Attachment 1- Technical Specifications

Alameda - Contra Costa Transit District

Project Specifications for Construction of

Oakland Greyhound Terminal – Tenant Improvement Project

Contract No. 2020-10431

Issued for Bid
01-28-2020

PREPARED BY
CHOW ENGINEERING INC.

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SECTION 01 10 00
SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information
2. Work covered by Contract Documents
3. Construction Schedule Constraint
4. Work under separate contracts
5. District-furnished products
6. Access to site
7. Coordination with occupants
8. Work restrictions
9. Specification and drawing conventions
10. Miscellaneous provisions

B. Related Requirements:

1. Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.
2. Section 01 31 00 “Project Management and Coordination”
3. Section 01 32 00 “Construction Progress Documentation”
4. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of District’s facilities

1.3 PROJECT INFORMATION

A. Project Identification: Oakland Greyhound Terminal/Northern Layover

B. Project Location: 2103 San Pablo Ave, Oakland, CA 94612

C. Owner: AC Transit (referred to as the "District"), 1600 Franklin Street, Oakland, CA 94612

D. District's Designated Representative: Jason Auyeung, Project Manager, AC Transit

E. Architect: Lisa Kinura

F. Construction Manager: Jason Auyeung

1. Construction Manager may be engaged for this Project to serve as an advisor to District and to provide assistance in administering the Contract for Construction between District and Contractor, according to a separate contract between the District and Construction Manager.

G. District's Web-based Project Management Software: The District provides a web-based Project Management Software to be used for purposes of managing communication and documents during the construction stage.

1. See Section 01 31 00 "Project Management and Coordination." for requirements for using the District's Project Management Software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Renovation of an existing tenant space for a new AC Transit breakroom at the Greyhound Bus Terminal. The work includes removal of restroom fixtures, walls, lighting fixtures, floor drains, and miscellaneous items, installation of new restroom fixtures, flooring, wall coverings, cabinets, sinks, appliances, plumbing and electrical systems.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 CONSTRUCTION SCHEDULE CONSTRAINTS

A. This project may require disruption to daily operations for portions of the scope of work. The work shall be implemented in a manner that will provide the least possible impact. Contractor to provide a phasing schedule for these portions of work for review by the Architect and approval by the District PM. Great care must be taken throughout the project to ensure minimal impact on the on-going operation.

1.6 WORK UNDER OTHER CONTRACTS

A. General: Coordinate and cooperate fully with separate contractors so that work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts.

B. Work under other contracts, including but not limited to those listed in this section, may be underway during the time of performance of this Contract. The Contractor must coordinate its work with other Contracts as required by General Conditions Section 00 70 00, Part 9 and Project Management and Coordination, Section 01 31 00.

C. Information regarding work under other contracts may be obtained by inspection of documents at the Project manager's Office or the District's Office, and copies may be obtained at the cost of reproduction and handling upon Bidder's request and payment. These documents are not part of the Contract Documents.

D. Contractor shall include in its bid all costs associated with coordinating, scheduling and sequencing its Work with the Work of the contracts listed herein. Contractor shall consider, accept fully and account for in its bid prices, for the risk that these Contracts may not be complete or be performed in the scope, time or duration anticipated.

E. In the event that the performance of Work on contracts other than those listed herein shall occur and the performance of Work on such other contracts materially increases or decreases the Contractor's costs, the work and the amount to be paid therefore will be appropriately adjusted as determined by the Project Manager.

1.7 DISTRICT FURNISHED PRODUCTS

A. There are no District furnished products in this project.

1.8 WORK SEQUENCE

A. Construct Work in stages and at times to accommodate the District's operational requirements during the construction period, and coordinate the construction schedule with the Project Manager.

B. The Contractor shall phase the Work in stages and at times such that the milestone dates for completion are achieved in accordance with the approved schedule submitted pursuant to the Agreement Section 00 52 00 (if applicable) and Section Construction Progress Documentation Section 01 32 00.

C. Access through various areas of the worksite must be maintained for other contractor's use throughout the duration that the Contractor occupies the segment. The access must be aligned with the corresponding falsework opening. Listed below are the locations and access requirements the Contractor shall comply with.

1.9 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Except as described above, keep driveways parking garage, loading areas, and entrances serving premises clear and available to District, District's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials
2. Schedule deliveries to minimize use of driveways and entrances by construction operations.
3. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weather-tight condition throughout construction period. Repair damage caused by construction operations.

1.10 COORDINATION WITH OCCUPANTS

A. Full District Occupancy: Greyhound employees will occupy site and existing building(s) during entire construction period. Cooperate with District and Greyhound during construction operations to minimize conflicts and facilitate Greyhound usage. Perform the Work so as not to interfere with Greyhound's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from District and approval of authorities having jurisdiction.

2. Notify District not less than seventy-two (72) hours in advance of activities that will affect Greyhound's operations.

1.11 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by District or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify District not less than two (2) days in advance of proposed utility interruptions.

2. Obtain District's written permission before proceeding with utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to District occupancy with District.

1. Notify District not less than two (2) days in advance of proposed disruptive operations.

2. Obtain District's written permission before proceeding with disruptive operations, or perform disruptive operations that result in noise of 60 dBa or more in any occupied area on weekends or before 6:00 a.m. and after 5:00 p.m. on weekdays.

1.

D. Nonsmoking Building: Smoking is not permitted within the building or within twenty-five (25) feet of entrances, operable windows, or outdoor-air intakes.

E. Employee Identification: District will provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," indicate a mandatory requirement.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 -GENERAL

1.1 SECTION INCLUDES

A. Inspection.
B. Demolition.
C. Cutting.
D. Salvaging.
E. Initial building cleaning.
F. Disposal of debris.
G. Restoration of existing structures and facilities.
H. Field Quality Control

1.2 RELATED WORK

A. Temporary facilities, such as fences, barricades, warning lights, and other temporary safety measures shall be provided by the Contractor. Provide such additional temporary facilities as may be required to facilitate continuous operations during transitional construction work.

1.3 REFERENCES, CODES, AND STANDARDS

A. American National Standards Institute (ANSI):
   1. ANSI A10.6 Safety and Health Program Requirements for Demolition Operations
B. California Code of Regulations (CCR)
   1. CCR, Title 8, Division 1, Chapter 4, Subchapter 4, Construction Safety Orders.
   2. CCR, Title 24, Part 2, California Building Code, Chapter 33, “Safeguards During Construction.”

1.4 DESCRIPTION

A. The building involved in this work will be in continuous operation during the construction period. This will require that the Contractor plan the Work carefully to work around unavoidable obstacles in the prosecution of the Work.
B. Utility services to facilities to be removed or demolished shall be disconnected, cut, and capped, as required.
C. The work includes restoration of existing structures and facilities to remain in place that are damaged by demolition and removal operations.

1.5 SITE CONDITIONS

A. Protection of Persons and Property: Erect and maintain temporary lights, barricades, baffles, curtains, signs, and other measures as necessary to protect the public, workers, and adjoining property from damage from demolition work, all in accordance with applicable codes and regulations.

B. Protection of Utilities:
   1. Protect active sewer, water, gas, electric, and other utilities; and drainage lines indicated or, when not indicated, found or otherwise made known to the Contractor before or during demolition work. If utility is damaged, immediately notify the utility owner for corrective action.
   2. Arrange with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

C. Noise and Dust Abatement:
   1. Provide continuous noise and dust abatement as required to prevent disturbance and nuisance to the public and workers and to the occupants of adjacent premises and surrounding areas. Dampen or cover areas affected by demolition operations as necessary to prevent dust nuisance.
   2. When a certain level of noise is unavoidable because of the nature of the work or equipment involved, and such noise is objectionable to the occupants of adjacent premises, make arrangements with the authorities having jurisdiction to perform such work or operate such equipment at the most appropriate time periods of the day. Provide abatement measures to the extent feasible and practicable.

D. Unknown Conditions:
   1. The Contract Drawings and related documents may not represent all conditions at the site and adjoining areas. The known conditions are as indicated, and shall be compared with actual conditions before commencement of work.
   2. Existing utilities and drainage systems below grade are located from existing documents and from surface facilities such as manholes, valve boxes, area drains, and other such surface fixtures.
   3. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under construction, notify the Engineer in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provided is not interrupted, and do not proceed with the work until written instructions are received from the Engineer.

PART 2 -PRODUCTS

2.1 MATERIALS, EQUIPMENT, AND FACILITIES

A. The Contractor shall furnish all materials, tools, equipment, devices,

appurtenances, facilities, and services as required for performing the selective demolition and removal work.

