interior and exterior of valves as specified in Section 40 27 02 Process Valves and Operators.

3.12 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

B. System No. 102 Wood, Exterior:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Wood Surface Preparation	Alkyd Wood Primer, MPI #5	1 coat
	Latex, exterior, matching topcoat	1 coat
	Latex, exterior gloss (Gloss Level 6), MPI #119	1 coat

1. Use on the following items or areas:

a. All exterior wood.

C. System No. 106 Wood, Interior, Latex System: n/a

D. System No. 109 Masonry, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

1. Use on the following items or areas:

a. All interior CMU walls in the first and 2nd floor of the MBR Building to include MCC room, auxiliary room, and stair room

E. System No. 112 Concrete, Flat:

Surface Prep.	Paint Material	Min. Coats, Cover
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In accordance with Paragraph Concrete Surface Preparation	Acrylic Latex (Flat)	2 coats, 240 SFPGPC
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1. Use on the following items or areas:
 - a. Basin exterior walls. (only two walls looking South & West)
 - b. Lower and upper walls of the building. (no paint needed on future Phase II tank side)

F. System No. 114 Gypsum Board, Latex System:

Surface Prep.	Paint Material	Min. Coats
In accordance with Paragraph Gypsum Board Surface preparation	Interior Latex Primer Sealer	1 coat
	Interior latex matching topcoat	1 coat
	Interior latex (eggshell)	1 coat

1. Use Latex System MPI INT 9.2A on the following items or areas:
 - a. Interior gypsum board in dry areas.

G. System No. 115 Gypsum Board, Epoxy-Modified Latex System:

Surface Prep.	Paint Material	Min. Coats
In accordance with Paragraph Gypsum Board Surface preparation	Skim coat of joint compound	1 coat
	Primer sealer, latex, interior	1 coat
	Epoxy-modified latex, interior, gloss (Gloss Level 6)	2 coats

1. Use Epoxy-Modified Latex System MPI INT 9.2F on the following items or areas:
 - a. Interior gypsum board in wet areas.

3.13 COLORS

- A. Provide color chart to owner for color section.
- B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.
- C. Equipment Colors:
 - 1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
 - 2. Paint equipment and piping one color as selected.
 - 3. Paint non – submerged portions of equipment the same color as the piping it serves, except as itemized below:
 - a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
 - b. Fire Protection Equipment and Apparatus: OSHA Red.
 - c. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.
- D. Pipe Identification Painting:
 - 1. Color code non – submerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.
 - 2. Pipe Color Coding & Labeling: As indicated in Piping Schedule at the bottom of spec.
 - 3. Pipe Supports (for metals that are not galvanized steel, aluminum and stainless steel): Painted light gray, as approved by Engineer.
 - 4. PVC and CPVC pipe located inside of buildings and enclosed structures will not require painting except as noted or scheduled.

3.14 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are a part of this Specification:
 - 1. Paint System Data Sheet (PSDS).
 - 2. Product Data Sheet (PDS).

END OF SECTION

PAINT PRODUCT DATA SHEET

Complete and attach manufacturer's Technical Data Sheet to this PDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

Temperature/RH	50/50	70/30	90/25
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer's recommendations for the following:

Mixing Ratio: _____

Maximum Permissible Thinning: _____

Ambient Temperature Limitations: min.: _____ max: _____

Surface Temperature Limitations: min.: _____ max: _____

Surface Profile Requirements: min.: _____ max: _____

Attach additional sheets detailing manufacturer's recommended storage requirements and holiday testing procedures.

Wastewater Treatment Plant Color Coding Schedule

TYPE OF PIPE	USE OF PIPE	COLOR OF PIPE
Sludge Lines:	Raw Sludge	Brown w/ black bands
	Sludge recirculation or suction	Brown w/ yellow bands
	Sludge drw off	Brown w/ orange bands
	Sludge recirculation discharge	Brown
Gas Lines:	Sludge Gas	Orange (or Red)
	Natural Gas	Orange (or Red) w/ Black bands
Water Lines:	Non-potable Water	Blue w/ black bands
	Potable Water	Blue
	Water for heating digestors or buildings	Blue with a 6 in. (150mm) red band space 30 in. (760mm) apart
Other Lines:	Chlorine	Yellow
	Alum	Orange
	Caustic	Yellow with Green band
	Sewage (wastewater)	Gray
	Compressed Air	Green
	Reuse Water	purple

All exposed piping shall be labeled properly according to the pipe content with Arrow Tape that clearly show which direction the pipe flows.

