

SPECIFICATIONS - DETAILED PROVISIONS
Section 09900 - Painting and Protective Coatings

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SECTION 09900
PAINTING AND PROTECTIVE COATINGS

PART 1 - GENERAL

1.01 SCOPE

- A. Requirements of Conditions of Contract and Division 1 apply to this Section. Provide all labor, materials, apparatus, scaffolding, and all appurtenant work in connection with painting and protective coatings, complete as indicated, specified and required.
- B. Work included in this section. Principal items include:
 - 1. All exposed piping, conduits, ducts and other metal surfaces, interior and exterior, except as hereinafter specifically excluded.
 - 2. All submerged and intermittently submerged metal surfaces, except stainless steel.
 - 3. All structural and miscellaneous steel, including tanks.
 - 4. The interior of wet wells, headworks, manholes, junction structures, transition stations and similar structures.
 - 5. Exterior above-ground concrete and concrete block as specified and shown on the Drawings.
 - 6. The interior and exterior of structures as specified in the Painting Schedule and shown on the Drawings.
 - 7. Equipment furnished with and without factory finished surfaces.
 - 8. Equipment on which factory applied finishes have been marred, abraded, scratched, nicked, or otherwise damaged.
 - 9. Exterior and interior concrete, concrete unit masonry, cement plaster, doors, frames, sheet metal surfaces and other architectural work as specified and shown on the Drawings.
 - 10. Protective coating of submerged and intermittently submerged concrete and masonry surfaces, except portion of such surfaces designated to receive waterproofing.

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11. Recoating of existing interior and exterior painted surfaces from architectural break where damaged or altered in performance of Work of this General Contract.
- C. Related Work Not Included in This Section. The following surfaces, in general, shall not be painted:
1. Concrete surfaces subject to pedestrian or vehicular traffic except as herein specified.
 2. Plastic surfaces and fiberglass reinforced plastic (FRP) surfaces, except as specified for identification purposes.
 3. Nonferrous metals and stainless steel unless otherwise noted or indicated. Galvanized metal shall not be coated unless specified otherwise.
 4. Mechanical equipment with factory finish as specified herein.
 5. Electrical and instrumentation equipment with approved factory finish as indicated herein.
 6. Waterproofing, damp proofing and roof covering Work.
 7. Pavement stripping and marking as specified elsewhere in these Specifications.
 8. Existing painted surfaces which are not within areas of alterations performed under this General Contract unless such surfaces are damaged in performance of Work of this General Contract.
- D. In no case shall any concrete, wood, metal, or any other surface requiring protection be left unpainted or uncoated even though not specifically defined herein.

1.02 WARRANTY

- A. A two (2) year guarantee which commences on the date of acceptance against any failure of coatings shall be provided. Defective coating shall be any of those defined by SSPC's Visual Comparison Manual and include isolated failures. Failure of any coating during the guarantee period shall be repaired by the Contractor who shall absorb all costs related to the repair of the coating.
- B. All personnel present at the Pre-Job Conference should attend a warranty inspection. All defective work shall be repaired in strict accordance with this Specification and to the satisfaction of the Engineer.

1. Notification: The Owner shall establish the date for the inspection and shall notify the Contractor at least 30 days in advance. The Contractor shall provide, at his own expense, suitable access equipment, lighting, and ventilation for the inspection.
- C. Inspection: all surfaces of the coating systems shall be visually inspected. All defective coatings, as well as damaged or rusting spots, shall be satisfactorily repaired by and at the sole expense of the Contractor. Defective coating shall be any of those defined by SSPC's Visual Comparison Manual.
1. Inspection Report: the Engineer shall prepare and deliver to the Contractor an inspection report covering the warranty inspection. The report shall set forth the number and type of failures observed, and the names of the persons making the inspection.
 2. Schedule: upon completion of the inspection and receipt of Inspection Report as noted herein, Owner shall establish a date for Contractor to proceed with remedial work. Any delay on part of Contractor to meet schedule established by Owner shall constitute breach of this Contract and Owner may proceed to have defects remedied through other means, and these costs may be charged to the Contractor.
 3. Remedial Work: any location where coating or paint is defined as defective shall be considered to be a failure of the system at that location. The Contractor shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surface, and recoating or repainting with the same system specified herein. Any spot repairs to defective areas will require feathering at least 3 inches into sound adjacent coating. If an area of failure exceeds 25 percent of a specific coated surface, the entire coating system from that specific area may be required to be removed and recoated in accordance with the original Specification.

1.03 CONTRACTOR

- A. The Contractor shall hold a valid State of California Contractor's Class C-33, Painting and Decorating license for performing surface preparation, cleaning and coating/painting work. The Contractor shall have a minimum of five years' experience and successful history in the application of the specified products to similar surfaces. The Contractor shall demonstrate said experience by submitting qualifications to the Owner for approval.
- B. All coating and surface preparation work shall be performed by skilled personnel demonstrating experience, as listed above. Continuity of personnel shall be maintained

throughout the duration of the cleaning and coating work and any changes in key personnel shall be subject to the approval of the Owner.

- C. Applicator Training: Application of coating is considered specialized work. Personnel performing this work shall be trained in proper methods of application.
- D. Subcontractor Qualifications: Where the coating is to be applied by a Subcontractor, the Contractor shall provide 5 references, which show that the Subcontractor has previous successful experience with the indicated coating systems in similar applications. Include the name, address, and the telephone number for the owner of each installation for which the Subcontractor provided the coating.

1.04 DEFINITIONS

- A. "Lining" refers to protective materials used or applied to interior surfaces, "Paint" refers to protective materials used or applied on exterior surfaces, and "Coating" refers to protective materials used or applied on interior surfaces, or any protective material in general.
- B. "Owner" refers to Eastern Municipal Water District. "Engineer" refers to the Inspector, Owner, or the Owner's designated representative.

1.05 HOURS OF WORK

- A. Work areas will be available for performance of the Contract work between 7:00 A.M. and 5:00 P.M. excluding Saturdays, Sundays and holidays. No work shall be accomplished during hours or on days other than specified above, unless approved in advance by the Owner.
- B. Inspections requested by or made necessary as a result of actions of the Contractor on Saturdays, Sundays or holidays must be scheduled and approved in writing by Engineer. The contractor shall bear all additional fees or expenses of Owner's personnel and Inspection services created by extraordinary work hours including standby time or overtime.

1.06 PRE-JOB CONFERENCE

- A. A Pre-Job Conference shall be scheduled prior to start of project. The Owner, Contractor and Engineer shall be present. A schedule of work to be accomplished and a list of labor, material and equipment rates for additional work will be established and maintained throughout the project. Contractor shall furnish a complete set of submittal data for use by Engineer.

1.07 QUALITY ASSURANCE

- A. Quality assurance procedures and practices shall be used to monitor all phases of surface preparation, application and quality control inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be used provided they meet recognized and acceptable professional standards and are approved by the Engineer.
- B. All materials furnished and all work accomplished under the Contract shall be subject to fulltime continuous inspection by the Engineer. The Contractor shall be held strictly to the true intent of the Specifications in regard to quality of materials, workmanship, and diligent execution of the Contract.
- C. Work accomplished in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection. The entire cost of removal and replacement, including the cost of all materials which may be furnished by the Owner and used in the work thus removed, shall be borne by the Contractor regardless of whether the work removed is found to be defective or not. Work covered up without the authority of the Engineer, shall upon order of the Engineer, be uncovered to the extent required. The Contractor shall similarly bear the entire cost of performing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, as directed and approved by the Engineer.
- D. The Engineer will make, or have made, such tests as deemed necessary to assure the work is being accomplished in accordance with the requirements of the Contract. Unless otherwise specified, the cost of such testing will be borne by the Owner. In the event such tests reveal non-compliance with the requirements of the Contract, the Contractor shall bear the cost of such corrective measures deemed necessary by the Engineer, as well as the cost of subsequent retesting. It is understood and agreed the making of tests shall not constitute an acceptance of any portion of the work, nor relieve the Contractor from compliance with the terms of the Contract.

1.08 SAFETY AND HEALTH REQUIREMENTS

- A. General: ventilation, electrical grounding, and care in handling coatings, paints, solvents and equipment are important safety precautions during coating and painting projects. Contractor shall conform with safety requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals. The Contractor shall provide and require use of personal protective life saving equipment for all persons working in or about the project site.
- B. Access Facilities: all ladders, scaffolding and rigging shall be designed for their intended uses. Ladders and scaffolding shall be erected where requested by Engineer to facilitate

inspection and be moved by the Contractor to locations requested by the Engineer.

- C. Ventilation: where ventilation is used to control hazardous exposure, all equipment shall be explosion-proof, of industrial design and shall be approved by the Engineer. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist by educting air, vapors, etc. from the confined space. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured. Forced air eduction during blast cleaning and coating application operations is mandatory 24 hours per day until coatings have fully cured. If dehumidification equipment is used, equipment must be operated on a continuous basis during all blasting and coating operations, including shifts during which no work is being accomplished. Only ventilation, not dehumidification is required during final curing phases.
1. Ventilation system shall be furnished and installed by the Contractor in accordance with these specifications. The Contractor shall make modifications to the ventilation system as directed by the Engineer to insure a safe working environment and complete removal of all solvent vapors. Upon completion of the final curing period, as determined by the Engineer, the Contractor shall remove the ventilation system.
 2. The exhaust blower capacity shall be sufficient to maintain air changes within tank interiors in accordance with OSHA, the coating manufacturer's recommendations, and the local air quality management district's regulations.
 3. If Contractor uses dehumidification equipment, or any other alternative ventilation systems, Contractor must submit, in advance, for approval by the Engineer, a complete list of equipment and procedures for its use.
 4. Where applicable, upon completion of applied coating system, Contractor shall furnish an approved exhaust fan or blower of sufficient capacity to insure removal of solvent vapors during curing process. The fan or blower shall be installed as approved by the Engineer and shall remain in continuous operation until coating is completely cured as determined by the manufacturer of the coating system.
- D. Head and Face Protection and Respiratory Devices: equipment shall include protective helmets, which shall be worn by all persons while in the vicinity of the work. During abrasive blasting operations, nozzle-men shall wear U.S. Bureau of Mines approved air-supplied helmets and all other persons who are exposed to blasting dust shall wear approved filter-type respirators and safety goggles. When coatings are applied in confined areas all persons exposed to toxic vapors shall wear approved respiratory protection.
- E. Grounding: blasting, spray, and air hoses shall be grounded to prevent accumulation of charges of static electricity.