PART 3 -EXECUTION

3.1 INSPECTION

A. Prior to starting selective demolition operations, perform a thorough inspection of the building and premises, and report to the Engineer any defects and structural weaknesses of existing construction and of improvements to remain.

3.2 DEMOLITION

A. Operational Procedures and Methods:
   1. Perform demolition and removal work in accordance with the contract drawings. Perform demolition work in accordance with ANSI A10.6 and the California Code of Regulations, Title 8 and Title 24, as applicable.
   2. Remove items indicated for demolition within the limits of the Work and as required to complete the Work of this Contract. Do not remove anything beyond the limits of Work indicated without prior written approval of the Engineer. If in doubt whether to remove an item, obtain written approval of the Engineer prior to proceeding.
   3. Remove materials carefully, to the extent indicated and as required, providing for neat and orderly junctions between existing and new materials.
   4. Protect existing structures, facilities, and landscaping from damage. Items damaged as a result of demolition operations shall be repaired or replaced, as required, at no increase in the Contract Price.
   5. Perform work so as to provide the least interference and most protection to existing facilities and improvements to remain.

3.3 DISPOSAL OF DEBRIS

A. Dispose of removed materials, waste, trash, and debris in a safe, acceptable manner, in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction.
B. Burying of trash and debris on the site will not be permitted. Burning of trash and debris at the site will not be permitted.
C. Remove trash and debris from the site at frequent intervals so that their presence will not delay the progress of the work.
D. Removed materials, trash, and debris shall become the property of the Contractor and shall be removed from the District's property and disposed of in a legal manner. Location of disposal site and length of haul shall be the Contractor's responsibility.

3.3 RESTORATION OF EXISTING STRUCTURES AND FACILITIES

A. All damage to existing structures and facilities, which are to remain in place, shall be repaired to a condition equal to that existing prior to the beginning of demolition and removal operations. The cost of repairing existing structures and facilities damaged by the Contractor's operations shall be at the Contractor's expense.

3.4 FIELD QUALITY CONTROL

A. Following performance of the Work, perform an inspection of the premises and report defects and structural weaknesses of structures partially demolished, cut, or removed; of adjacent structures; and of improvements remaining.

B. The Engineer will accompany the Contractor before and after performance of the Work to confirm the physical condition of the structures and improvements involved.

END OF SECTION 02 41 19

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes specifications for conveying and placing cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, curing, and finishes, as indicated on the Contract Drawings.

1.2 REFERENCE STANDARDS

A. American Concrete Institute (ACI):

ACI 116R	Cement and Concrete Terminology
ACI 117	Standard Tolerances for Concrete Construction and Materials
ACI 212.1R	Admixtures for Concrete & Guide Use of Admixtures
ACI 212.2R	Admixtures for Concrete & Guide Use of Admixtures
ACI 212.3R	Chemical Admixtures for Concrete
ACI 301	Specifications for Structural Concrete
ACI 302.1R	Guide for Concrete Floor and Slab Construction
ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 304.2R	Placing Concrete by Pumping Methods
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 306.1	Standard Specification for Cold Weather Concreting
ACI 308	Standard Practice for Curing Concrete
ACI 308.1	Standard Specification for Curing Concrete
ACI 309R	Guide for Consolidation of Concrete
ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Guide to Formwork for Concrete
ACI 503.2	Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive

B. American Society for Testing and Materials (ASTM):

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/42M	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C94/94M	Standard Specification for Ready-Mixed Concrete
ASTM C143	Standard Test Method for Slump for Hydraulic-Cement Concrete

ASTM C143M	Standard Test Method for Slump for Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C881	Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C881	Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1059	Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete
ASTM C1064	Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM E329	Standard Specification for Agencies Engaged in Construction Inspection and/or Testing
ASTM E548	Standard Guide for General Criteria Used for Evaluating Laboratory Competence
ASTM E1155	Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers

C. "Greenbook" Standard Specifications for Public Works Construction, 2015 Edition

D. American Association of State Highway and Transportation Officials (AASHTO): AASHTO M182 Burlap Cloth made from Jute or Kenaf

1.3 DEFINITIONS:

A. The words and terms used in these Specifications conform to the definitions given in ACI 116R.

B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. General: Refer to the General Conditions for submittal requirements.

B. Product Data: For each type of product indicated.

C. Qualification Data for testing agency.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Aggregates.
2. Cementitious materials.
3. Admixtures.
4. Form materials and form-release agents.
5. Steel reinforcement and accessories.
6. Curing compounds.

E. Field quality-control test and inspection reports.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend a pre-construction meeting, including the following:
a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, curing procedures, forms and form removal limitations, anchor rod and anchorage device installation tolerances, steel reinforcement installation, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Delivering and placing of concrete in hot weather and cold weather shall conform to the applicable requirements of ACI 305R and ACI 306R, respectively.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
a. High-density overlay, Class 1 or better.
b. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: ASTM C150, Type II, low alkali, of the same type, brand, and source, throughout Project:

B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
   1. Coarse-Aggregate: Uniformly graded from No. 4 to ¾-inch maximum size.
   2. Fine Aggregate: Uniformly graded from ¼-inch to fines, washed clean.

C. Water: ASTM C 94/C 94M, clean and potable, free of impurities detrimental to concrete.

2.5 ADMIXTURES

A. Contractor may include accepted concrete admixtures in the mix to improve the water-cement ratio or workability of the concrete, providing the strengths specified and other desirable characteristics of the concrete can be achieved and maintained. Admixtures require the Engineer's acceptance before they may be used, and shall be included in the design mix, introduced in solution form. Comply with ACI 212.1R, ACI 212.2R, and ACI 212.3R as applicable.
   1. Air-Entraining Admixture: ASTM C 260.
   2. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
      a. Water-Reducing Admixture: ASTM C 494.

b. Plasticizing Admixture: ASTM C 1017.

3. Pozzolanic Admixtures: ASTM C618
4. Fly Ash: ASTM C 618, Class F, with weight loss on ignition limited to 3 percent.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.7 RELATED MATERIALS

A. Expansion-and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt- saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

D. Admixtures: Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability. Use admixtures according to manufacturer's written instructions.

2.9 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 REMOVING AND REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

B. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groove tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.5 CONCRETE PLACEMENT

A. Notify the Owner’s Representative at least 24 hours in advance of placing concrete.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.6 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power- driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces exposed to view.
   2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot-long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure all unformed surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Continuous water-fog spray.
      b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surface and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cures or use moisture retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
   4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same

materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive- strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

C. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 03 30 00

SECTION 08 11 00

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal doors.
B. Door seals and weatherstripping.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI/ Standard Test Procedure & Acceptance Criteria for Prime SDI A250.10 Painted Steel Surfaces for Steel Doors and Frames
B. American Society for Testing and Materials (ASTM):
   1. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
C. National Fire Protection Association (NFPA):
   1. NFPA 80 Standard for Fire Doors and Other Opening Protectives
   2. NFPA 252 Standard Methods of Fire Tests of Door Assemblies
D. Steel Door Institute (SDI):
   1. SDI A250.8 Recommended Specifications for Standard Steel Doors and Frames
   2. SDI A250.11 Recommended Erection Instructions for Steel Frames
   3. SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
   4. SDI 110 Standard Steel Doors and Frames for Modular Masonry Construction
   5. SDI 111 Recommended Selection & Usage Guide for Standard Steel Doors, Frames and Accessories
   6. SDI 117 Manufacturing Tolerances for Standard Steel Doors and Frames
   7. SDI 118 Basic Fire Door Requirements
   9. SDI 131 Accelerated Physical Endurance Test Procedure for Steel Doors, Frames, and Frame Anchors
E. Underwriters Laboratories (UL):
   1. UL 10B UL Standard for Safety Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. General: Refer to Section 01 for Submittal Procedures, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
B. Shop Drawings: Submit Shop Drawings for metal doors and frames showing size, location, and elevation of each metal door and frame, gauge and type of material, details for fabrication of each door and frame, including size and location of each mortise, penetration, reinforcement, sound seal, light, louver, and anchoring device. Indicate the quantity of each size and type of door and frame. Comply with

applicable requirements of SDI A250.8 and SDI 111 Series Drawings.

C. Product Data: Submit manufacturer's product data of each type of door and frame and certification that materials meet Specification requirements.

D. Reports and Certificates:
   1. Submit certified test reports from an independent testing laboratory of sound transmission class (STC) ratings for acoustical door assemblies.
   2. Submit certificates of inspection as required for fire-rated doors.

1.4 QUALITY ASSURANCE

A. Manufacturing Standards: Comply with applicable requirements of SDI A250.8.
B. Manufacturing Tolerances: Comply with applicable requirements of SDI 117.
C. Fire-Rated Doors and Frames: Comply with applicable requirements of SDI A250.8 and SDI 118.