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SECTION 09 90 01**PROTECTIVE COATING FOR NEW
CONCRETE AND MASONRY SANITARY SEWER STRUCTURES****PART 1 – GENERAL****1.1 GENERAL**

- A. This specification covers labor, materials, and equipment required for protecting and/or rehabilitating the interior of concrete sanitary sewer structures by application of a coating to protect the concrete structure from hydrogen sulfide and acid generated by microbiological sources present in the municipal wastewater environment. The protective coating shall also eliminate infiltration, repair voids, and enhance the structural integrity of the sanitary sewer structure.
- B. Cementitious material will not be allowed for the protective coating; however, it will be allowed for patching operations.
- C. For new sanitary sewer manholes: The protective coating shall be an acrylic polymer-base concrete coating and sealant. Procedures for surface preparation and application are described herein.
- D. For force main discharge manholes (including the second manhole downstream from a force main discharge) and drop manholes: The protective coating shall be a polymer-based polyurethane or a high-build, solvent-free epoxy coating. Procedures for surface preparation, cleaning, application, and testing are described herein.
- E. This specification also covers labor, materials, and equipment required for corrosion protection of the ductile iron pipes and fittings within sanitary sewer structures.

1.2 REFERENCES

- A. ASTM D638 –Tensile Properties of Plastics.
- B. ASTM D790 –Flexural Properties of Unreinforced/Reinforced Plastics.
- C. ASTM D695 –Compressive Properties of Rigid Plastics.
- D. ASTM D4414 –Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gauges.
- E. ASTM D4541 –Pull-off Strength of Coatings Using a Portable Adhesion Tester.
- F. ASTM D2584 –Volatile Matter Content.
- G. ASTM D2240 –Durometer Hardness, Type D.
- H. ASTM D543 –Resistance of Plastics to Chemical Reagents.

- J. ASTM C109 –Compressive Strength Hydraulic Cement Mortars.
- K. ACI 506.2-77 –Specifications for Materials, Proportioning, and Application of Shotcrete.
- L. ASTM C478 –Bond Strength to Concrete: Concrete Failed.
- M. ASTM C496 –Tensile Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.
- N. ASTM C579 –Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.
- O. ASTM –The published standards of the American Society for Testing and Materials, West Conshohocken, PA.
- P. NACE –The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.
- Q. SSPC –The published standards of the Society of Protective Coatings, Pittsburgh, PA.
- R. ASTM C396 –Compressive Strength of Cement Mortars.
- S. ASTM C580 –Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concrete.
- T. ASTM D4541 –Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
- U. ASTM D4787 –Standard Practice for Continuity Verification of Liquid or Sheet Depth Applied to Concrete Substrates.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.
 - 2. Material Safety Data Sheets (MSDS) for each product used.
 - 3. Project specific guidelines and recommendations.
 - 4. Warranty Certificate in accordance with Part 1.08 of this Section.
 - 5. Applicator Qualifications
 - a- Manufacturer certification that Applicator has been trained and approved in the handling, mixing, and application of the products to be used.

- b- Certification that the equipment to be used for applying the products has been manufactured or approved by the protective coating manufacturer and application personnel have been trained and certified for proper use of the equipment.
- c- Five (5) recent references of Applicator (projects of similar size and scope) indicating successful application of a high-build, solvent-free epoxy coating by plural component spray application.
- d- Written documentation of having installed a minimum of 40,000 s.f. of protective coating similar to that specified in Part 2.04 A, within the last two (2) years.

6.

1.4 QUALITY ASSURANCE

- A. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE, and SSPC standards and the protective coating manufacturer's recommendations.
- B. Coating Manufacturer's authorized field representative shall be on site prior to the application of the coating system to verify that the substrate has been properly prepared, and during the application of the coating system to certify that the coating system has been properly applied. The authorized field representative will provide the Owner with an accurate and objective written report stating inspection observations on the preparation, application, and final inspection verifying adherence to coating manufacturer recommendations, industry standards, and the written specifications.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. All materials are to be kept dry, protected from weather, and stored under cover.
- B. Protective coating materials are to be stored according to manufacturer's recommendations. Do not store near flame, heat, or strong oxidants.
- C. Repair and protective coating materials are to be handled according to their material safety data sheets.