- F. Illumination: spark proof artificial lighting shall be provided for all work in confined spaces. Light bulbs shall be guarded to prevent breakage. Lighting fixtures and flexible cords shall comply with the requirements of NFPA 70 "National Electric Code" for the atmosphere in which they will be used. Whenever required by the Engineer, the Contractor shall provide additional illumination per SSPC Guide 12 and necessary supports to cover all areas to be inspected. The Engineer shall determine the level of illumination required for inspection.
- G. Toxicity and Explosiveness: the solvents used with specified protective coatings are explosive at low concentrations and are highly toxic. The maximum allowable concentration of vapor shall be kept below the maximum safe concentration for eight-hour exposure, plus Lower Explosive Limit must be strictly adhered to. If coatings or paints contain lead or other hazardous materials, all regulations related to safety of personnel and handling of such materials shall be strictly adhered to.
- H. Protective Clothing: coating and paint materials may be irritating to the skin and eyes. When handling and mixing coatings and paints workmen shall wear appropriate covering gloves and eye shields.
- I. Fire: during mixing and application of coatings and paints, all flames, welding and smoking shall be prohibited in the vicinity. Appropriate type fire extinguishers shall be provided by Contractor and kept at the jobsite during all operations.
- J. Sound Levels: whenever the occupational noise exposure exceeds the maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices. General sound levels for project shall be those that will not affect routine facility or neighborhood activities. Whenever any levels are objectionable, they shall be adjusted as directed by the Engineer. Adjustments to noise levels required may include the relocation of equipment or the installation of a sound barrier, as required by the Engineer.
- K. Compliance with California Code of Regulations: Contractor shall submit a notarized letter signed by a principal officer of the Corporation certifying the Contractor fully complies with California Code of Regulations pertaining to the work including, but not limited to, the following:

1.	Illness Injury Prevention Program	CSO/GISO	1508/3203
2.	Confined Space Plan	GISO	5156/5159
3.	Respiratory	CSO/GISO	1531/5144
4.	Hazard Communication	GISO	5194
5.	Rolling Scaffolds	CSO	1646
6.	Employee Safety Instruction	CSO	1510
7.	Emergency Medical Service	CSO	5112
8.	Dusts, Fumes, Mists, Vapors & Gases	CSO	1528

- L. Protective Coverings, Containment, and Ventilation Materials/Equipment: The Contractor shall provide all protective coverings needed to protect those surfaces that are not designated to be prepared or coated. Provide all materials needed for the implementation of a containment/ventilation system around the operation to control emissions and exposures in accordance with the provisions of this Section. This includes, but is not limited to, rigging, scaffolding, planking, tarpaulins, dust collectors and vacuums. Verify that all materials are free of lead, chromium, loose dust and debris when brought onto the Owner's property and upon removal from the site.

1.09 REFERENCE SPECIFICATIONS AND STANDARDS

- A. Without limiting the generality of other requirements of these Specifications, all cleaning, surface preparation, and coating work shall conform to the applicable requirements of the referenced portions of the standards specified herein to the extent that the requirements therein specified are not in conflict with the provisions of this Section.
- B. Unless otherwise specified, all work and materials for the preparation and coating of all metal surfaces shall conform to the applicable requirements specified in the Steel Structures Painting Manual, Volume 2, Systems and Specifications, latest edition, published by SSPC: The Society for Protective Coatings.
- C. The Engineer's decision shall be final as to interpretation and/or conflict between any of the referenced codes, laws, ordinances, specifications and standards contained herein.
- D. The latest edition of standards and regulations herein form a part of this specification.
- E. American Society for Testing and Materials (ASTM)
 - 1. ASTM E337, Standard Test Method for Measuring Humidity with a Psychrometer
 - 2. ASTM D1186, Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
 - 3. ASTM D2240, Standard Test Method for Rubber Property-Durometer Hardness
 - 4. ASTM D3359, Standard Test Method for Measuring Adhesion by Tape.
 - 5. ASTM D4138, Standard Test Method for Measurement of Dry Paint Thickness of Protective Coating Systems by Destructive Means
 - 6. ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

7. ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air
 8. ASTM D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages
 9. ASTM D4417, Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
 10. ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 11. ASTM D4562, Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces
 12. ASTM D4752, Standard Test Method for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
 13. ASTM D5402, Standard Test Methods for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs
 14. ASTM D7091, Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
 15. ASTM D7234, Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
- F. International Concrete Repair Institute (ICRI)
1. Guideline No. 03732, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
 2. ICRI, Concrete Surface Profile Standards
- G. NACE International (NACE)
1. NACE SP 0188-06, Standard Recommended Practice for Discontinuity (Holiday) Testing of Protective Coatings
 2. NACE SP 0178-89, Standard Recommended Practice for Fabrication Details, Surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service.

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- H. Painting Decorators and Contractors of America (PDCA)
 - 1. PDCA P2 - Third Party Inspections: Qualifications, Responsibilities, and Procedures
 - 2. PDCA P4 - Responsibility for Inspection and Acceptance of Surfaces Prior to Painting and Decorating
 - 3. PDCA P13 - The Inspection and Acceptance of Architectural Paints on the Interior Surfaces of Structures When Dry Film Thickness is Specified
 - 4. PDCA P22 - Cleaning Surfaces Using Pressurized Water
- I. SSPC: The Society for Protective Coatings (SSPC)
 - 1. SSPC-SP5 White Metal Blast Cleaning, removal of all visible rust, mill scale, paint, and foreign matter by blast cleaning by wheel or nozzle (dry) using sand, grit, or shot (Typically for very corrosive atmosphere).
 - 2. SSPC-SP10 Near-White Blast Cleaning, blast cleaning until at least 95 percent of each element of surface area is free of all visible residues. (For high humidity, chemical atmosphere, marine or other corrosive environment.)
 - 3. SSPC-SP6 Commercial Blast, blast cleaning until at least 66 percent of each element of surface area is free of all visible residues.
 - 4. SSPC-SP7 Brush-Off Blast Cleaning, blast cleaning to remove loose rust, loose mill scale, and other detrimental foreign matter present to the degree specified. Loose materials are those that can be removed with a dull putty knife.
 - 5. SSPC-SP 2/3 Hand/Power Tool Cleaning, hand or powertool cleaning of all loose materials. Loose materials are those that can be removed with a dull putty knife.
 - 6. SSPC-SP1 Solvent Cleaning, removal of oil, grease, dirt, soil, visible salts, and contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.
 - 7. Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating (SSPC-SP12)
 - 8. Surface Preparation of Concrete (SSPC-SP13)
 - 9. SSPC-PA1, Shop, Field, and Maintenance Painting of Steel
 - 10. SSPC-PA 2, Measurement of Dry Film Thickness with Magnetic Gages

11. SSPC-VIS 1, Visual Standard for Abrasive Blast Cleaned Steel
 12. SSPC-VIS 2, Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces
 13. SSPC-VIS 3, Visual Standard for Hand and Power Tool Cleaned Steel
 14. SSPC Guide 12, Guide for Illumination of Industrial Painting Projects
 15. SSPC Publication No. 91-12, Coating and Lining Inspection Manual
 16. SSPC-SSPC Visual Comparison Manual
- J. Equipment and Coating Manufacturers' Published Instructions.

1.10 COMPLIANCE WITH ENVIRONMENTAL REGULATORY REQUIREMENTS

- A. Contractor shall comply with all current federal, state, and local environmental laws and regulations, including, but not limited to the laws and regulations of the U.S. Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD).

1.11 SUBMITTALS

- A. For compliance with these Specifications, the Contractor shall prepare and submit three (3) paint and protective coating samples of each finish, including all coats thereof, to the Owner for review, as specified. The samples shall be clearly marked with the manufacturer's name and product identification, and shall be submitted in sufficient time to allow for review, and, if necessary, resubmittal without causing any delay of the Project.
- B. Coating Materials List
1. The Contractor shall provide eight (8) copies of a paint and coating materials list which indicates the manufacturer and paint number, keyed to the coating schedule herein, for approval of the Owner prior to, or at the time of, submittal of samples required herein.

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2. The Contractor shall include with his submittal his protective coating schedule for shop and field coatings of items to receive protection. The schedule shall conform to the specified requirements for surface preparation, priming, and coating for items covered, and shall follow the same requirements for similar work where such work has not been specifically called-out. No bare ferrous nonworking surfaces shall be omitted from the schedule. Particular care shall be taken to cover in sufficient detail the coating of mechanical joints and other mechanical devices, which shall conform to the recommended practice of the manufacturer of the joint or other mechanical devices.
 3. Submittals shall be sufficiently early to permit Owner's review and then Contractor's coordination with affected material and equipment suppliers to assure their use of reviewed shop coats of same manufacture as field coats and compatibility with field applied coats for respective coating system.
 4. The coating system shall include a letter from the paint or coating manufacturer endorsing the use of the submitted system for the service environment.
 5. Coatings to be used on plastic and fiberglass materials shall be certified as acceptable by all plastic and fiberglass manufacturers whose products are to be coated. Certification copies shall be submitted to the Owner. The Contractor shall be certified in writing by the painting and coating material manufacturers as qualified applicators of their products, and copies of the certification submitted to the Owner.
- C. Contractor shall submit paint and coatings material manufacturers' printed Product Data Sheets for materials intended for use in each of various paint and coating systems. Data sheets shall fully describe material as to its intended use, make-up, recommended surface preparation and application conditions, primers, material mixing and application (including recommended dry mil thickness), thinners, precautions, safety and maintenance cleaning directions.