PART 2 – PRODUCTS

2.1 DOORS

A. The entry door shall be 7'-0" high and 3'-0" wide, 14 gauge steel; reinforced with 14 gauge steel ribs welded at 6" intervals on each face, concealed; reinforced with a welded plate for door closer mounting; hung on a single continuous, 1 million cycle, aluminum gear hinge with stainless steel vandal resistant screws at nominal 4" on center. The doors shall weigh nominally 176 lbs each for a 36" X 84" door. Custom fabricated 14-gauge steel door jambs with 4" steel heads shall be welded to the steel cap beam and be solid filled with 3000 psi masonry grout mix.

B. All exterior entry doors shall have a ¼" thick stainless steel "Z-shaped" anti-microbial pull handles and Schlage B-600 series commercial series dead bolts. Each exterior door shall have a Schlage Activated Lock Set and conductive (transfer) hinge.

C. The door closer shall be "LCN" heavy duty #4210 Series, fastened to a structural reinforced door plate per door manufacturer design.

D. Stainless steel vandal resistant fasteners shall be used on all hardware.

2.2 DOOR SEALS AND WEATHERSTRIPPING

A. Doors and frames shall be fitted with door seals or gaskets where indicated, and exterior doors and frames shall be fitted with applied rain drips and weatherstripping on all four sides (entire perimeter of opening) in accordance with applicable requirements of SDI 111.

B. Weatherstripping and seals shall be non-ferrous, with synthetic rubber edge seals where indicated or required, of type or style appropriate for the purpose. Drips and visible weatherstripping shall be painted out to match doors and frames.

C. Door seals or gasketing for fire-rated doors and acoustical doors shall be synthetic rubber of type manufactured and appropriate for the purpose.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation Standards: Install door frames and doors in accordance with SDI A250.8, meeting the performance and acceptance criteria of SDI 131. Door frames and doors installed in masonry walls shall meet the requirements of SDI A250.8 and SDI 110.

B. Frames: Frames shall be set accurately in position, plumbed, aligned, and braced securely until permanent anchors are installed. Where frames require ceiling struts or other structural overhead bracing, they shall be anchored securely to structure above, as required. Where indicated or required by class of opening, frames shall be filled solid with portland cement grout by providing one inch grout holes at top of each door jamb. Provide additional grout holes as required to fill around internal obstructions.

C. Doors: Doors shall be hung by skilled workers to fit snug against stops. Fit accurately and hang free from hinge bind with uniform clearance of 3/32 inch at heads and jambs. After hanging, make adjustments, and then remove doors and hardware for finish painting and make final adjustments. Verify that direction of swing is as indicated.

D. Finish Hardware:
   1. Install accurately and securely without marking or defacing hardware or finish work. Hardware shall be fastened with machine screws or bolts. Sheet metal screws will not be permitted. Test hardware to assure correct alignment and operation. Finish hardware shall be fastened at all points where fasteners are indicated or required.
   2. Thresholds shall be embedded in approved sealant, and shall be secured to concrete floors with stainless steel screws in nonferrous expansion shields.
   3. Provide hardware in satisfactory working order. Clean and polish.

E. Door Seals and Weatherstripping: Weatherstripping and seals shall be installed to provide rainproof service and so that there is no air, light, and sound leakage. Stops shall fit tight against doors.

F. Fire-Rated Doors and Frames: Installation of doors and frames, including hardware and operational characteristics, shall be in accordance with NFPA Standard No. 80, as applicable. Verify that doors and frames are labeled as indicated.

G. Prime Paint Touch-Up: Immediately after installation, touch up damaged prime coat with the same primer as was used for the shop finish. Lightly sand and feather out damaged surfaces so that paint touch-up becomes invisible. Spray paint touch-up work.

H. Temporary Protection: Provide protective facings or coverings for doors and frames to receive continued use during construction.

END OF SECTION 08 11 00

SECTION 09 67 23

RESINOUS FLOORING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Provide labor, equipment and materials to complete coatings work as indicated on the drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. References: Cited Standards are incorporated herein by reference and govern the work:
   1. Pamphlet No. 03732, International Concrete Repair Institute (Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays.

B. Single Source Responsibility: Obtain primary resinous floor materials including hardening agents, finish or sealing coats from a single manufacturer with not less than 5 years of successful experience in manufacturing and installing the principal materials described in this section. Provide secondary materials only of type and from a source recommended by the manufacturer of the primary material.

C. Contractor Experience: Contractor must furnish the following proof of experience.
   1. Letter of training from the Approved Material manufacturer stating that contractor is an approved installer and has been successful in the installation of the manufacturers Approved Materials.

D. Sampling of Material:
   1. When directed by Engineer, obtain test samples from material stored at the project site or source of supply.
   2. Select samples at random from sealed containers

1.3 SUBMITTALS

A. Submit product literature indicating technical data.
B. Submit product installation and application guide.
C. Submit copies of manufacturer's Safety Data Sheets.

1.4 JOB CONDITIONS

A. Environmental requirements
   1. Comply with manufacturer's recommendations as to environmental conditions under which coating systems can be applied. Surfaces to be coated and ambient air temperature shall be between 60°F and 85°F. Do not apply coatings at temperatures beyond those limits stated in the manufacturer's technical data sheet unless given written permission by the

manufacturer.

2. Do not apply coatings in areas where dust or other airborne particulate matter is being generated.

B. Protection:

1. Cover or otherwise protect finished work of other trades and surfaces not being coated concurrently or not to be coated.

PART 2 – PRODUCTS

2.1 MATERIAL

A. ROCK-TRED's FULL FLAKE LAMINATED 1/16" System, a multi-colored, decorative, 100% solids epoxy, single flake broadcast, high performance flooring system as manufactured by ROCK-TRED at 405 Oakwood Ave. Waukegan, IL. 60085. (888-762-8733) www.rocktred.com

1. System Components – contact ROCK-TRED to determine which flake size, primer, seed, finish and top coats are best for your project.
   a. Recommended ROCK-TRED Primer – CHEM-ROCK PRIMER or POXI-ROCK PRIMER depending on job site conditions.
   b. ROCK-TRED FLAKE
   c. CHEM-ROCK LV, MV or UV for broadcast and top coats
   d. High Performance Finish Coat – CHEM-THANE 509, CHEM-THANE WBP, CHEM-THANE P-50, CHEM-THANE P-80 OR CHEM-THANE P-100 (*OPTIONAL*

B. Selected coating systems shall be applied in accordance with manufacturer's instructions and these specification documents.

C. Include on labels of containers:

1. Manufacturer's name.
2. Product name.
3. Product number.
4. Color.
5. Instructions for reducing, where applicable.
6. Component description

2.2 COLORS

A. Colors of decorative flake shall be selected by the Owner/Engineer from Manufacturer's standard palette of color blends and different flake sizes.

2.3 MIXING

A. Accomplish job mixing and application only when acceptable to the Engineer.

B. Mix components only in containers furnished or approved in writing by the Manufacturer.

C. Proportioning of two-part and three-part coatings shall be in strict accordance with methods recommended by the Manufacturer.

D. All products shall be mixed using a variable speed drill with a PS Jiffy blade. Parts A and B shall be mixed a minimum of two minutes. Part C, where applicable, should be mixed into pre-mixed A and B parts for a minimum of two

minutes. Ensure full blending of all parts with all material measured into the mixing container. Apply the mixed material within the pot life, induction times and temperatures recommended by the Manufacturer.

E. For all mixing operations, the coating system components shall be considered as hazardous materials. Read and observe container label warnings and Material Safety Data Sheets for health and safety information prior to starting mixing operations.

F. Do not reseal mixed material. Permit final chemical set to occur in the container and when set has been achieved; dispose of hardened material by legal means.

G. Do not apply any material that has exceeded shelf and pot life as determined by manufacturer.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine surfaces scheduled to receive coating for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into an acceptable condition through preparatory work as included in 3.02. PREPARATION OF SURFACES.

B. Notify Owner's agent immediately upon determination that surfaces scheduled to receive coating are unacceptable for proper adhesion or subsequent performance.