1.6 SITE CONDITIONS

- A. Applicator shall conform with all local, state, and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.
- B. Method statements and design procedures are to be provided by the Contractor when confined space entry is required.
- C. During coating operations of existing manholes and lift station wetwells, Contractor shall provide temporary flow bypassing of the structure if required by the City.

1.7 ACCESS TO THE WORK SITE

- A. Contractor shall provide proper facilities for such access and observation of the

Work and also for any inspection or testing by others. If any Work is covered contrary to the request of the Owner's Representative or Engineer, it must, if requested by the Owner or Engineer, be uncovered for observation and replaced at the Contractor's expense.

- B. Contractor shall provide access to site inspection.

1.8 WARRANTY

- A. Sanitary Sewer Manholes:

All materials and workmanship shall be warranted to the owner for a period of ten (10) years.

- B. Force Main Discharge Manholes and Drop Manholes:

Manufacturer shall warrant all work against defects in materials and workmanship for a period of ten (10) years from the date of final acceptance of the project. Manufacturer shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship if any develop during said ten (10) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the Owner. No prorated warranties or exclusions for improper application will be accepted. Manufacturer shall also be responsible for the costs associated with bypass pumping to maintain continuous service if repairs are necessary during the warranty period.

1.9 MEASUREMENT AND PAYMENT

- A. All equipment, labor, and materials included in this section will not be measured or paid for separately. Payment will be included in the contract price for item of work to which it pertains.

1.10 LOCATION NEEDED RAVEN 404 COATINGS

- 1- All sewer drains manholes
- 2- Top of the vertical walls and top three feet of concrete walls for grit system to include influent and effluent trough
- 3- Top three feet of interior walls (including ceiling) of the splitter box
- 4- Top three feet of the anaerobic, aeration, post anoxic, and the membrane tanks
- 5- Top seven feet of the pre-anoxic tank
- 6- Top three feet of MBT tank and the digesters

PART 2 – PRODUCTS

2.1 REPAIR MATERIALS

- A. Cementitious patching, repair, and structural restoration materials used shall be

only those specified and pre-approved. Project specific submittals shall be provided including application, cure time, and surface preparation procedures which permit optimum bond strength with protective coating.

- B. Repair materials shall be used to fill voids, structurally reinforce, and/or rebuild substrate surfaces, etc. as determined necessary by the engineer and protective coating applicator. Quick blending, rapid setting, high early strength, fiber reinforced, non-shrink repair mortar that can be trowelled or pneumatically spray applied must be compatible with the specified protective coating and shall be applied in accordance with the manufacturer's recommendations.
- C. The following products are accepted and approved as compatible repair basecoat materials for protective topcoating for use within the specifications.

1. Infiltration Control

All fast setting materials furnished shall be applied directly to active leaks under hydrostatic pressure from the exterior of the concrete in wetwell structures or control by dewatering methods. Materials shall consist of rapid setting cements and various accelerating agents. Material shall not contain chlorides, gypsum, or metallic particles.

Should groundwater be encountered, Contractor shall be responsible for utilizing a dewatering system(s) to remove water from the excavations.

2. Repair, patching, and structural restoration

All material furnished shall be designed to fill voids and to repair or reconstruct where no hydrostatic pressure exists. Material shall consist of rapid setting cements, NSG aggregates, and various accelerating agents. Material shall not contain chlorides, gypsum, or metallic particles.

All structural restoration materials shall be specifically designed for the rehabilitation of wastewater manholes and other related concrete structures. Materials shall contain poly fiber reinforcement, fused calcium aluminate, and chemical admixtures.