1.12 PROTECTION OF WORK

- A. The Contractor shall be responsible for any and all damage to his work or the work of others during the time his work is in progress. The Contractor shall conduct all operations so as to confine general debris, abrasive blasting debris, and paint overspray to within the bounds of the site. The Contractor shall take all precautions necessary to prevent adverse consequences of painting operations. Any complaints received by the Owner relating to any such potential problems will be immediately delivered to the Contractor. The Contractor shall immediately halt work and shall take whatever corrective action is required to mitigate any such problems. All costs associated with protection of off-site properties and/or correction of damage to property as a result of painting operations shall be borne directly by the Contractor at no additional expense to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Surfaces to receive paint and protective coating materials as herein specified in this Section shall be coated in conformance with the applicable coating systems specified herein. All materials specified by name and/or manufacturer or selected for use under these Specifications shall be delivered unopened at the job site in their original containers and shall not be opened until inspected by the Owner. Whenever a manufacturer's brand name is specified, it is intended to define the general type and quality of paint or coating desired. Other coatings or paints of equal quality may be used, under the approval of the Engineer.
- B. Coating materials shall be as specified herein or approved equal. Architectural paint finishes are specified hereinafter. All paint and coatings shall be produced and applied as herein called for, or, if not specifically called for, it shall be applied in accordance with the manufacturer's printed recommendations as reviewed by Owner. So far as possible, all paint and coating materials shall be provided by a single source supplier.
- C. Materials specified are those which have been evaluated for the specific service. Products are listed to establish a standard of quality. Standard products of manufacturers other than those specified will be accepted when proven to the satisfaction of the Engineer they are equal in composition, durability, usefulness and convenience for the purpose intended. Substitutions will be considered provided the following minimum conditions are met:
 - 1. The proposed coating or paint system shall have a dry film thickness equal to or greater than that of the specified system.
 - 2. The proposed coating or paint system shall employ an equal or greater number of separate coats.
 - 3. The proposed coating or paint system shall employ coatings or paints of the same generic type.
 - 4. All requests for substitution shall carry full descriptive literature and directions for application, along with complete information on generic type, non-volatile content by volume and a list of 10 similar projects, all at least three years old, where the coatings or paints have been applied to similar exposure. Substitutions shall be endorsed in writing from the materials manufacturer that these substituted materials will provide equivalent performance as those specified.
 - 5. If the above mentioned data appears to be in order, the Engineer may require that the Contractor provide certified laboratory data sheets showing the results

of complete spectrographic and durability tests accomplished on the proposed substitute. An independent testing laboratory satisfactory to the Engineer shall accomplish tests and all costs incurred in the testing program shall be borne by the Contractor. In any case, the Engineer shall be sole and final judge of the acceptability of any proposed substitution. Requests for substitution must be approved in writing.

- D. Flammability, toxicity, allergenic properties, and any other characteristic requiring field precautions shall be identified and specific safety practices shall be stipulated.
- E. All paint and coating materials shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings and paints must be stored to conform to local, county, state and federal safety codes for flammable coating and paint materials. At all time the paint and coatings shall be protected from freezing.

2.02 PAINT AND COATING MATERIALS

- A. Paint and protective coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at the time of use. Pigmented paints shall be furnished in containers not larger than five (5) gallons.
- B. Materials shall conform to the specifications shown herein and to the requirements hereinafter specified. Containers shall not be opened or used until Engineer has physically inspected contents and obtained necessary data from information printed on containers or labels. Materials exceeding storage life recommended by the manufacturer shall be rejected.
- C. Products shall be standard for recognized manufacturer engaged in production of such materials for essentially identical or similar applications in the water and wastewater treatment industry and industrial plants.
- D. Only compatible materials shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to review of the Owner, a compatible barrier coat shall be applied between all existing prime coats and subsequent field coats to ensure compatibility.
- E. All colors and shades of colors of all coats of paints and protective coating material shall be as selected by the Owner. Each coat shall be of a slightly different color to facilitate inspection of surface coverage of each coat.

- F. Any discrepancies between the coating supplier's written recommendations and the specified requirements herein shall be brought to the attention of the Owner prior to application.

2.03 SERVICE CONDITION A

- A. Ferrous metals, other than stainless steel, submerged or intermittently submerged in water, sludge, sewage, chemical mixtures or similar corrosive liquid and all steel angles in contact with concrete shall be prepared and coated in accordance with the following requirements.
- B. Surface Preparation. All metal surfaces shall be field abrasive blast cleaned in accordance with SSPC-SP10, Near White Blast Cleaning. A sharp jagged anchor profile of not less than 2 mils, as determined by a Test-Ex Tape Replica Tape, shall be attained. Weld surface, edges, and sharp corners shall be ground to a curve and all weld splatter removed in accordance with NACE SP0178.
- C. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. All sharp edges, nuts, bolts, or other items difficult to coat shall receive a stripe coated with a brush-applied coat of the specified coating prior to application of each coat.
- D. Coating System A. Except as otherwise noted, the prime coat shall have minimum dry film thickness of 10 mils; and the final coat, 10 mils. The total system shall have a minimum dry film thickness of 20 mils.

Carboline System:	Primer - Carboguard 891 VOC Final - Carboguard 891 VOC
Sherwin Williams System:	Primer - Sherglass FF Low VOC Final - Sherglass FF Low VOC
Tnemec System:	Primer - L69 Hi-Build Epoxoline II Final - L69 Hi-Build Epoxoline II

2.04 SERVICE CONDITION B

- A. Ferrous metals, other than stainless steel, not subject to chemical attack, normal indoor or outdoor exposure, shall be prepared and coated in accordance with the following requirements.

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- B. Surface Preparation. All surfaces shall be free of dirt, dust, grease, or other foreign matter that may act as a contaminant. Surfaces, except galvanized, shall be cleaned in accordance with the Steel Structures Painting Council Specification SSPC-SP7 (Brush-Off Blast Cleaning). Weld surface, edges, and sharp corners shall be ground to a curve and all weld splatter removed in accordance with NACE SP0178.
- C. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. All sharp edges, nuts, bolts, or other items difficult to coat shall receive a brush-applied coat of the specified coating prior to application of each coat.
- D. Coating System B. Except as specified below, the prime coat shall have a minimum thickness of 1.5 mils and two or more finish coats minimum total dry film thickness of 4.5 mils. The total system shall have a minimum of 6.0 mils.

Carboline System:	Primer – Carbocrylic 3358 MC 2 Finish Coats – Carbocrylic 3359 MC
Sherwin Williams System:	Primer – Procryl Universal Primer 2 Finish Coats – Pro Industrial Acrylic
Tnemec System:	Primer - Series 115 Uni-Bond DF 2 Finish Coats - Tnemec - Series 1029 Enduratone

2.05 SERVICE CONDITION C

- A. Ferrous metals, other than stainless steel, subject to a corrosive atmosphere and condensation shall be prepared and coated in accordance with the following requirements.
- B. Surface Preparation. All metal surfaces shall be sandblasted in accordance with Steel Structures Painting Council Specification SSPC-SP10 (Near White Metal Blast Cleaning). A sharp, jagged anchor profile of not less than 2 mils as determined by a profile comparator shall be attained. Weld surface, edges and sharp corners shall be ground to a curve and all weld splatter removed.
- C. Application. Application shall be in strict conformance with the manufacturer's recommendations.
- D. Coating Systems C. Except as hereinafter specified, the prime coat shall have a minimum dry film thickness of 3.0 mils; the intermediate coat, 4 mils; and the final coat, 2 mils. The total system shall have a minimum dry film thickness of 9.0 mils.

Carboline System:	Primer - Carbozinc 11HS (Shop) Primer - Carbozinc 859 VOC (field) Intermediate - Carboguard 890 VOC Finish - Carbothane 133 MC
Sherwin Williams System:	Primer – Corothane I Galvapak -100 Intermediate – Macropoxy 646-100 Finish – Hi Solids Polyurethane-100
Tnemec System:	Primer - Series 94H2O Tnem Zinc Intermediate - L69 Hi-Build Expoxoline II Finish - 750 UVX Hybrid Polyurethane, Semi-Gloss

2.06 SERVICE CONDITION D

- A. Concrete which is subject to submerged and intermittent submergence in water, sludge or chemical mixtures, or which is exposed to corrosive atmospheres, shall be prepared and coated in accordance with the following requirements:
- B. Surface Preparation.
1. All green concrete surfaces shall be aged for at least 30 days prior to application.
 2. Prior to final preparation of the concrete surfaces, the contractor shall thoroughly clean the surfaces to be lined to remove dirt, residue, and other foreign deposits. Surfaces shall be tested by placing droplets of clean water onto sample locations. Satisfactory surfaces will allow water to be easily absorbed or penetrated into the concrete, while contaminated surfaces will result in the water beading. Contaminated surfaces shall be cleaned. Surfaces showing evidence of such contamination shall be cleaned using solutions of caustic soda or trisodium phosphate (TSP). They should be applied with vigorous scrubbing, followed by flushing with fresh water to remove all traces of both the detergent and contaminant and then allowed to thoroughly dry.
 3. The contractor shall use either abrasive blasting or high-pressure waterjetting surface preparation methods to remove any loose concrete and produce a clean, contamination-free, sound, roughened surface acceptable to the lining manufacturer. Abrasive blast cleaning shall be completed in accordance with SSPC-SP7 and SSPC-SP13. The actual water pressure required during any water jetting to achieve the proper removal of deteriorated concrete is not known, but it is projected that pressures between 10,000 to 30,000 psi will be required. Any water jetting equipment shall utilize an oscillating tip.