C. Do not proceed with surface preparation or coating application until conditions are suitable.

3.2 PREPARATION OF SURFACES

A. Old concrete floor slabs on grade.

1. Employ a radio frequency moisture meter to determine that residual un-combined moisture content of concrete slab is less than five (5) percent by weight. Conduct ASTM F 2170 to record the Relative Humidity. Do not apply high performance floor coatings to floor slabs that exceed 80 percent RH content per ASTM F 2170 unless otherwise approved by the material manufacturer, or unless treated using ROCK-TRED's ROCK-BLOCK Moisture Vapor Barrier System.
2. Shot blast or diamond grind to profile all concrete floor surfaces scheduled to receive high performance floor coatings to a classification of CSP-2. Diamond grinding is recommended to avoid blast lines in the substrate from showing through the coating system.
3. Where visual inspection of prepared surface indicates that oil-based penetration of the surface has occurred the stained areas shall be mechanically scrubbed using ROCK-SOLV or ROCK-POWER MICROBIAL industrial detergent applied according to the Manufacturer's instructions. Rinse with clean water and dry all floor surfaces scheduled to receive high performance floor system finish prior to commencement of prime coat application. If there is evident or suspected remaining contamination contact Manufacturer for further preparation instructions prior to proceeding with primer application.

4. Remove and legally dispose of all debris and contaminants produced by the preparation process. Steel media resulting from the shot blasted floor slab surface shall be removed from cracks, slab edges, construction joints, and corners by magnets, magnetic broom, air blast, vacuum, or stiff bristle broom.

3.3 APPLICATION

A. General Requirements:

1. Do not apply initial coating until moisture content of surface is within limitations recommended by coating manufacturer and never install coatings when the substrate temperature is less than 5 degrees above dew point unless specifically approved, in writing, by the manufacturer.
2. OPTIONAL: Substrate patching and joint filling
   a. Mechanically open, to clean and prepare, all joints, cracks, spalls or areas of eroded concrete. Vacuum prepared areas clean of all dust and debris.
   b. Patch all non-moving cracks, joints, spalls and areas of eroded concrete using POXI-ROCK FLOORING MORTAR, ROCK-MENDER or RQP.
   c. For any joints where minor substrate movement is expected, or joints in slabs less than 5 years old, mechanically open and clean joints and then proceed with coating system application leaving the joints unfilled. After final coating is applied and sufficiently cured a ¼" wide saw cut is to be made through the finished coating system directly over the original joint. The new joint is then to be filled to grade using ELASTI-POXI JOINT FILL applied in a color chosen by the architect.
3. OPTIONAL: Integral Epoxy Cove Base
   a. For EASYCOVE preformed Cove Base: Where indicated on the architectural drawings apply EASYCOVE radius base cove in the finish height specified. Apply EASYCOVE base according to the manufacturer's published instructions and secure using EASYCOVE ADHESIVE. After EASYCOVE ADHESIVE has sufficiently cured apply 1 coat of 100% solids epoxy primer such as CHEM-ROCK PRIMER or POXI-ROCK PRIMER in a solid color complimentary to the chosen flake blend and immediately broadcast flake to rejection onto the EASYCOVE. Apply a 2nd broadcast of flake onto the EASYCOVE at the same time as and with the same material used for the floor's first broadcast of flake.
   b. For Hand Troweled Cove Base: Where indicated on the architectural drawings apply rolled radius base cove in the finish height specified. Apply cove base using POXI-ROCK FLOORING liquids and PCA-324N aggregate. After cove has sufficiently cured apply 1 coat of 100% solids thixotropic epoxy such as CHEM-ROCK HV in a solid color complimentary to the chosen flake blend and immediately broadcast flake to rejection onto the cove base. Apply a 2nd broadcast of flake onto the cove base at the same time as the floor is receiving its

first broadcast of flake.

4. Mix and apply POXI-ROCK Primer or CHEM-ROCK Primer at a rate no thinner than 150 square feet per gallon and according to product specific instructions. Tint the PRIMER in a color complimentary to the chosen blend of flake to provide a colored base coat to mask stains, patching and discoloration in the substrate.
5. Mix and apply a clear coat of CHEM-ROCK MV, LV or LV-UV at an approximate coverage rate of 135-150 square feet per gallon over the primer. Immediately broadcast selected blend of flake to rejection (approximately .15- .20 lbs. per square foot) into CHEM-ROCK MV, LV or LV-UV and wait for appropriate cure.
6. After broadcast lift is sufficiently cured, remove all excess flake that did not bond into the seed coat by sweeping with a clean medium bristle broom and/or scraping to flatten any protruding flake. Properly dispose of excess flake.
7. After sweeping, mix and apply a locking top coat of clear CHEM-ROCK MV, LV or LV-UV at a rate of approximately 60-100 square feet per gallon according to the instructions on the technical data sheet. Coverage of the finish coat will vary depending upon desired finished texture of floor.
8. *OPTIONAL*: When higher abrasion or chemical resistance is desired a final High Performance Top Coat such as CHEM-THANE 509, CHEM-THANE WBP, CHEM-THANE P-50, CHEM-THANE P-80 or CHEM-THANE P-100 may be applied according to the instructions on the Technical Data Sheets.

3.4 CLEANING

A. Remove debris promptly from work area and dispose of properly.
B. Remove spilled, splashed, or splattered coating materials from all surfaces.
C. Do not mar surface finish of items being cleaned.

3.5 FINISH SCHEDULE

A. Apply coating systems to all areas shown on the drawings or specified in the Finish Schedule.

END OF SECTION 09 67 23

SECTION 09 91 00

PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Paint materials.
B. Accessory materials.

1.2 DESCRIPTION

A. The work includes the painting and finishing of exterior and interior exposed surfaces throughout the Contract, except as otherwise indicated. Surface preparation, priming, and coats of paint specified are in addition to shop priming and surface treatment specified under other Sections of the Specifications.
B. The work includes the field painting of bare and covered pipes (including color coding in accordance with ASME A13.1), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment except as otherwise indicated.
C. The work includes restoration of existing painted surfaces as indicated. Extent of restoration work involving existing painted surfaces is indicated on the Contract Drawings.
D. Paint exposed surfaces whether or not colors are designated in any schedule, except where the natural finish of the material is specifically indicated as a surface not to be painted. Where surfaces are not specifically identified, paint such surfaces the same as adjacent similar surfaces.
E. The paint systems specified indicate the basic painting systems. Deviations within the system, such as the use of two finish coats in lieu of undercoat and finish, will be permitted only where such procedure is recommended by the paint manufacturer and approved by the Engineer.

1.3 DEFINITIONS

A. The term “paint” as used herein means all coating systems materials, and includes primers, emulsions, enamels, stain, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.4 WORK NOT INCLUDED IN THIS SECTION

A. Shop or Factory Primed Surfaces: Shop priming of ferrous and galvanized metal items is included under the various Sections for structural steel, metal decking, miscellaneous metal items, hollow metal work, and similar items, and shop-fabricated or factory-built mechanical and electrical equipment and accessories.
B. Pre-Finished Items: Field finish does not include painting when factory-finishing is specified for items such as acoustical materials, finished mechanical and electrical equipment, including light fixtures and distribution cabinets. Field touch-up is required, however, in all cases where the factory finish is damaged.
C. Concealed Surfaces: Painting is not required on wall or ceiling surfaces in

concealed areas and generally inaccessible areas, such as foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts, and elevator shafts. Paint piping, equipment, and other such items within these areas as indicated.

D. Nonferrous Metal Surfaces: Anodized aluminum, stainless steel, copper, and similar nonferrous metal materials will not require finish painting unless otherwise indicated or specified.

E. Operating Parts and Labels:
   1. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, and expansion joints, will not require finish painting unless otherwise indicated.
   2. Do not paint over code-required labels, such as UL, FM, and WH, or equipment identification, performance rating, name, or nomenclature plates.
   3. Do not paint automatic fire sprinkler heads.

F. Miscellaneous Surfaces: Rubber and elastomeric sealants, cementitious fireproofing, and machined surfaces of metal hardware and related fittings will not require finish painting.

1.5 REFERENCES

A. American Society of Mechanical Engineers (ASME):
   1. ASME A13.1 Scheme for the Identification of Piping Systems

B. Painting and Decorating Contractors of America (PDCA):
   1. "Painting and Decorating Craftsman's Manual and Textbook"

C. The Society for Protective Coatings (SSPC):
   1. SSPC Painting Manual, Volume 2, "Systems and Specifications"
   2. SSPC-SP 1 Solvent Cleaning
   3. SSPC-SP 3 Power Tool Cleaning
   4. SSPC-SP 6/NACE No.3 Commercial Blast Cleaning
   5. SSPC-SP 10/NACE No. 2 Near-White Blast Cleaning

D. American Society of Testing and Materials (ASTM):
   1. ASTM D360 Standard Specification for Shellac Varnishes

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Paint products and solvents shall comply with the latest regulations of the Bay Area Air Quality Management District regarding regulations governing permissible content of volatile organic compounds (VOC).