D. Structural Restoration Material Properties:

Product type	Fused Calcium Aluminate or Fiberglass Cementitious
Cure Time	<48 hours
Curing gases	Non-toxic
Compressive Strength	5,000 psi
Tensile Strength	500 psi
Flexural Strength	600 psi
Shrinkage	0% at 90% Relative Humidity

2.2 SANITARY SEWER MANHOLES AND VALVE PITS

A. Exterior Coating Material

The exterior of all manhole and valve pit structures shall be coated with three coats of a factory or field applied acrylic polymer-base concrete coating and

sealant that is neither asphalt nor coal tar based. Acceptable coating is ConSeal CS-55, colors gray or black, as manufactured by Concrete Sealants, New Carlisle, Ohio or equal. The total dry film thickness shall be 3.5 mils. Coating shall be applied to the tongue and groove area of the manhole sections as well.

B. Interior Coating Material

The interior of all manhole and valve pit structures shall be coated with three coats of a factory or field applied acrylic polymer-base concrete coating and sealant that is neither asphalt nor coal tar based. Acceptable coating is ConSeal CS-55, color gray, as manufactured by Concrete Sealants, New Carlisle, Ohio or equal. The total dry film thickness shall be 3.5 mils. Coating shall be applied to the tongue and groove area of the manhole sections as well. The coating manufacturer and applicator shall inspect and certify all coatings prior to leaving the pre-cast facility.

2.3 ALL NEW STRUCTURES & FORCE MAIN DISCHARGE MANHOLES

A. Protective Coating Material:

The lining system to be utilized for manhole structures shall be a multi-component stress skin panel liner system equivalent to the Raven 405 system and shall have the following properties:

B. Coating product physical properties shall be substantiated through submittal of accredited third-party testing results and shall be representative of the actual field applied product and cure mechanism(s) to be employed in the field.

C. Manufacturer: RLS Solutions Inc., Broken Arrow, Oklahoma 800-324-2810, 918-615-0020 or FAX 918-615-0140.

D. product: Raven 405 – 100% solids, solvent-free ultra high-build epoxy system exhibiting the following characteristics:

1. Product Type: amine cured epoxy
2. VOC Content (ASTM D2584): 0%
3. Compressive Strength, psi (ASTM D695): 18,000 (minimum)
4. Tensile Strength, psi (ASTM D638): 7,500 (minimum)
5. Flexural Modulus, psi (ASTM D790): 700,000 (minimum)
6. Adhesion to Concrete, psi/mode of failure (ASTM D4541/7234): 200 psi (minimum) with substrate (concrete) failure.
7. Chemical Resistance (ASTM D543/G20) immersion service for:
 - a. Municipal sanitary sewer environment
 - b. Sulfuric acid, 30%
 - c. Sodium hydroxide, 10%
8. Water Vapor Permeance, WVP, metric perms (ASTM D1653 Method B, Condition C @ ≤ 80 mils DFT): < 0.002 metric perms
9. Successful Pass: Sanitation District of L.A. County Coating Evaluation Study or SSPWC 210.2.3.3 (Greenbook "Pickle Jar" Chemical Resistance test)

2.4 COATING APPLICATION EQUIPMENT

A. Manufacturer approved heated plural component spray equipment.

- B. Hard to reach areas, primer application and touch-up may be performed using hand tools.

2.5 STRUCTURAL RESTORATION MATERIAL AND PROTECTIVE COATING APPLICATION EQUIPMENT

- A. Structural restoration mortars and protective coatings shall be applied with manufacturer approved equipment.

PART 3 – EXECUTION

3.1 ACCEPTABLE APPLICATORS

- A. Repair mortar must be applied by manufacturer trained and approved applicators. The repair mortar shall be applied according to manufacturer's recommendations.
- B. Protective coating must be applied by a Certified Applicator of the protective coating manufacturer and according to manufacturer specifications.

3.2 EXAMINATION

- A. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
- B. All bidders are required to verify that they have visited the jobsite and are familiar with the conditions and the entire scope of work. Bidders shall field verify the attached plans and perform their own quantity measurements prior to bidding.
- C. Contractor shall provide a minimum 24-hour notice to the City Inspector/Representative and Engineer for the following conditions:
 - 1. after final surface preparation is completed but before structure rehabilitation;
 - 2. after patching operations have cured, and
 - 3. after each coating layer is applied.
- D. Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.
- E. Temperature of the surface to be coated should be maintained between 60° F and 100° F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply the coating when the temperature is falling versus rising (i.e., late afternoon into evening vs. morning into afternoon).