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4. No efflorescence, laitance, or deteriorated concrete shall remain following final surface preparation. Only sound concrete shall remain. The remaining sound concrete shall be uniformly gray in color and appearance.
5. The integrity testing of the prepared concrete shall include dragging the dull edge of putty knife along the prepared surfaces. Properly prepared surfaces will leave behind a scratch without substantial substrate removal. Areas where the scraping action leaves behind a groove or indentation shall be further prepared and retested.
6. All surfaces shall have a surface profile or anchor pattern equal to the International Concrete Repair Institute (ICRI) replica coupon recommended by the coating supplier.
7. The pH of the prepared concrete shall range between 7.0 and 9.0. The pH of the prepared surfaces shall be tested by the contractor according to ASTM D4262.
8. If any reinforcing steel is exposed after removing concrete, it shall be thoroughly cleaned by sandblasting to a near-white metal blast condition (SSPC-SP10).
9. The moisture vapor transmission of the area shall be tested in accordance with ASTM D4263. All testing shall be completed by the contractor and witnessed by the Owner.
10. Prior to installing the coating system, the Contractor shall fill all surface areas with depressions deeper than 1/4-inch by filling in with a resurfacing material that is compatible with the coating system selected. The Contractor shall follow the instructions and recommendations of the manufacturer as to application, curing time requirements, depth of repair, and surface preparation procedures. Any resurfacing material shall be properly prepared through scarification prior to the application of any coatings.
11. The Contractor shall not start application until the surface pH, moisture content, and surface temperature are within the recommended limits, and the prepared surfaces have been accepted by the Engineer. Application shall only be performed when the surface temperature is stable or on the decline.
12. Leading Edges/Terminations: If in the opinion of the Engineer the concrete surfaces specified for coating application does not include a well defined beginning or ending anchor (e.g. terminating edge on lined concrete) or a proper anchored transition between concrete and steel substrates, the coating shall be mechanically anchored to a dry, clean saw cut to a minimum depth of 1/4 inch and width of 1/4 inch. This includes any steel appurtenances penetrating concrete surfaces. The coating system shall be applied into the saw cut to full depth.

13. Should cracks be identified after preparation of concrete that require sealing to assure prevention of moisture intrusion or proper continuous lining work, seal all cracks in accordance with the written recommendations of the lining supplier, as approved by the Engineer.

E. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. All coats shall be applied within 24 hours of the previous coat and within the written recoat limitations.

F. Coating System D. The prime coat shall have a minimum dry film thickness of 6 mils and two finish coats shall have a minimum total dry film thickness of 16 mils. The total system shall have a minimum dry film thickness of 22 mils.

Sherwin Williams System :	Prime – Corobond 100
	Two Finish Coats – Sherglass FF Low VOC

Tnemec System:	Primer - Series 218 MortarClad (surfacers)
	Two Finish Coats - 436 Perma-Shield FR

2.07 SERVICE CONDITION E

A. Concrete surface subject to corrosive atmosphere and condensation shall be prepared and coated in accordance with the following requirements.

B. Surface Preparation.

1. All concrete surfaces shall be aged for at least 30 days prior to application.

2. Prior to final preparation of the concrete surfaces, the Contractor shall thoroughly clean the surfaces to be lined to remove dirt, residue, and other foreign deposits. Surfaces shall be tested by placing droplets of clean water onto sample locations. Satisfactory surfaces will allow water to be easily absorbed or penetrated into the concrete, while contaminated surfaces will result in the water beading. Contaminated surfaces shall be cleaned. Surfaces showing evidence of such contamination shall be cleaned using solutions of caustic soda or trisodium phosphate (TSP). They should be applied with vigorous scrubbing, followed by flushing with fresh water to remove all traces of both the detergent and contaminant and then allowed to thoroughly dry.

3. The Contractor shall use either abrasive blasting or high-pressure waterjetting surface preparation methods to remove any loose concrete and produce a clean, contamination-free, sound, roughened surface acceptable to the lining manufacturer. Abrasive blast cleaning shall be completed in accordance with SSPC-SP7 and SSPC-SP13. The actual water pressure required during any water

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jetting to achieve the proper removal of deteriorated concrete is not known, but it is projected that pressures between 10,000 to 30,000 psi will be required. Any water jetting equipment shall utilize an oscillating tip.

4. No efflorescence, laitance, or deteriorated concrete shall remain following final surface preparation. Only sound concrete shall remain. The remaining sound concrete shall be uniformly gray in color and appearance.
5. The integrity testing of the prepared concrete shall include dragging the dull edge of putty knife along the prepared surfaces. Properly prepared surfaces will leave behind a scratch without substantial substrate removal. Areas where the scraping action leaves behind a groove or indentation shall be further prepared and retested.
6. All surfaces shall have a surface profile or anchor pattern equal to the International Concrete Repair Institute (ICRI) replica coupon recommended by the coating supplier.
7. The pH of the prepared concrete shall range between 7.0 and 9.0. The pH of the prepared surfaces shall be tested by the Contractor according to ASTM D4262.
8. If any reinforcing steel is exposed after removing concrete, it shall be thoroughly cleaned by sandblasting to a near-white metal blast condition (SSPC-SP10).
9. The moisture vapor transmission of the area shall be tested in accordance with ASTM D4263. All testing shall be completed by the Contractor and witnessed by the Owner.
10. Prior to installing the coating system, the Contractor shall fill all surface areas with depressions deeper than 1/4-inch by filling in with a resurfacing material that is compatible with the coating system selected. The Contractor shall follow the instructions and recommendations of the manufacturer as to application, curing time requirements, depth of repair, and surface preparation procedures. Any resurfacing material shall be properly prepared through scarification prior to the application of any coatings.
11. The Contractor shall not start application until the surface pH, moisture content, and surface temperature are within the recommended limits, and the prepared surfaces have been accepted by the Engineer. Application shall only be performed when the surface temperature is stable or on the decline.
12. Leading Edges/Terminations: If in the opinion of the Engineer the concrete surfaces specified for coating application does not include a well defined beginning or ending anchor (e.g. terminating edge on lined concrete) or a proper anchored transition between concrete and steel substrates, the coating shall be mechanically anchored to a dry, clean saw cut to a minimum depth of 1/4 inch

and width of 1/4 inch. This includes any steel appurtenances penetrating concrete surfaces. The coating system shall be applied into the saw cut to full depth.

13. Should cracks be identified after preparation of concrete that require sealing to assure prevention of moisture intrusion or proper continuous lining work, seal all cracks in accordance with the written recommendations of the lining supplier, as approved by the Engineer.
- C. Application. Application shall be in strict conformance with the manufacturer's recommendations, including recoat times.
- D. Coating System E. First and second coats shall have a minimum dry film thickness of 4.0 mils each. The top coat, minimum dry film thickness shall be 1.5 mils. The total system shall have a minimum dry film thickness of 9.5 mils.

Carboline System:	First Coat – Semstone 110 Second Coat - Carboguard 890 VOC Topcoat - Carbothane 133 MC
Sherwin Williams System	First Coat – Macropoxy 646-100 Second Coat – Macropoxy 646-100 Topcoat – Hi Solids Polyurethane-100
Tnemec System:	First Coat - Series 287 Enviro-Pox Second Coat - Series 287 Enviro-Pox Topcoat - Series 297 Enviro-Glaze
Lifelast System:	First Coat - Primall 160 Second Coat - Durasheild 310

2.08 SERVICE CONDITION F

- A. Coating for plastic and fiberglass pipe for purposes of color coding and label stenciling. Coatings to be used for this category shall be certified by the pipe manufacturer to be completely acceptable and non-injurious to the pipe.
- B. Surface Preparation. Lightly sand pipe and wipe with a solvent to degrease and clean surface.
- C. Application. Application shall be in strict conformance with manufacturer's printed recommendation.
- D. Coating System F. Two (2) coats having a total dry film thickness of 8.0 mils.

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Carboline System:	Prime Coat - Carbothane 133 MC Second Coat - Carbothane 133 MC
Sherwin Williams System:	Prime Coat – Macropoxy 646-100 Finish Coat – Hi Solids Polyurethane-100
Tnemec System:	Series 115 Uni-Bond DF Series 1029 Endurotone

2.09 SERVICE CONDITION G

- A. Submerged moving parts including cables, chains, gears, pulleys, etc. shall be prepared and coated in accordance with the following requirements.
- B. Surface Preparation. All rust, scale, dust, and foreign matter removed by power or hand tool cleaning.
- C. Application. Application shall be in strict accordance with manufacturer's recommendation.
- D. Coating System G. The system shall have a total thickness of 25 mils and shall consist of the following:

Chevron - E.P. Roller Grease
Texaco - Rust Inhibitive Grease

2.10 SERVICE CONDITION H

- A. Ferrous metals requiring a heat resistant coating. To ensure proper coating selection, accurately measure surface temperatures. Surface preparation shall be performed in strict conformance with manufacturer's printed directions and treated surfaces shall be coated as soon as possible to avoid surface contamination. In conformance with printed directions of manufacturer: mix and apply coats of each system; and cure coats before recoating or before reaching surface operating temperature. Contingent upon expected temperature range, apply one of the following or equal systems, and avoid excessive film thickness.
- B. Coating System H apply high-temperature coating in strict accordance with the manufacturer recommendations. Some systems may exceed VOC limit restrictions for SCAQMD Rule 1113 and will require installation in a jurisdiction with higher VOC limits.

Rust-Oleum Systems:

300-800° F Temp. Range	4200 System
400-1200° F Temp. Range	4300 System

Carboline Systems:

Up to 450° F Temp.	Thermaline 2977 VOC / Thermaline 4900 VOC
400-1200° F Temp.	Carbozinc 11 Series / Thermaline 4700 VOC

Sherwin Williams Systems:

Ambient To 250° F:	Prime – Corothane I Galvapak -100 Finish – Pro Industrial Acrylic
To 500°F:	Prime - Heat-Flex Hi Temp 1200 Finish – Heat-Flex Hi Temp 500
500°F to 1200°F:	Prime - Heat-Flex Hi Temp 1200 Finish – Heat-Flex Hi Temp 1100

2.11 SERVICE CONDITION I

- A. Coating of concrete and metal surfaces within the extremely corrosive areas as indicated on the Schedule.
- B. Surface Preparation - Concrete.
 1. All concrete surfaces shall be aged for at least 30 days prior to application.
 2. Prior to final preparation of the concrete surfaces, the Contractor shall thoroughly clean the surfaces to be lined to remove dirt, residue, and other foreign deposits. Surfaces shall be tested by placing droplets of clean water onto sample locations. Satisfactory surfaces will allow water to be easily absorbed or penetrated into the concrete, while contaminated surfaces will result in the water beading. Contaminated surfaces shall be cleaned. Surfaces showing evidence of such contamination shall be cleaned using solutions of caustic soda or trisodium phosphate (TSP). They should be applied with vigorous scrubbing, followed by flushing with fresh water to remove all traces of both the detergent and contaminant and then allowed to thoroughly dry.