B. Quality Standards:
   1. Preparation and painting work shall conform with the recommended practices and quality standards of the "Painting and Decorating Craftsman's Manual and Textbook," latest edition, published by the Painting and Decorating Contractors of America.
   2. Preparation and painting of steel surfaces shall conform with the quality standards of the SSPC Painting Manual, Volume 2.
   3. Paints, enamels, stains, lacquers, and varnishes shall be applied in accordance with the manufacturers' latest specifications, instructions, and

recommendations.

C. Paint Coordination:
   1. Coordinate and interface the work of this Section with the various Sections specifying factory-applied finishes.
   2. Coordinate the work of this Section with the work specified under Mechanical and Electrical, for color-coding and painting of mechanical and electrical equipment, piping, conduit, ducts, and panels.
   3. Provide finish coats that are fully compatible with the prime paints used. Field-applied primers shall be supplied by the same manufacturer as the intermediate (if any) and finish coats used. Review other Sections of these Specifications in which prime paints are specified to ensure compatibility of the coating system for each of the various substrates. Provide barrier coats over incompatible primers or remove and reprime as required.

1.7 SUBMITTALS

A. General: Refer to Section 01 for Submittal Procedures, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Product Data:
   1. Submit a complete list of all materials proposed for use, together with manufacturers' product specifications for such products.
   2. No claim by the Contractor concerning the unsuitability of any material specified, or the Contractor's inability to produce first class work with such materials, will be considered unless such claim is made in writing to the Engineer before the work is started.
   3. Provide product documentation of VOC content in g/L.

C. Colors and Samples:
   1. Colors: The Engineer will prepare a Color Schedule with samples for guidance of the painter, and reserves the right to select, allocate, and vary colors on different surfaces throughout the station or building, subject to the limitation that not more than 20 percent of bright or deep colors will be selected.
   2. Samples:
      a. Before beginning work, prepare for approval a sample of each color, texture, and finish required. Such samples, when approved, shall constitute standards for color, texture, and finish of completed work.
      b. Make samples eight by 10 inches in size and upon materials corresponding with those to be finished in the station or building.
      c. When samples are rejected, a maximum of two additional modified samples may be required, in each instance, to obtain approval.
      d. Approved samples shall be marked for identification and shall be distributed to the Engineer and field offices as required.
      e. Mock-up for approval of final colors shall match the approved colors and samples.

1.8 DELIVERY AND STORAGE

A. Deliver paint materials to the site in original, unopened packages and containers

with labels intact and seals unbroken.

B. Store materials, tools, and equipment in a locked, properly ventilated, designated storage space on the site, assigned for this purpose. Receiving, opening, and mixing of paint materials shall be performed in this storage space. Keep storage space neat, clean, and accessible at all times. Protect areas from paint spillage.

C. Place paint-soaked or solvent-soaked rags, waste, and other materials that might constitute a fire hazard in closable metal containers and remove from the premises at the close of each day's work. Take all necessary precautions to avoid fire danger.

1.9 WEATHER AND TEMPERATURE

A. Surfaces shall be painted only when they are free from moisture. No painting on exterior surfaces shall be performed less than 72 hours of actual drying weather after a rain, or during periods of dew or fog. Receiving surfaces shall be properly dried out before proceeding with the work.

B. No painting shall be performed when temperature is below 40 degrees F and above 90 degrees F or when the relative humidity is above 90 percent, unless recommended otherwise in writing by the paint manufacturer.

1.10 SCAFFOLDING AND PROTECTION

A. Furnish, maintain, and remove all scaffolding, ladders, and planks required for this work, and all drop cloths for the protection of concrete walks, floors, adjacent surfaces, prefinished materials, building fixtures, and similar surfaces.

B. Painted and finished surfaces subject to damage or defacement due to other work in the building shall be properly protected and covered. The Contractor shall be responsible for damage to painted work and to that of other work caused by painting operations under this Section until final acceptance by the District.

PART 2 – PRODUCTS

2.1 PAINT QUALITY STANDARDS

A. Paint and painter's finish shall be the highest quality products of nationally recognized manufacturers specializing in the manufacture of paint products. Minimum percent solids (MPS) required for the paint products herein specified shall be as indicated in the following example: MPS: 35.

B. Provide primer and undercoater paints produced by the same manufacturer as the intermediate and finish coats. Use thinners approved by the paint manufacturer which meet previously referenced regulatory requirements, and provide only to recommended limits.

C. Provide primers and undercoaters which are suitable for each surface to be painted and which are compatible with specified intermediate and finish paint coats.

D. Materials necessary to complete the painting work are herein generically specified. Except as otherwise specified, materials for any one paint system shall be by the same manufacturer.

E. Minimum dry film thicknesses (MDFT), in mils, and the number of coats required to obtain such thicknesses shall be in accordance with the paint manufacturer's application instructions and recommendations.

F. VOC limits as required by the Bay Area Air Quality Management District.

2.2 PAINT MATERIALS

A. Type and Manufacture: The following products constitute the standards for the primers, intermediate, and finish coats of the paint systems herein specified in articles 3.4 and 3.5.

1. Exterior Masonry Paint: Exterior 100 percent acrylic latex masonry paint. MPS: 35.
2. Exterior Wood Primer: Exterior wood primer as recommended by the manufacturer for the location and conditions. MPS: 40.
3. P.V.A. Primer-Sealer: Polyvinyl-acetate primer-sealer for interior gypsum board (drywall). MPS: 30.
4. Alkyd Primer-Sealer: Alkyd or acrylic latex primer sealer for interior plaster, concrete, masonry, and gypsum board (drywall). MPS: 30.
5. Semi-Gloss Enamel: Alkyd or acrylic latex enamel, semi-gloss sheen, washable. MPS: 35.
6. Heavy-Duty Gloss Enamel: Heavy-duty, industrial grade, polyurethane, gloss sheen. MPS: 45.
7. Interior Flat Latex Paint: Interior flat latex paint for drywall; not washable. MPS: 30.

B. Accessory Materials:

1. Shellac: ASTM D360, Type I, bleached, No. 4, cut with pure grain alcohol.
2. Thinner: As recommended by the manufacturer for the respective product.
3. Spackle or Putty: Standard commercial product manufactured for the purpose, thoroughly mixed to prevent the possibility of shrinkage. Use exterior grade for exterior Work. Spackle or putty shall be tinted toward finish color. Spackle or putty containing white lead will not be permitted for use on this Project.

PART 3 – EXECUTION

3.1 PREPARATION OF SURFACES

A. New Surfaces to be Painted:

1. Painting or finishing shall not be started until the surfaces to be painted or finished are in proper condition to accept, and assure the proper adhesion and functioning of, the specified painting system in accordance with the paint manufacturer's installation instructions and recommendations. Surfaces that cannot be properly prepared by the painter for finishing shall not be painted or finished until they are corrected. All surfaces to be painted shall be clean and dry.
2. Wood surfaces shall be sandpapered and dusted clean. Knots, pitch

pockets, or sappy portions shall be sealed with clean shellac or knot sealer. Spackle or putty all nail holes, cracks, and other imperfections after first or prime coat with spackle or putty of color to match finish coat. Do not seal wood surfaces to receive stain or natural finish.

3. Concrete, masonry, stucco, and plaster shall be cleaned of form oils, efflorescence, chalk, dust, and dirt, and shall be thoroughly dry or dried before painting.
4. Holes, cracks, and other imperfections in surfaces to be painted shall be suitably primed and patched with a compound recommended by the manufacturer of the paint to be applied to these surfaces, and all areas to be painted shall be brought to true, even surfaces.
    a. Where cracks exist at transitions between existing and new materials, or in patched surfaces, such cracks shall be patched, and the patching material shall be feathered out and textured to match adjacent surfaces, so as to make the patched surface "invisible" after painting.

B. Existing Painted Surfaces to be Painted:
1. Concrete, Masonry, and Stucco Surfaces:
    a. Exterior concrete, masonry, and stucco surfaces shall be sandblasted by the "wet" sandblast method to remove all existing paint film from these surfaces.
        1) When "wet" sandblasting is not permitted by jurisdictional authority, surfaces shall be selectively power wire-brushed to remove loose and defective existing paint film. Edges of removed paint film shall be feathered out to conceal such edges in the finished work.
            a) Surfaces not to be sandblasted shall be properly masked and otherwise protected to preclude damage to these surfaces.
            b) Protection of the public and adjacent buildings from the residue of sandblasting operations shall be provided in accordance with the requirements of the jurisdictional authority.
2. Wood Surfaces: All wood surfaces shall be power sanded as required to remove all peeling, flaking, blistering, loose, or otherwise defective existing paint surfaces.
3. Metal Surfaces: Immediately preceding power-tool cleaning, pressure wash and rinse existing painted metal surfaces. Where access problems or the likelihood of damaging adjacent surfaces exist, wash and rinse. Existing painted metal surfaces shall be power-tool cleaned in accordance with SSPC-SP 3 to remove loose and defective paint surfaces, and then feathered smooth. Rust shall be completely removed.