3.3 SURFACE PREPARATION

- A. Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. The existing piping, valves, and appurtenances shall be protected during structural rehabilitation and protective coating application.

The pipes and connectors are to be top coated with 30-50 mils DFT nominal. The pipes and connectors are to be primed by the fabricator with epoxy primer (not coldtar or asphaltic base) that is compatible with the protective coating. After installation, the pipes are to be pressure washed using at a minimum 5,000 PSI and 4 GPM washer and/or abrasive blast cleaned to an SSPC-SP7 'brush-off' specification as necessary for the window of overcoating of the primer.

- B. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
- C. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.
- D. Old concrete must be firm and structurally sound as specified by the Engineer.
- E. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the protective coating to be applied.
- F. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. At a minimum, this will be achieved with a low-pressure water cleaning equipment using a 0-degree rotating nozzle at a minimum 3,500 psi and 4 gpm. Other methods such as high-pressure water jetting (refer to NACE Standard No. 6 /SSPC-SP 13), abrasive blasting, shot blasting, grinding, scarifying and/or acid etching may also be used. In addition, detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. The method(s) used shall be performed in a manner that provides a uniform, sound clean, neutralized surface that is not excessively damaged.

3.4 APPLICATION OF REPAIR MATERIALS

- A. Areas where structural steel has been exposed or removed shall be repaired in accordance with the Project Engineer's recommendations.
- B. Repair/Structural Restoration materials shall meet the specifications here and as described in part 2.01A of these specifications. The materials shall be applied utilizing proper equipment on to specified surfaces. The structural restoration material shall match the original undamaged surface.
- C. Infiltration shall be stopped by using a material which is compatible with the specified repair mortar, waterproof quick setting mortar-type that is suitable for top coating with the specified protective coating. Contractor shall completely identify the types of grout, mortar, and sealant for repair of leak defects and provide case histories of successful use.
- D. Infiltration areas that require crack injection shall be covered in this scope of work. Injection holes shall be drilled through the wet well at 120-degree angles from each other at the same plane of elevation. Rows shall be separated no more than three vertical feet, and the holes shall be staggered with the holes in

the rows above and below. Provide additional injection holes near observed defects and pipe seals. A minimum of 6 injection holes shall be provided per defect.

Grout shall be injected through holes under pressure with a suitable probe. Injection pressure shall not cause damage to the wetwell structure or surrounding surface features. Grout shall be injected through the lowest holes first. Grouting from the ground surface will not be allowed. Provide additional injection holes if necessary to ensure grout travel, verified by field observation of grout at adjacent defects or holes. Patch injection holes using a waterproof quick setting mortar after cleaning with a drill.

- E. The approved repair materials shall provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair mortar.
- F. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds should not be used unless approved for compatibility with the specified protective coating.
- G. After required cleaning and repair is performed, all surfaces shall be inspected for remaining laitance prior to protective coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other approved method. If repair materials are used, refer to these specifications for surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a repair mortar and prior to application of the protective coating.

3.5 APPLICATION OF PROTECTIVE COATING

- A. Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
- B. The equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.
- C. The protective coating material must be applied by a certified applicator of the protective coating manufacturer.
- D. Specified surfaces shall be coated by a moisture tolerant, solvent-free, protective coating properties as described in these specifications.
- E. Application equipment approved by the coating manufacturer shall be used to apply each coat of the protective coating.
- F. If necessary, subsequent top-coating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, ideally within 12 hours but no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.

3.6 TESTING AND INSPECTION

- A. During application a wet film thickness gage meeting ASTM D4414 Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a uniform thickness during application.
- B. After the protective coating has set hard to the touch it shall be inspected with high-voltage holiday detection equipment meeting ASTM D4787 – Standard Practice for Continuity Verification of Liquid or Sheet Depth Applied to Concrete Substrates. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures, for areas that do not meet the specified thickness, shall follow the protective coating manufacturer's recommendations.

The NACE Certified Coatings Inspector must be present and monitor the holiday testing (and repairs, if necessary). The final inspection report is to include the holiday testing results.

- C. A final visual inspection shall be made by the Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Applicator.

END OF SECTION