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3. The Contractor shall use either abrasive blasting or high-pressure waterjetting surface preparation methods to remove any loose concrete and produce a clean, contamination-free, sound, roughened surface acceptable to the lining manufacturer. Abrasive blast cleaning shall be completed in accordance with SSPC-SP7 and SSPC-SP13. The actual water pressure required during any water jetting to achieve the proper removal of deteriorated concrete is not known, but it is projected that pressures between 10,000 to 30,000 psi will be required. Any water jetting equipment shall utilize an oscillating tip.
4. No efflorescence, laitance, or deteriorated concrete shall remain following final surface preparation. Only sound concrete shall remain. The remaining sound concrete shall be uniformly gray in color and appearance.
5. The integrity testing of the prepared concrete shall include dragging the dull edge of putty knife along the prepared surfaces. Properly prepared surfaces will leave behind a scratch without substantial substrate removal. Areas where the scraping action leaves behind a groove or indentation shall be further prepared and retested.
6. All surfaces shall have a surface profile or anchor pattern equal to the International Concrete Repair Institute (ICRI) replica coupon recommended by the coating supplier.
7. The pH of the prepared concrete shall range between 7.0 and 9.0. The pH of the prepared surfaces shall be tested by the Contractor according to ASTM D4262.
8. If any reinforcing steel is exposed after removing concrete, it shall be thoroughly cleaned by sandblasting to a near-white metal blast condition (SSPC-SP10).
9. The moisture vapor transmission of the area shall be tested in accordance with ASTM D4263. All testing shall be completed by the Contractor and witnessed by the Owner.
10. Prior to installing the coating system, the Contractor shall fill all surface areas with depressions deeper than 1/4-inch by filling in with a resurfacing material that is compatible with the coating system selected. The Contractor shall follow the instructions and recommendations of the manufacturer as to application, curing time requirements, depth of repair, and surface preparation procedures. Any resurfacing material shall be properly prepared through scarification prior to the application of any coatings.
11. The Contractor shall not start application until the surface pH, moisture content, and surface temperature are within the recommended limits, and the prepared surfaces have been accepted by the Engineer. Application shall only be performed when the surface temperature is stable or on the decline.

12. **Leading Edges/Terminations:** If in the opinion of the Engineer the concrete surfaces specified for coating application does not include a well defined beginning or ending anchor (e.g. terminating edge on lined concrete) or a proper anchored transition between concrete and steel substrates, the coating shall be mechanically anchored to a dry, clean saw cut to a minimum depth of 1/4 inch and width of 1/4 inch. This includes any steel appurtenances penetrating concrete surfaces. The coating system shall be applied into the saw cut to full depth.
13. Should cracks be identified after preparation of concrete that require sealing to assure prevention of moisture intrusion or proper continuous lining work, seal all cracks in accordance with the written recommendations of the lining supplier, as approved by the Engineer.

C. Surface Preparation - Steel.

1. All metal surfaces shall be field abrasive blast cleaned in accordance with SSPC-SP10, Near White Blast Cleaning. A sharp, jagged anchor profile not less than 3.5 mils shall be attained. Weld surface, edges, and sharp corners shall be ground to a curve and all weld splatter removed in accordance with NACE SP0178.

D. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. The applicator shall be a licensed applicator by the coating manufacturer. The finished coating shall be spark tested and all holidays repaired in accordance with NACE SP0188.

E. Coating System I. Except as otherwise noted, the prime coat on metal surfaces shall have a minimum thickness of 2.0 mils and a maximum thickness of 3.0 mils. The finish coat on a non-abrasive metal surface shall be 30 mils and in an abrasive area shall be 40 mils. The prime coat on concrete surfaces shall have a minimum thickness of 3.0 mils and a maximum thickness of 5.0 mils. The finish coat shall be a minimum 65 mils dry film thickness.

Carboline System:	Primer - Plasite 4503 Topcoat - Reacatamine 760 Series
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Sherwin Williams System:	Concrete Primer - Corobond 300 Steel Primer – Macropoxy 646-100 Finish Coat – Sherflex Elastomeric Polyurethane
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Sancon System:	Concrete Primer - Sancon 100 Epoxy Steel Primer - United 302 Urethane Topcoat - Sancon 100 Polyurethane
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Lifelast System:	Concrete Primer - Primall 160 Topcoat - Durachield 310
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2.12 ARCHITECTURAL PAINT FINISHES

A. Manufacturer. Unless otherwise noted, products listed below are the standards of quality. Other materials may be approved if they meet the requirements of Section 2.01.

1. System P-1 - Enamel on Structural Steel Members

Frazer Paint System:	First Coat - C309 UltraTech Water-Based Universal Metal Primer (Delete on factory primed materials)
	Second Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss
	Third Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss
Sherwin Williams System:	First Coat – Procryl Universal Primer (Delete on factory or shop primed materials)
	Second Coat – Procryl Universal Primer
	Third Coat – Pro Industrial Acrylic
	Fourth Coat – Pro Industrial Acrylic
Vista Paint System:	First Coat - Vista 9600 Protec Primer (Delete on factory primed materials)
	Second Coat - Vista 9800 Protec Semi-Gloss Enamel
	Third Coat - Vista 9800 Protec Semi-Gloss Enamel
Dunn Edwards System:	First Coat - BLOC-RUST Premium Red Rust Preventative Primer (BRPR00-1-RO) (delete on factory primed materials)
	Second Coat – Ultrashield – Gloss ULSH60
	Third Coat – Ultrashield Gloss ULSH60
	Fourth Coat – not necessary

2. System P-2 - Concrete Masonry Paint on Concrete Unit Masonry

Frazer Paint System:	First Coat - C251 Flex Lox Epoxy-Acrylic High pH Masonry Primer
	Second Coat - 146 Aro-Thane Water Based Urethane Mod. Alkyd Gloss
	Second Coat - 146 Aro-Thane Water Based Urethane Mod. Alkyd Gloss
Sherwin Williams System:	Monochem System: First Coat – Aquaseal ME12
	Second Coat – Permasheeld Premium
	Third Coat – Permashield Premium
Vista Paint System:	First Coat - Vista 4600 Uniprime II Masonry Primer
	Second Coat- Vista 290 Uretech Acrylic Gloss Urethane
	Third Coat - Vista 290 Uretech Acrylic Gloss Urethane
Dunn Edwards System:	First coat – Carboline – Sanitile 100 (If on concrete block) First coat – Carboline – Sanitile 120 (If not on block)
	Second coat– Carboline, Carbothane 134
	Third coat – Carboline, Carbothane 134

3. System P-3 - Concrete Masonry Paint on Concrete

Frazer Paint System:	First Coat - 203 Duratec II Exterior 100% Acrylic Flat
	Second Coat - 203 Duratec II Exterior 100% Acrylic Flat

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Sherwin Williams System: First Coat – Loxon Concrete Masonry Primer

Second Coat – Loxon Acrylic Coating

Vista Paint System: First Coat - Vista 4600 Uniprime II Masonry Primer

Second Coat- Vista 2000 Duratone 100% Acrylic Flat

Third Coat - Vista 2000 Duratone 100% Acrylic Flat

Dunn Edwards System: First coat - Eff Stop Premium Primer (ESPR00)

Second Coat - Evershield 100% Acrylic (EVSH10)

Third Coat - Evershield 100% Acrylic (EVSH10)

4. System P-4 - Enamel on Galvanized Metal (Doors, Frames, & Sheet Metal)

Frazer Paint System: Pretreatment - Krud Kutter Metal Clean and Etch

First Coat - C309 UltraTech Water-Based Universal Primer

Second Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss

Third Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss

Sherwin Williams System: Pretreatment – Great Lakes Clean and Etch

First Coat– Procryl Universal Primer

Second Coat - Pro Industrial Acrylic

Third Coat – Pro Industrial Acrylic

Vista Paint System: Pretreatment - Jasco Prep N Prime

First Coat - Vista 4800 Acrylic Metal Prime

Second Coat - Vista 8400 Carefree 100% Acrylic
Semi
Gloss Enamel

Third Coat - Vista 8400 Carefree 100% Acrylic Semi
Gloss
Enamel

Dunn Edwards System: Pretreatment – Carboline – Galoseal (if substrate is
unpainted galvanized)

First Coat – If previously painted use Ultrashield
DTM Gray Primer ULDM00GR

Second Coat - Ultrashield Gloss ULSH60

Third Coat - Ultrashield Gloss ULSH60

5. System P-5 - Enamel on Primed Metal

Frazer Paint System: First Coat - 168 Prime+Plus Primer/Sealer

Second Coat - 136 Aro-Thane Water-Based
Urethane
Modified Alkyd Semi-Gloss

Sherwin Williams System: Prime Repair Coat - Procryl Universal Primer

First Coat– Pro Industrial Acrylic

Second Coat - Pro Industrial Acrylic

Vista Paint System: First Coat - Vista 8400 Carefree 100% Acrylic Semi
Gloss
Enamel

Second Coat - Vista 8400 Carefree 100% Acrylic
Semi
Gloss Enamel

Dunn Edwards System: First Coat – Ultrashield Multi Surface Primer ULMS

Second Coat - Ultrashield Gloss ULSH60

6. System P-6 - Semi Gloss Enamel Paint on Interior Concrete Unit Masonry

Fraze Paint System:	First Coat - C302 Ultra Tech 100% Acrylic Block Filler
	Second Coat - 124 Mirro Glide 100% Acrylic Semi-Gloss
	Second Coat - 124 Mirro Glide 100% Acrylic Semi-Gloss
Sherwin Williams System:	First Coat – Loxon Block Resurfacer
	Second Coat– Pro Industrial Acrylic
	First Coat - Pro Industrial Acrylic
Vista Paint System:	First Coat - Vista 040 Block Coat
	Second Coat- Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel
	Third Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel
Dunn Edwards System:	First Coat - "Blocfill" Smooth W305SMOOTH BLOCFILL (SBPR00)
	Second Coat - Decoglo W450SUPREMA (SPMA50)
	Third Coat - Decoglo W450SUPREMA (SPMA50)

7. System P-7 - Sealer for Unpainted Masonry Surfaces

A transparent waterproofing sealer shall be applied to all above grade masonry surfaces, with the exception of interior building walls, both smooth face and split face block as shown on plans and in Coating Systems Schedule. Apply to dry, clean split faced surface with airless spray. Rate of application shall be in accordance with manufacturer's recommendations.