C. Hardware and Fixtures:
1. Hardware, hardware accessories, plates, lighting fixtures, and similar items in place shall be removed prior to painting and replaced upon completion of each space.

2. Heating and other equipment adjacent to walls shall be disconnected, using workers skilled in appropriate trades, and moved to permit wall surfaces to be painted. Following completion of painting, they shall be expertly replaced and reconnected.

D. Exposed Plumbing, Mechanical, and Electrical Items:
1. Items without factory finish such as conduits, pipes, ducts, grilles, registers, vents, access panels, and items of similar nature shall be finished to match adjacent wall and ceiling surfaces, unless otherwise directed. Paint visible surfaces behind vents, registers, and grilles flat black.
2. Wash exposed metal with solvent, prime, and paint as scheduled or specified. Spray paint wherever practicable. Do not paint concealed conduits, piping, and ducts.

3.2 PAINT PERFORMANCE AND FIELD QUALITY ASSURANCE

A. Painting shall be performed by skilled and experienced painters, working under the supervision of a capable supervisor. Materials shall be thinned only for proper workability and in compliance with the manufacturer's specifications.

B. Paint material shall be evenly brushed or smoothly flowed on without runs or sagging, and free from drops, ridges, laps, and brush marks. Assure that all coats are thoroughly dry before applying succeeding coats. Sand surfaces between coats as necessary to produce a smooth finish and as may be required for adhesion of succeeding coats.

C. Priming or painting of wood will not be permitted on or in the station or building where concrete, masonry, or plaster is in the process of installation or application, or in the process of drying.

D. Putty, caulking, or spackle shall be applied after surface is primed and primer is dry.

E. Interior surfaces shall not be painted until concrete, masonry, and plaster surfaces in the station or building have completely cured and have stabilized moisture content in accordance with the paint manufacturer's recommendations.

F. Finish coats of paint shall not be applied on the interior of the station or building until the interior spaces are completely closed-in with windows and doors in place and glazed, until all interior wet and dust-producing work is complete and dry, and until the heating and ventilating system (or air-conditioning system) is in operation.

3.3 PAINT SYSTEMS

A. Provide three-coat work (unless otherwise specified), consisting of prime coat, intermediate coat, and finish coat, in texture and color as selected and approved by the Engineer.

B. Exterior paint systems are specified and identified herein by letter and interior paint systems by number, and the systems specified correspond to the finishes indicated on the Contract Drawings.

C. The herein specified paint systems indicate the minimum dry mil film thickness (MDFT) required for the particular paint system. Paint shall be applied at the manufacturer's recommended rate to achieve the proper MDFT specified. If a

manufacturer normally does not utilize an intermediate coat in its paint system to achieve the specified MDFT, then the intermediate coat may be omitted.

3.4 EXTERIOR PAINTING

A. Paint System "A" - Paint Finish on Concrete, Masonry, and Stucco:
Prime Coat: Masonry Surface Conditioner, tinted toward finish color.
Intermediate Coat: Exterior Masonry Paint.
Finish Coat: Exterior Masonry Paint.
MDFT: 6.

B. Paint System "B" - Paint Finish on Ferrous and Galvanized Metal:
Prime Coat: For new ferrous metal: Field-apply Ferrous Metal Primer. For shop primed ferrous metal: Apply touchup primer. For galvanized metal: Galvanized Metal Primer touchup. For existing ferrous and galvanized metal: Rust-inhibitive primer as recommended by manufacturer of finish coats.
Intermediate Coat: Heavy-Duty Gloss Enamel.
Finish Coat: Heavy-Duty Gloss Enamel.
MDFT: 6.

C. Paint System "C" – Paint Finish on Wood:
Prime Coat: Factory-primed (new surfaces). Exterior Wood Primer (existing surfaces).
Intermediate Coat: Exterior House and Trim Paint.
Finish Coat: Exterior House and Trim Paint.
MDFT: 7.

3.5 INTERIOR PAINTING

A. Paint Systems:

1. Paint System "1" - Flat Finish on Gypsum Wallboard:
Prime Coat: P.V.A. Primer-Sealer, tinted toward finish color.
Intermediate Coat: Interior Flat Latex Paint.
Finish Coat: Interior Flat Latex Paint.
MDFT: 5.

2. Paint System "2" - Eggshell Finish on Gypsum Wallboard:
Prime Coat: P.V.A. Primer-Sealer.
Intermediate Coat: Alkyd Primer-Sealer, tinted toward finish color.
Finish Coat: Eggshell Enamel.
MDFT: 5.

3. Paint System "3" - Semi-Gloss Finish on Gypsum Wallboard:
Prime Coat: P.V.A. Primer-Sealer.
Intermediate Coat: Alkyd Primer-Sealer, tinted toward finish color.
Finish Coat: Semi-Gloss Enamel.
MDFT: 5.

4. Paint System "4" - Flat Finish on Concrete, Masonry, and Plaster:
Prime Coat: Alkyd Primer-Sealer.
Intermediate Coat: Interior Flat Latex Paint.
Finish Coat: Interior Flat Latex Paint.
MDFT: 5.

5. Paint System "5" - Eggshell Finish on Concrete, Masonry, and Plaster:
   Prime Coat: Alkyd Primer-Sealer.
   Intermediate Coat: Alkyd Primer-Sealer, tinted toward finish color.
   Finish Coat: Eggshell Enamel.
   MDFT: 5.
6. Paint System "6" - Semi-Gloss Finish on Concrete, Masonry, and Plaster:
   Prime Coat: Alkyd Primer-Sealer.
   Intermediate Coat: Alkyd Primer-Sealer, tinted toward finish color.
   Finish Coat: Semi-Gloss Enamel.
   MDFT: 5.
7. Paint System "7" - Paint Finish on Metal:
   Prime Coat: Factory Prime Coat and field-applied Ferrous Metal Primer or Galvanized Metal Primer touchup, as applicable.
   Intermediate Coat: Enamel Undercoat Enamel, tinted toward finish color.
   Finish Coat: Semi-Gloss Enamel.
   MDFT: 5.
8. Paint System "8" - Paint Finish on Woodwork and Trim:
   Prime Coat: Shop Prime Coat or Enamel Undercoat, as applicable.
   Intermediate Coat: Semi-Gloss Enamel, tinted toward finish color.
   Finish Coat: Semi-Gloss Enamel.
   MDFT: 5.

3.6 CLEANING

A. Clean and retouch the work as necessary for a first-class job. All surfaces of the station or building and surrounding areas shall be left clean and neat in all respects, free from any paint spots, smears, smudges, or stain.

END OF SECTION 09 91 00

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Toilet with sensor.
B. Sink.
C. Faucet.
D. Seat cover dispensers.
E. Paper towel dispensers.
F. Toilet paper dispenser.
G. Soap dispensers.
H. Over-sink mirrors.
I. Trash bins.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
   2. ASTM A240/A240M Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
   3. ASTM A269/A269M Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
   4. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

1.3 SUBMITTALS

A. Refer to Contract Specifications Sections 01 for Submittal Procedures, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
B. Submit manufacturer's product data illustrating each accessory item at large scale. Include manufacturer's installation details.

PART 2 – PRODUCTS

2.1 ACCESSORIES

A. General: See Bill of Materials on contract drawings for list of materials (or equal as approved by the Engineer).
B. Toilet (water closet) with sensor – Toto: flushometer toilet, 1.28gpf (CT705EN), Ecopower high efficiency toilet flush valve, 1.28 gpf (TET1LA) and Toto SC534 toilet seat.
C. Sink (lavatory) – Zurn: Z5340 series lavatory, single hole sink Z5341.

D. Faucet with temperature valve – Zurn: battery-powered single hole touchless bathroom faucet with plug-in power supply in polished chrome (Z6915-XL-ACA).
E. Seat cover dispensers – Bobrick: stainless steel toilet seat cover dispenser, 15 3/4 x 2 x 11, satin finish (BOB221).
F. Hand dryer – Excel Dryer XLERATOReco Hand Dryer (XL-W-ECO).
G. Grab bars – Kohler 36-inch and 48-inch grab bar, polished stainless (K-10544-S and K-11897).
H. Toilet paper dispensers- Georgia Pacific: translucent smoke jumbo jr. bathroom tissue dispenser 2 rolls (GPC59209).
I. Soap dispensers – Bobrick: soap dispenser, B2111.
J. Over-sink Mirrors – Bobrick: welded frame 18x36 mirror with shelf (B-292 1836).
K. Trash bins (for restrooms) - Bobrick: floor-standing open-top industrial waste receptacle (B-2260).
L. Trash bins (for breakroom) -SimpleHuman: stainless steel trash can, open top, 16 gallon, brush silver.
M. Sign for toilets: “DO NOT THROW PAPER TOWERLS….IN TOILET” MYDOORSIGN sign (S-7358), 7”x10” aluminum.