Fraze Paint System:	Monochem 4990 Aquaseal SS Water Repellent
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Vista Paint System: Monochem Aquaseal ME12

Dunn Edwards System: Rainguard - Microseal

8. System P-8 - Interior Pipe Insulation

Frazer Paint System: First Coat - C152 Ultratech Multi-Solution Latex Primer

Vista Paint System: Second Coat - 077 Velvin ETU Latex Flat
First Coat - Vista 8000 PrimeZall

Second Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel

Third Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel

Dunn Edwards System: First Coat - Sanitile 120

Second Coat - Ultrashield Gloss ULSH60

9. System P-9 - Metal Protected Exterior Pipe Insulation

Frazer Paint System: First Coat - C309 Ultratech Water Based Universal Primer

Second Coat - 203 Duratech II Exterior 100 Acrylic Flat

Vista Paint System: First Coat - Vista 9600 Protec Primer

Second Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel

Third Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel

Dunn Edwards System: First Coat- Ultrashield DTM Gray Primer ULDM00GR

Second Coat - Ultrashield Gloss ULSH60

10. System P-10 - New Galvanized Surfaces

Frazer Paint System:	Pretreatment - Krud Kutter Metal Clean and Etch
	First Coat - C309 UltraTech Water-Based Universal Primer
	Second Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss
	Third Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss
Vista Paint System:	Pretreatment - Jasco Prep N Prime
	First Coat - Vista 4800 Acrylic Metal Prime
	Second Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel
	Third Coat - Vista 8400 Carefree 100% Acrylic Semi Gloss Enamel
Dunn Edwards System:	Pretreatment – Carboline – Galoseal (if substrate is unpainted galvanized)
	Prime Coat – If previously painted use Ultrashield DTM Gray Primer ULDM00GR
	Second Coat - Ultrashield Gloss ULSH60
	Third Coat - Ultrashield Gloss ULSH60

11. System P-11 - Spot Repair of Damaged New Galvanized Metal

Frazer Paint System:	First Coat - C309 UltraTech Water-Based Universal Primer
	Second Coat - 136 Aro-Thane Water-Based Urethane Modified Alkyd Semi-Gloss
Vista Paint System:	First Coat - Vista 4800 Acrylic Metal Prime
	Second Coat - Vista 8400 Carefree 100%

Acrylic Semi Gloss Enamel

Third Coat - Vista 8400 Carefree 100% Acrylic
Semi Gloss Enamel

12. System P-12 - Primer Over Bituminous Coating

Frazer Paint System: First Coat - Macropoxy 646-100 Fast-Cure
(VOC 100 g/l)

Second Coat - Macropoxy 646-100 Fast-Cure
(VOC 100 g/l)

Vista Paint System: First Coat - Vista 8000 PrimeZall Primer

Second Coat - Vista 8400 Carefree 100%
Acrylic Semi Gloss Enamel

Third Coat - Vista 8400 Carefree 100% Acrylic
Semi Gloss Enamel

Dunn Edwards System: First Coat - Carboline Sanitile 120

Second coat - Ultrashield Gloss ULSH60

2.13 MISCELLANEOUS COATINGS

- A. Hydrants, indicator post, traffic posts, guard rails and ladders shall be safety yellow, matching OSHA Safety Yellow Color and using specified Service Condition "B".
- B. Handwheels and operating handles of all valves and equipment shall be safety red, matching OSHA Safety Red Color, using, contingent upon exposure, Coating System "B" in non-corrosive atmosphere and Coating Services Condition "C" in corrosive atmosphere and high humidity exposures.

PART 3 - EXECUTION

3.01 GENERAL

- A. All surface preparation, coating and paint application shall conform to applicable standards of SSPC and the manufacturer's printed instructions. Material applied prior to approval of the surface by the Engineer shall be removed and reapplied to the satisfaction of the Engineer at the expense of the Contractor.

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- B. All work shall be performed by skilled craftsmen qualified to accomplish the required work in a manner comparable with the best standards of practice. Continuity of personnel shall be maintained and transfer of key personnel shall be coordinated with the Engineer.
- C. The Contractor shall provide a supervisor to be at the work site during cleaning, application operations. The supervisor shall have the authority to sign any change orders, coordinate work and make other decisions pertaining to the fulfillment of their contract.
- D. Contractor shall provide approved sanitary facilities for all project personnel, as no existing facilities will be available to the Contractor. Facilities shall be maintained during the project to complete standards established by Owner, and shall be removed prior to Contractor's departure from the site at completion of the project.
- E. Dust, dirt, oil, grease or any foreign matter which will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved commercial cleaning solvent, rinsed with clean water and wiped dry with clean rags.
- F. The Contractor's painting and coating equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Blotter test shall be accomplished at each start-up period and as deemed necessary by the Engineer. Contractor's equipment shall be subject to approval of the Engineer.
 - 1. Cleanliness of compressed air supply used for conventional equipment or blow down operations shall be verified daily, and as deemed necessary by Engineer, by directing a stream of air, without abrasive, from the blast nozzle onto a white blotter or cloth for twenty seconds in accordance with ASTM D4285. If air contamination is evident, change filters, clean traps, add moisture separators or filters, or make adjustments as necessary to achieve clean, dry air.
- G. Application of the first coat shall follow immediately after surface preparation and cleaning within an eight-hour working day. Any cleaned areas not receiving first coat within an eight-hour period shall be re-cleaned prior to application of first coat.
- H. Because of the presence of moisture and possible contaminants in the working atmosphere, care shall be taken to ensure previously coated or painted surfaces are protected or re-cleaned prior to application of subsequent coat(s). The Engineer shall approve methods of protection and re-cleaning.
 - 1. The project is subject to intermittent shutdown if, in the opinion of the Engineer, cleaning, coating and painting operations are creating a localized condition

detrimental to ongoing facility activities, personnel, or adjacent property.

2. In the event of emergency shutdown by the Engineer, Contractor shall immediately correct deficiencies. All additional costs created by shutdown shall be borne by Contractor.
- I. The Contractor shall provide, at his own expense, all necessary power for his operations under the contract.
- J. Inspection: all operations will be monitored 100% by an Owner-appointed quality assurance inspector. All additional costs incurred by off-site inspection shall be borne by the Contractor. These include, but are not limited to travel, lodging, food, auto rental (where applicable) and any other expenses directly related to the inspection.

3.02 QUALITY CONTROL

- A. Ambient Conditions: no coating shall be applied when the surrounding air temperature or the temperature of the surface to be coated or painted is below 50 degrees F. No coatings shall be applied at temperatures above 110 degrees F. No coatings shall be applied to wet or damp surfaces or in rain, snow, fog or mist, when the surface temperature is less than 5 degrees F. above the dewpoint, or when it is expected the air temperature will drop below 50 degrees.
- B. Dewpoint shall be measured by the use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables or equivalent in accordance with ASTM D337. Relative humidity shall not be more than 85 percent. If unacceptable conditions are prevalent coating or paint application shall be delayed or postponed until conditions are favorable. The day's coating or paint application shall be completed in time to permit the film sufficient drying time prior to damage though atmospheric conditions. Temperature and dewpoint requirements noted above and herein shall apply to all surface preparation operations, except low and high temperature limits.
- C. Surface Preparation: surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces," SSPC-Vis 1 and as described herein. Anchor profile for prepared steel surfaces shall be sharp and jagged (not peened) and measured by using a nondestructive instrument such as a Testex Press-O-Film System in accordance with ASTM D4417. Anchor profile for prepared concrete shall be measured by using a ICRI CSP comparison coupons.
- D. The Contractor shall conduct all operations so as to confine debris and overspray to within the bounds of the site. The Contractor shall take all precautions necessary to prevent adverse off-site consequences of painting operations. Any complaints received

by the Owner relating to any such potential offsite problems will be immediately delivered to the Contractor. The Contractor shall immediately halt work and shall take whatever corrective action is required to mitigate any such problems. All costs associated with protection of off-site properties and/or correction of damage to property as a result of painting operations shall be borne directly by the Contractor at no additional expense to the Owner.

- E. Film Thickness Testing: thickness of each coat of coating shall be checked with a non-destructive film thickness gauge in accordance with ASTM D7091, where applicable.
- F. Inspection Devices: Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for hardness, adhesion, detection of holidays, and measurement of dry-film thickness of coatings and paints, where required. They shall also furnish National Institute of Standards and Technology/National Bureau of Standards (NIST/NBS) certified thickness calibration plates to test accuracy of thickness gauges. Acceptable devices for ferrous metal surfaces include, but are not limited to Tinker-Razor Models M-1, AP, and AP-W holiday detectors and SSPC, Type II units for dry film thickness gauging. Inspection devices shall be calibrated and operated in accordance with specified requirements. High-voltage testing shall require written acceptance from the lining manufacturer. Adhesion shall be measured using a fixed alignment, type II pull-off adhesion tester such as an Elcometer 106. Hardness testers shall be Type Shore D or as recommended by the lining manufacturer..
- G. Gauges and detectors shall be available at all times until final acceptance of application. Inspection devices shall be operated by, or in the presence of the Engineer with location and frequency basis determined by the Engineer. The Engineer is not precluded from furnishing his own inspection devices and rendering decisions based solely upon these quality assurance tests. Should in the opinion of the Engineer a 24-hour, continuous reading surface temperature gauge be required to assure that maximum recoat windows are observed, the Contractor shall provide a working calibrated instrument to meet this need. The gauge shall be digital and capable of providing instantaneous average measurements of the temperatures recorded.

3.03 SURFACE PREPARATION, GENERAL - INDUSTRIAL

- A. Slag, weld spatter, or sharp edges such as those created by flame cutting shall be removed by chipping and grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer in accordance with NACE SP 0178. The rolled edges of angles, channels, and wide flange beams do not normally require further rounding unless specifically directed by the Engineer.
- B. Abrasive blasting nozzles shall be equipped with "deadman" emergency shut-off nozzles. Blast nozzle pressure shall be a minimum of 95 P.S.I. and shall be verified by using an approved nozzle pressure gage at each start-up period or as directed by the Engineer.

- Number of nozzles used during all blast cleaning operations must be sufficient to insure timely completion of project as approved and directed by Engineer.
- C. All blast hose connections shall be connected with external couplings. These connections shall be taped with duct tape prior to pressurizing. All taped connections shall be visually inspected for leaks within five minutes after start of blast cleaning operations and at the end of blast cleaning operations. Leaking connections shall be immediately repaired to prevent further damage.
 - D. Particle size of abrasives used in blast cleaning shall be that which will produce a surface profile or anchor pattern specified herein, or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied, subject to approval of Engineer. Surface Profile or Anchor pattern shall be sharp and jagged in nature (not peened).
 - E. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants, which would interfere with adhesion of coatings and paints and shall not be reused unless specifically approved by the Engineer. Abrasives shall be certified for unconfined dry blasting pursuant to the California Administrative Code, Section 92520 of Subchapter 6, title 17, and shall appear on the current listing of approved abrasives.
 - F. The Contractor shall select an abrasive media that is proper for the quality of surface preparation specified. Should it be determined that the production rate and quality of the surface preparation is less than specified, it shall be the Contractor's responsibility to use other types and/or sizes of abrasive to meet the requirements of this contract. At no time shall considerations of extra effort be considered by the Owner unless, in the opinion of the Engineer the Contractor has explored all alternative means of abrasive blasting during their operations.
 - G. Blast cleaning from rolling scaffolds shall only be performed within the confines of the interior perimeter of the scaffold. Reaching beyond the limits of the perimeter will be allowed only if blast nozzle is maintained in a position, which will produce a profile acceptable to the Engineer.
 - H. The Contractor shall keep the area of work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities. Spent abrasives and other debris shall be removed at the Contractor's expense as directed by the Engineer. If waste is determined to be hazardous, disposal by Contractor shall meet requirements of all regulatory agencies for handling such wastes.
 - I. Blast cleaned surfaces shall be cleaned prior to the application of specified coatings or paints through a combination of blowing with clean dry air, brushing/brooming and/or vacuuming as directed by the Engineer. Air hose for blowing shall be at least 1/2" in

diameter and shall be equipped with a shut-off device.

- J. The surfaces of any non-carbon steel substrates, or specialty items (i.e. galvanized, anodized, etc.) shall be properly treated and prepared prior to any coating operations in accordance with the coating manufacturer's written recommendations, subject to approval of the Engineer.

3.04 SURFACE PREPARATION, GENERAL - ARCHITECTURAL

- A. Before Priming, correct all finish surfaces which are not properly prepared. Assure that all surfaces to be painted are in a proper condition as required by the manufacturer's written recommendations and will provide a proper uniform appearance. Do not prime any surface that has not been approved by the Engineer.
- B. Prior to surface preparation and painting operations, remove all hardware, hardware accessories, plates, lighting fixtures and similar items in contact with painted surfaces and not to be painted. Replace all removed items following completion of all paint work in the area. Items may be protected and not removed if approved by the Engineer.
- C. Program and schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- D. Clean concrete and masonry surfaces of all dirt, encrustations, efflorescence and other foreign matter. Roughen all glazed surfaces on concrete.
- E. Clean ferrous metal not provided with a shop prime of all loose rust, mill scale, oil, grease and foreign matter by wire brushing, scraping or sandblasting as required by the written requirements of the paint manufacturer and SSPC-SP2/3. Clean ferrous metal provided with shop prime of all oil, grease and foreign matter in accordance with SSPC-SP1 and the manufacturer's written requirements.
- F. Clean gypsum board (drywall) of all dust, dirt, encrustations and foreign matter.

3.05 APPLICATION, GENERAL

- A. Coating and paint application shall conform to the requirements of the SSPC's Paint Application Specification No. 1 (SSPC-PA1), latest revision, for "Shop, Field and Maintenance Painting," the manufacturer of the coating and paint materials printed literature, and as specified herein.
- B. All surfaces to receive paint and protective coatings shall be cleaned as specified herein prior to application of coating materials. The Contractor shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. Beginning the coating work without reporting unsuitable conditions to the Owner constitutes acceptance of conditions by the Contractor. Any required removal, repair, or

- replacement of the work caused by unsuitable conditions shall be done at no additional cost to the Owner. All marred or abraded spots on shop-primed and factory-finished surfaces shall receive touch-up restoration prior to any other coating application.
- C. Paint and coating materials shall be protected from exposure to excessive hot or cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Materials of different manufacturers shall not be mixed together. Packaged materials may be thinned immediately prior to application in accordance with the manufacturer's directions.
 - D. All coatings shall be thoroughly mixed utilizing an approved slow-speed power mixer until all components are thoroughly combined and are of a smooth consistency.
 - E. Thinning shall only be permitted as recommended by the manufacturer and approved by the Engineer, and shall not exceed the limits set by applicable regulatory agencies.
 - 1. If the Contractor applies any coatings which have been modified or thinned to such a degree as to cause them to exceed established VOC levels, Contractor shall be responsible for any fines, costs, remedies, or legal action and costs which may result.
 - F. Each application of coating and paint shall be applied evenly with a uniform appearance. The system shall be free of brush marks, unfeathered edges, sags, runs, and evidence of poor workmanship, or any aesthetic defects, as defined by SSPC. Care should be exercised to avoid lapping on glass or hardware. Coating and paint shall be sharply cut to lines. Finished surfaces shall be uniform in appearance and shall be free from defects or blemishes.
 - G. Coatings shall not be applied when area wind speeds exceed fifteen miles per hour.
 - H. Protective coverings or drop cloths shall be used to protect floors, concrete, fixtures, equipment, prepared surface and applied coatings. Personnel entering work area shall take precautions to prevent damage or contamination of coated or painted surfaces. Care shall be exercised to prevent coating or paint from being spattered onto surfaces, which are not to be coated or painted. Surfaces from which such material cannot be removed satisfactorily shall be replaced, repainted or recoated as required to produce a finish satisfactory to the Engineer.
 - I. All welds and irregular surfaces, as defined by the Engineer shall receive a brush coat of the specified product prior to application of each complete coat. Coating/paint shall be brushed in multiple directions to insure penetration and coverage, as directed by the Engineer.

- J. Coating which has endured an excessive time element beyond manufacturer's recommended recoat cycle, shall be scarified by methods approved by the Engineer, prior to application of additional coating or paint. Scarified coating shall have sufficient depth to assure a mechanical bond of subsequent coat.
- K. All attachments, accessories, and appurtenances, as defined by the Engineer, to be painted shall be prepared and finished in the same manner as specified for adjacent sections.

3.06 APPLICATION, SPECIFIC - ARCHITECTURAL

- A. Coating shall be thoroughly stirred or agitated to uniformly smooth consistency and prepared and handled in a manner to prevent deterioration and inclusion of foreign matter. Straining shall be completed as recommended by the paint manufacturer. Unless otherwise specified or reviewed, no materials shall be reduced, changed, or used except in accordance with the manufacturer's label or tag on container.
- B. Unless otherwise specified herein, the paint and coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protection of coating materials; for preparation of surfaces for coating; and for all other procedures relative to coating shall be strictly observed. No substitutions or other deviations shall be permitted without written permission of the Owner.
- C. Materials shall be delivered in manufacturer's original, sealed containers, with labels and tags intact. Coating materials and equipment shall be stored in designated areas. Coating containers shall be opened only when required for use. Coatings shall be mixed only in designated rooms or spaces in the presence of the Engineer.
- D. Apply material evenly, free from sags, fisheyes, runs, drips, crawls, holidays or other defects. Mix to proper consistency, brush out all areas smooth leaving only minimum brush marks.
 - 1. Sand and dust between each coat to remove defects visible from a distance of five feet.
 - 2. Finish coats shall be uniform in appearance, smooth, free of brush marks, streaks, laps, and skipped or missed areas. Finished metal surfaces shall be free of skips, voids or pinholes in any coat when tested with a low voltage detector.
 - 3. Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer.