PART 3 – EXECUTION

3.1 PREPARATIONS

A. Deliver inserts, backing plate mounting kits, and rough-in-frames to Jobsite at appropriate time for incorporating all such items into the construction. Provide templates and rough-in measurements as required.
B. Before starting work, correct any conditions detrimental to installation or operation of units.

3.2 INSTALLATION

A. Locate accessories as indicated. Ensure layout of fixtures is compliant with ADA guidelines. Provide one toilet, sink, faucet, seat cover dispenser, paper tower dispenser, toilet paper dispenser, soap dispenser, over-sink mirror, and trash bin per restroom.
B. Install fixtures, accessories, and items in accordance with the manufacturer’s installation instructions and recommendations. Use security type fasteners.
C. Install true, plumb, and level, securely and rigidly anchored to backing plates, blocking, and reinforcement in the substrate construction.
D. Soap dispensers shall be located directly over lavatories in such a manner that the nozzle discharge shall fall into the lavatory bowl.

3.2 SCHEDULE OF TOILET ACCESSORIES

A. Refer to the Contract Specifications and Drawings for scheduled toilet accessories (Bill of Materials).

END OF SECTION 10 28 13

SECTION 11 30 00

BREAKROOM APPLIANCES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Refrigerators.
B. Microwave ovens.
C. Water filtration system.
D. Faucet.
E. Sink.

1.2 SUBMITTALS

A. General: Refer to Section 01 for Submittal Procedures, Shop Drawings, Product Data and Samples, for submittal requirements and procedures.
B. Product Data: Submit description of appliances, including materials, finishes, and energy consumption.
C. O& M Instructions: Submit manufacturer's operation and maintenance instructions.

PART 2 – PRODUCTS

2.1 BREAKROOM APPLIANCES

A. General: See Bill of Materials on contract drawings for list of materials (or equal as approved by the Engineer).
B. Microwave Oven: Provide a countertop microwave oven, 2.2 cubic foot capacity. Electrical requirements: 120Vac, 1.2 kW, 10 A. Minimum 1100 watts. Maximum width 24 inches. Microwave oven shall be a plug-in type appliance and approved by a nationally known testing laboratory. Such as General Electric: Profile 2.2 cu ft countertop microwave in stainless steel with sensor cooking.
C. Conventional Refrigerator with Freezer: Provide 18 cubic feet top freezer refrigerator, frost-free, with lighting at fresh food compartment and interior up-front controls. Refrigerator shall qualify for EPA/DE Energy Star product labeling program. Freezer capacity shall be minimum four cubic feet and fresh food capacity shall be minimum 14 cubic feet. Provide with two ice cube trays. Refrigerator shall be plug-in type. Electrical requirements, 115Vac, two wire, 60 Hz, and shall be approved by a nationally known testing laboratory.
D. Under-sink water filtration system: General Electric: Under-sink dual flow water filtration system with two spare cartridges/filters.
E. Faucet (kitchen sink): Delta: foundations 2-handle standard kitchen faucet in stainless (21987LF-SS).
F. Kitchen sink: Kohler: 25"x22"x7-11/16" top-mount single-bowl kitchen sink with three faucet holes.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install appliances as indicated and in accordance with the manufacturer's installation instructions and recommendations.

B. In addition to complying with O&M manual submittal requirements specified herein, include one copy of each appliance's standard owner's manual in the cabinetry adjacent to the appliances for convenient of users. Enclose manuals in heavy duty plastic bag, such as zip-loc freezer bag.

END OF SECTION 11 30 00

SECTION 11 32 00

UNIT KITCHEN

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Cabinets.
B. Countertop.

1.2 SUBMITTALS

A. General: Refer to Section 01 for Submittal Procedures, Shop Drawings, Product Data and Samples, for submittal requirements and procedures.
B. Product Data: Submit description of appliances, including materials, and finishes.

PART 2 – PRODUCTS

2.1 UNIT KITCHEN

A. General: See Bill of Materials on contract drawings for list of materials (or equal as approved by the Engineer).
B. Cabinets: Allen + Roth, color: Stone Maple
   1. Sink base cabinet: 36-in W x 35.4-in H x 24-in D (#25350)
   2. Base cabinet: 36-in W, 34.5-in H x 24-in D (#20807)
   3. Wall cabinet: 36-in W, 30-in H x 12-in D (#1361)
   4. Misc. components to complete kitchen cabinets including drawers, shelves, toe kick, base cabinet stretchers, etc.
C. Kitchen sink: Kohler: 25"x22"x7-11/16" top-mount single-bowl kitchen sink with three faucet holes.
D. Countertop: granite countertop with sink cutout, 4" backsplash.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install cabinetry as indicated and in accordance with the manufacturer's installation instructions and recommendations.
B. Provide manufacturer warranty.

END OF SECTION 11 32 00

SECTION 22 04 13

PIPING, GENERAL

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Pipe materials and installation procedures shall be in accordance with the pipe manufacturer's recommendations unless otherwise specified in this Section, or in the specific Section of these Specifications for the particular pipeline material being used.

B. Contractor shall use piping, fittings and joint materials approved by the local jurisdictions.

C. Pipe sizes cited in these Specifications refer to the nominal diameter of the pipe in whole inches.

D. For a particular sewer installation, pipe and manufactured fittings connecting pipe between structures shall be of one and only one manufacturer's brand and of the same type, quality, class and size.

E. Joining of pipe dissimilar size should be joined using an eccentric sheer band coupler and matching the inverts of the pipes to be connected.

F. Where field cuts are required, the Contractor shall use tools and/or equipment recommended by the pipe manufacturer. No hammer and chisel cuts will be permitted.

G. All pipe and fittings delivered to the jobsite shall be marked by the manufacturer with such inventory and identification (Brand Name, Pipe Type, Strength Class, Batch Lot, Lengths, etc.) as to be properly identified in the field as meeting the requirements of these Specifications.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards and Codes:
1. ANSI/ASME B1.20. Pipe Threads, General Purpose (inch)
2. ANSI/AWS D1.1 Structural Welding Code
3. Cal/OSHA Construction Safety Orders

1.3 QUALITY ASSURANCE

A. Pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, local jurisdiction/agent shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with these Specifications.

B. Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards. The manufacturer shall perform all tests at its own cost.

1.4 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Where the assistance of a manufacturer's service representative is required, in order to obtain compliance for pipe joints, supports, or special connections, the Contractor shall arrange for such assistance.

1.5 MATERIAL DELIVERY, STORAGE AND PROTECTION

A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground. All pipe and appurtenances shall be protected from damage by sunlight, moisture, corrosive materials, equipment and other sources. All defective or damaged pipe or appurtenances shall be removed from the jobsite and replaced with new materials.

PART 2 PRODUCTS

2.01 GENERAL

A. Pipes, fittings, and appurtenances shall be furnished in accordance with the requirements of the applicable Section of these Specifications for the particular pipeline material being used.

B. Application of pipe coatings shall be in accordance with the requirements of the local jurisdiction.

2.02 BANDED COUPLINGS

A. Where banded couplings are used for joining of new pipe or repair of existing pipelines, only couplings listed in the Approved Materials List shall be allowed.

PART 3 EXECUTION

3.01 GENERAL

A. Install piping true to line and grade, supported and guided to ensure alignment under all conditions. Installed piping shall clear obstructions, preserve headroom, and keep openings and passageways clear.

B. Valves shall be accessible for operation and servicing. Valves located in furred spaces shall be accessible through access panels or access doors. Valves shall be installed as indicated, and shall not be installed having stems located below the horizontal position.

C. Perform flushing, testing, and disinfection per local jurisdiction guidelines.

END OF SECTION 22 04 13

SECTION 22 11 18

DOMESTIC WATER PIPING COPPER

PART 1 GENERAL

1.1 RELATED SECTIONS

A. Section 22 04 13 – General Piping.

1.2 REFERENCES

A. American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
   1. ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
   2. ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
   3. ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   4. ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

B. American National Standards Institute
   1. ANSI 61, Drinking Water System Components.

C. American Society for Testing and Materials International (ASTM)
   1. ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
   2. ASTM A536, Standard Specification for Ductile Iron Castings.
   3. ASTM B 88M, Standard Specification for Seamless Copper Water Tube.
   4. ASTM F 492, Standard Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe Fittings.