4. Rate of application shall not exceed that as recommended by paint manufacturer for the surface involved less ten percent allowance for losses.
5. Keep brushes and spraying equipment clean, dry, free from contaminants and suitable for the finish required.
6. Apply paint by clean brushes, roller or spray. Rollers shall be cleaned of loose nap prior to use.
7. Tint all pigmented undercoats to approximately same shade as final coat. Perceptibly increase the depth of shade in successive coats.
8. Allow each coat to dry thoroughly before succeeding coat application. For oil paints, allow at least 48 hours between coats of exterior work, except where otherwise recommended by the manufacturer.
9. Finish all four edges of doors with the same number and kind of coatings as specified for their main surfaces. Where openings into rooms having different finishes, finish door edges as directed by Engineer.
10. Do not paint factory finished items unless specifically directed.
11. Paint surfaces of metal ducts and vents.
12. Apply two finish coats of paint to shop primed metal surface of all mechanical and electrical equipment, to match adjoining wall or ceiling surfaces. In addition to above, prime coat all unprimed surfaces. Principal items of this work include interior of hose cabinets, air grilles, ceiling diffusers, electric panels, telephone panels, access panels, conduit, outlet and pull boxes, ducts and pipes.
13. Miscellaneous Painting: Paint surfaces to be painted and not specifically described herein, with a product specifically manufactured or prepared for the material and surface; prime coat and two finish coats, as approved by Engineer.
14. Upon completion, remove all rubbish caused by this trade. Remove spots from floors, glass and other surfaces. Leave in a clean and orderly condition.
15. At the completion of other trades, touch up damaged surfaces as required.

3.07 COLOR IDENTIFICATION

- A. All exposed and/or unburied pipe, including steel, copper and brass tubing, galvanized pipe, polyvinyl chloride pipe, fiberglass reinforced pipe, and stainless steel pipe, shall be identified by color to show its use/function. Color bands of an approved tape type may be used on PVC, FRP, and stainless steel pipe and all other pipe not readily susceptible to painted finish. Bands shall be adhesive type with extra strength and suitable for continuous duty at 250 degrees F. All markers shall have a protective silicone film.
- B. Color shall be those listed in the **COLOR CODE SCHEDULE**.

3.08 STENCIL IDENTIFICATION

- A. Both the direction of fluid flow and the name of the fluid in the pipe shall be stenciled on all piping at least once every twenty-five (25) feet and at every change of direction. Color bands shall be spaced at fifteen (15) foot intervals and every change in direction. The size in inches of the letters and color bands shall be as specified in the table below:

Outside Diameter Pipe or Covering	Width of Color Band	Height of Legend Letters
1/4 to 1-1/4	1	1/2
1-1/2 to 2	1	3/4
2-1/2 to 6	6	2
8 to 10	6	2-1/2
Over 10	6	3-1/2

- B. The stenciled labels shall be abbreviated and conform to the piping abbreviations shown on **COLOR CODE SCHEDULE**. The labels shall be safety yellow, matching OSHA Safety Yellow. Engines and listed electrical items shall be color coded as follows:

White: Sherwin Williams F65W1
 Electrical (Excluding panels)

Gray: ANSI 61
 Electrical panels

Light Yellow: (EMWD)
 Engines

- C. After the painting of process piping is complete, the Contractor shall stencil the tag numbers, as supplied by the Owner, of all process valves on the pipe adjacent to the

valve for pipe 2 inches and over. Characters shall be one inch high minimum and shall be oriented to be visible from the valve operating position. When the valve has extended operator shaft or chain operator, the number shall be placed both at the operating position and at the valve if practicable. The latter requirement does not apply if the valve is buried or in a pit. Valves in pipes under 2 inches shall have characters as large as the pipe will permit or at the Owner's option, on an adjacent surface. Characters shall be preferably white; however, if this would not provide sufficient contrast to the pipe, the Owner may select another color. Paint used shall be of the same type and quality as used for painting the pipe.

3.09 APPLICATION, SPECIFIC - INDUSTRIAL

- A. All coating components shall be mixed in exact proportions specified by the manufacturer. Care shall be exercised to insure all material is removed from containers during mixing and metering operations.
- B. Catalyzed coatings shall not be applied beyond pot-life limits specified by manufacturer. Any required induction requirements shall be strictly followed.
- D. Application shall be by conventional or airless spray method except as otherwise specified, or approved by the Engineer. Drying time between coats shall be strictly observed as stated in the manufacturer's printed instructions.
- E. When two or more coats are specified, where possible, each coat shall be of contrasting color.
- F. Care shall be exercised during spray operations to hold the spray nozzle perpendicular and sufficiently close to surfaces being coated to avoid excessive evaporation of volatile constituents and loss of material into the air or the bridging of cracks and crevices. Reaching beyond limits of scaffold perimeter will not be permitted. All dryspray or overspray shall be removed as directed by Engineer and the area recoated.

3.10 FINAL TESTING OF INDUSTRIAL COATING

- A. The final testing of the coating system shall include visual appearance, dry film thickness (DFT) measurements, hardness, cure, and adhesion testing and shall be performed in the presence of the Engineer.
- B. Visual Appearance- The coating system shall be uniform in appearance and free of any defects as defined by SSPC's Visual Comparison Manual.
- C. Dry Film Thickness - The thickness of each coat of coating shall be checked with a non-destructive film thickness gauge in accordance with ASTM D7091, where applicable. An

instrument such as Tooke Gage should be used in accordance with ASTM D4138 if a destructive tester is deemed necessary by the Engineer. The testing of film thickness of flat (e.g. plate) surfaces shall be tested in accordance with SSPC-PA2. The sampling of structural members or irregular surfaces shall be tested in frequency and locations, as directed by the Engineer. Final dry film thickness applied to concrete surfaces shall be determined by cutting out dry coupons for cross sectional measurement.

- D. Hardness - The hardness of catalyzed elastomeric coating systems shall be tested using a type Shore D hardness tester or device approved by the material manufacturer in accordance with ASTM D2240. The hardness of the final system shall be tested in areas randomly selected by the Engineer including any area suspected of being improperly mixed. The lining hardness after at least 48 hours shall be at least 70 when measured with a shore D hardness scale, or per the lining manufacturer's written recommendations.
- E. Holiday Detection - No pinholes or holidays will be permitted in any coating film. Upon completion of the final coat operations and after the required drying intervals, holiday detection shall be accomplished on all coated surfaces in intermittently submerged, submerged, or or severe environments (Service Conditions A, C, D, E, and I) in accordance with NACE SP0188. For thin film coatings, the Contractor shall obtain a letter from the coating manufacturer approving the use of high-voltage testing equipment, prior to any testing. Should the manufacturer not approve of high-voltage, a 67.5 volt low-voltage tester such as a Tinker and Razor M-1 device shall be used for thin film systems. All holiday detection of coatings shall be performed in the presence of the Engineer.
- F. Cure Evaluation - The proper cure of any inorganic zinc-rich (IOZ) primers and the final system(s) shall be verified. IOZ primers shall be evaluated in accordance with ASTM D4752. IOZ primers shall not be overcoated until fully cured. Organic, catalyzed coatings shall be tested in accordance with ASTM D5402 to verify adequate curing has been attained. If final cure has not been attained, the ventilation shall be continued until applied coating passes the solvent wipe test.
- G. Adhesion Testing - Adhesion of the catalyzed elastomeric lining systems shall be tested in areas selected by the Engineer in accordance with ASTM D4541. The number and locations of the testing shall be at the sole discretion of the Engineer. Acceptable adhesion values shall be at least the lining manufacturer's written recommendations for applications over concrete. The value obtained on the unlined concrete substrate itself shall be the minimum value requirement as long as the preparation of the substrate was found to be hard and sound by the Engineer.

3.11 CLEAN-UP

- A. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots upon adjacent surfaces shall be removed and the entire jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired, or refinished to the complete satisfaction of the Engineer at no cost to the Owner.

3.12 OMISSIONS

- A. Care has been taken to delineate herein those surfaces to be coated. However, if coating or painting requirements have been inadvertently omitted from this section or any other section of the specifications, it is intended that all surfaces, unless specifically exempted herein, shall receive a first-class protective coating or paint system equal to that given the same type surface pursuant to these specifications.

3.13 COLOR CODE SCHEDULE

Item	Color Code	Label
Aeration Air	Light Green	AA
Belt Press Return Water	Gray	BPRW
Building Drain	NA	BD
Compressed Air	Light Green w/Yellow	CA
Chlorinated Effluent	Blue	CE
Chlorine Gas	Yellow/Green Band	CG
Chlorine Solution	Yellow	CS
Cold Digested Sludge	Brown	CSL
Diesel Fuel	Yellow	DF
Digested Sludge	Brown	DSL
Digested Sludge Transfer	Brown	XSL
Digester Gs	Red	DG
Drain	NA	D
Electrical Panel (within bldg)	ANSI 61 - Gray	--
Electrical Conduit and Equipment (except panels)	White (Sherwin Williams F65W1)	--

Painting and Protective Coatings
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Item	Color Code	Label
Engine Coolant Water	Blue	ECW
Froth Spray	Blue	FS
Flotation Thickener Overflow	NA	FTO
Fresh Water	Light Blue	FW
Gravity Thickener Overflow	Gray/Yellow Bands	GTO
Grit	Brown	GRIT
Grit Washer Overflow	Gray	GWO
Ground Water Drain	NA	GWD
Heated Digested Sludge	Brown/Yellow Bands	HSL
High Temperature Water	Blue/Yellow Bands	HTW
Irrigation Water	NA	IW
Low Temperature Water	Blue/Orange Bands	LTW
Natural Gas	Light Yellow	NG
Oil Lines	Black	Oil
Polymer	Light Blue/Yellow Bands	POLY
Primary Tank Drain	Brown	PTD
Primary Sludge	Brown	PSL
Primary Scum	Brown	PSK
Raw Sewage	Brown	S
Return Digested Sludge	Brown	RDS
Return Water	Gray	RW
Secondary Scum	Brown	SSK
Sludge Bed Drain	NA	SBD
Sludge Heater Bypass	Brown	SLHB
Storm Water Drainage	NA	SWD
Thickened Sludge	Brown	TS
Thickener Dilution Water	Blue	TDW
Waste Activated Sludge	Brown	WAS
Waste Digested Sludge	Brown	WDS
Wash Water	Red	WW

Architectural System	Descriptive Color Code	Manufacturers' Paint Designation
PLANT BUILDINGS:		
General Surface	Tan	Rustoleum #865 (Dunes Tan)
Trim & Doors	Dark Brown	Rustoleum #977 (Chestnut Brown)
Walls (metal)	Yellow-White	Dunn-Edwards #CH-60B (Parchment)

END OF SECTION 09900

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