D. American Water Works Association (AWWA)
   1. AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   2. AWWA C606, Grooved and Shouldered Joints.

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 WARRANTY

A. Provide a written guarantee, signed and issued in the name of the owner, against defective materials and workmanship for a period of one (1) year from the date of Substantial Completion.

PART 2 PRODUCTS

2.1 PIPING

A. Domestic hot, cold and recirculation systems, within building.
   1. Above ground: copper tube, hard drawn, type L: to ASTM B88M.
   2. Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

2.2 FITTINGS

A. Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24.
B. Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
C. Cast copper, solder type: to ANSI/ASME B16.18.
D. Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
E. Cast bronze to ANSI/ASME B16.18 or wrought copper ANSI/ASME B16.22.
   1. Fittings to be manufactured to copper-tube dimensions. Flaring of tube or fitting ends to accommodate IPS sized couplings is not permitted.
F. NPS 1 ½ and under: Cast copper, ANSI/ASME B16.18 or wrought copper, ANSI/ASME B16.22; with 301 stainless steel internal components, EPDM seal, and push-to-connect or press fit joints, for hard drawn copper tube type L or K, rated for 1300 kPa at ASTM B88.

2.3 JOINTS

A. Rubber gaskets, latex-free, 1.6 mm thick: to ANSI/AWWA C111.
B. Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
C. Solder: 95/5 tin copper alloy lead free.
D. Push-to-connect: EPDM gasket, UL classified in accordance with ANSI/NSF 61 for potable water service.
E. Teflon tape: for threaded joints.
F. Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket. Gasket to be classified in accordance with ANSI/NSF 61 for potable water service. Couplings to be manufactured to copper-tube dimensions. Flaring of tube or fitting ends to accommodate IPS sized couplings is not permitted.
G. Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with California Plumbing Code and local authority having jurisdiction.
B. Install pipe work in accordance with Section 22 04 13 – Piping, General and by certified journeyperson supplemented as specified herein.

C. Assemble piping using fittings manufactured to ANSI standards.

D. Grooved joint couplings and fittings to be installed in accordance with the manufacturer's written installation instructions. Grooved ends to be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets to be verified as suitable for the intended service prior to installation. Gaskets to be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative to provide on-site training for Contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative to periodically visit the jobsite and review installation. Contractor to remove and replace any joints deemed improperly installed.

E. Push-to Connect Piping: Prepare copper tube and install in strict accordance with installation instructions. Pipe ends to be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool to clean and make installation mark. Push copper tube into fittings to installation depth mark, per installation instructions. Keep fittings free of dirt and oil.

F. Install CWS piping below and away from HWS and HWR and other hot piping so as to maintain temperature of cold water as low as possible.

G. Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

H. Buried Tubing
   1. Lay in well compacted washed sand in accordance with AWWA Class B bedding.
   2. Bend tubing without crimping or constriction. Minimize use of fittings.

3.2 VALVES

A. Isolate equipment, fixtures and branches with butterfly or ball valves.

B. Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 PRESSURE TESTS, FLUSHING AND CLEANING

A. Test potable water system and hot water system, each hydrostatically in sections, to a pressure of at least 150 psi for not less than 15 minutes witnessed by the Engineer. Pressure-test pipe before burial and concealment. Repair leaks and retest the system until the system is leak free. Use testing instruments calibrated by a qualified. Test sequence shall be as follows:
   1. Lines shall be fully flushed.
   2. Lines shall be hydrostatically tested.
   3. Lines shall be fully flushed.
   4. Lines shall be fully disinfected.

3.6 DISINFECTION

A. Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Owner's Representative.
B. Upon completion, provide laboratory test reports on water quality to Owner's Representative.

3.7 START-UP

A. Timing: Start up after:
   1. Pressure tests have been completed.
   2. Disinfection procedures have been completed.
B. Provide continuous supervision during start-up.
C. Start-up procedures:
D. Establish circulation and ensure that air is eliminated.
   1. Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
   2. Bring HWS storage tank up to design temperature slowly.
   3. Monitor HWS and HWR piping systems for freedom of movement, pipe expansion as designed.
   4. Check control, limit, safety devices for normal and safe operation.
E. Rectify start-up deficiencies.

3.8 PERFORMANCE VERIFICATION

A. Timing:
   1. After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
B. Procedures:
   1. Verify that flow rate and pressure meet Design Criteria.
   2. Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
   3. Sterilize HWS and HWR systems for Legionella control.
   4. Verify performance of temperature controls.
   5. Verify compliance with safety and health requirements.
   6. Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
   7. Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.
C. Reports:
   1. Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

END OF SECTION 22 11 18

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL, a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 – PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN-THWN and XHHW.

2.2 CONNECTORS AND SPLICES

A. Connect and splice wire No. 8 AWG and smaller with self-insulating, wire nut connectors.

B. Joints, taps, and splices of wire above grade shall be made by means of “Ideal-Nut” connectors or “3M Scothlok” spring connectors which are resistant to vibration.

C. Taps and splices of wire within in-grade handholes shall be made by means of Burndy Type YC-C compression connectors. Each joint, tap and splice in conductor of #8 and larger shall have the connector voids filled with electrical insulation putty and be taped with rubber covered with plastic tape providing insulation not less than one and a half times the thickness of the original insulation with two half-lapped layers each, Scotch #33.

PART 3 – EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS

AND WIRING METHODS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Concrete: Type THHN-THWN, single conductors in raceway.

D. Exposed Branch Circuits: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in structural steel supporting exterior canopies, Type UF, Type MC or Type THHN-THWN, single conductors in raceway. Conceal wiring systems within exterior canopy structure. Where concealment is not possible run wiring system in exposed painted conduit.

G. Branch Circuits Concealed in lighting poles, Type UF, Type MC or Type THHN-THWN, single conductors in raceway. Where concealment is not possible run wiring system in exposed painted conduit.

H. Branch Circuits Concealed in Concrete: Type THHN-THWN, single conductors in raceway.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

G. Use no wire smaller than No. 12 AWG for power and lighting circuits, and no smaller than No. 14 AWG for control wiring unless otherwise indicated. Provide minimum of No. 12 AWG for all switch legs. Provide neutral conductor of the same size as the phase conductors to which it is associated.

H. Provide homerun conductors of continuous length without joint or splice from overcurrent device to first outlet.

I. Provide feeder conductors of continuous length without joint or splice for their entire length.

J. Neatly train and lace wiring inside boxes, panelboards, switchgear, motor control centers, wiring gutters, and other equipment using Thomas & Betts “Ty-Wraps” or similar.

K. Provide equal conductor lengths for all parallel circuits.

L. Provide individual neutral for branch circuits unless indicated otherwise.

M. Drawings indicate proposed circuiting only, and do not indicate every conductor unless intent is unclear and further clarification is required. Provide the necessary travelers for all three-way and four-way switches.

N. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant. Do not exceed manufacturer's recommended tension.

O. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

P. Completely and thoroughly swab raceway system before installing conductors.

Q. Remove and discard conductors cut too short or installed in wrong raceway. Do not install conductors which have been removed from a raceway.

R. Do not install conductors in conduit which contains wires already in place.

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

D. Connectors shall be large enough to enclose and securely fasten all strands of the conductor.

E. Thoroughly clean wires before installing lugs and connectors.

F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Provide joints in branch circuits only where such circuits divide. Where circuits divide, provide one through circuit to which the branch is spliced from the circuit. Do not leave joints in branch circuits for fixture hanger to make. Make all taps and splices with approved type compression connector.

H. Terminate spare conductors with electrical tape.

I. Identify and label all conductor terminations as specified in electrical identification.

J. Properly terminate indicated conductors in equipment furnished and provide properly sized lugs.

3.5 SITE EQUIPMENT CONNECTIONS

A. Branch Circuits connections concealed in structural steel supporting exterior canopies, shall only be made in junction boxes concealed within the structural steel and shall be accessible behind access covers.

B. Make taps and splices for connections to exterior equipment mounted remote from building structures within in-grade handholes serving lighting poles, lighting, signage or security equipment mounted on Canopies and grade mounted equipment. Use waterproof fuseholder with fuses for taps.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Test insulation resistance of each main feeder and service after the installation is complete but before the connection is made to its source and point of termination.
2. Test insulation resistance using Biddle Megger or equivalent test instrument at a voltage not less than 1,000 volts DC. Measure resistance from phase-to-phase and phase-to-ground. In circuits where insulation test value is lower than 1 megohm, remove and replace conductor and retest.
3. Visually inspect connections of every branch circuit for tightness.
4. Ensure that grounding conductor is electrically continuous.
5. Test branch circuits against grounds, shorts or other faults.
6. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
7. Perform each visual and mechanical inspection and electrical test as indicated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19