

**FLORIDA STATE FAIR GROUND  
MIDWAY RESTROOM  
Tampa, Florida**

**TECHNICAL SPECIFICATIONS**

**August 12, 2011**



AA C000123

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## SECTION 01100 - SUMMARY

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

## 1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of furnishing material, labor, equipment, tools, and other incidentals required to construct the facilities and make them complete for use by The Florida State Fair Grounds Authority (hereby called "the Authority").
- B. The Work consists of construction of a new, one story gang restroom and related site improvements.
- C. The Work will be constructed under a single prime contract.
- D. Because of the nature of the operation and purpose of this facility the exterior and all exterior components must be able to withstand hurricane force winds. This project is being design to meet or exceed 120 mph winds. The contractor will ensure that all exterior components will withstand a minimum of 120 mph winds or higher. Should the contractor discover any building components that they believe will not withstand code required hurricane winds notify the Owner/Architect of this discrepancy.
- E. The Authority reserves the right of final approval and acceptance of all work and products over and above all specifications, drawings and regulations. The Authority supports and maintains the contractual relationship between the Contractor and the Architect and establishes the Architect as the County's agent. However, the Authority/Owner reserves the right and supersedes the directions and instructions of the Project Architect and Engineers only when inconsistent with the Authority's project objectives and budget when applicable.
- F. The successful contractor shall be responsible to pay for all fees, permit cost, inspections, geotechnical costs, and any incidental expenses to the project. The Authority shall pay for the following project expenses:
- Florida State Fire Marshall
  - Architectural/Engineering Fees

## 1.3 CONTRACTOR USE OF PREMISES

- A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises

is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.

- B. Use of the Site: Confine operations to areas within contract limits. Do not disturb portions of the site beyond the areas in which the Work is indicated.
- C. The Authority will maintain several facilities on site that must remain open and in operation at all times. The Contractor shall maintain all utilities, roads, walks, and other necessities to guarantee there on-going operations. All shut downs and redirection shall be carefully coordinated with the Authority before execution.

#### 1.4 OWNER-FURNISHED EQUIPMENT

- A. The Owner will furnish certain equipment for installation by the Contractor as well as equipment that the Owner will both furnish and install. Certain equipment items are to be contractor furnished and installed.
  - 1. See attached Owner furnished, Contractor installed list following this section.
- B. The Owner will arrange and pay for delivery to the site and placement within the buildings all Owner-furnished equipment according to the Contractor's Construction Schedule. Contractor shall provide all required utility services as indicated on drawings and connect the Owner-furnished, contractor-installed items.
  - 1. The Contractor shall designate delivery dates of Owner-furnished equipment items in the Contractor's Construction Schedule.
  - 2. The Contractor is responsible for protecting Owner-furnished equipment from damage including damage from exposure to the elements. The Contractor shall repair or replace items damaged as a result of his operations.

#### 1.5 WORK UNDER OTHER CONTRACTS

- A. Preceding Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01100

### LIGHT FIXTURE SCHEDULE

Item Mark	Fixture Type	Quantity	Make and Model
A	SPI		11P-19058-4F36-120-PT01-0AH18-WG, SUSPENDED 11'6" AFF
A1	SPI		11P-10935-2F36-120-PT01-0AH18-WG, SUSPENDED 11'6" AFF
A2	SPI		11P-8385-2F36-120-PT01--WG, SURFACE CEILING
B	METALUX		SS 232 UNV EB81 WG/SS-4FT-U- WALL 7'-6" AFF
C	HUNTER		MARINER 21955 (HOME DEPOT) PENDANT 10' AFF
D	METALUX		BA-232-UNV-EB81 – WALL 8'8" AFF CENTERED ON LAV
E	SURELITES		LPX 7 OR HW VSI – WALL ABOVE DOOR
EM	SURELITES		UEL1-WH – WALL AT 7'-9" AFF CENTERED ON WALL
F	MCGRAW		ISS A 02 LED E1 BL3 (COLOR) WALL AT 8'-6" AFF TO CENTER OF FIXTURE

### LIGHT FIXTURE SCHEDULE

Item Mark	Fixture Type	Quantity	Make and Model
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**LIGHT FIXTURE SCHEDULE**

<b>Item Mark</b>	<b>Fixture Type</b>	<b>Quantity</b>	<b>Make and Model</b>
P-5	WATER HEATER		
WH	WALL HYDRANT		
FCO	FLOOR CLEANOUT		
WCO	WALL CLEAN- OUT		
FD	FLOOR DRAIN		
TP	TRAP PRIMER		

**PLUMBING FIXTURE SCHEDULE**

Item Mark	Fixture Type	Quantity	Make and Model
P-1	WATER CLOSET BARRIER FREE		ZURN ONE NUMBER Z5615.301.01.00.00 COMPLETE WITH Z5615-BWL VITREOUS CHINA, 1.28 GPF, WALL HUNG TOILET, MOUNT AT 15" A.F.F. TO RIM, SIPHON JET ACTION WITH 1-1/2" TOP SPUD. Z5955SS-EL ELONGATED, STANDARD WHITE, OPEN FRONT TOILET SEAT LESS COVER WITH STAINLESS STEEL CHECK HINGE. HYDROVANTAGE ZGEN6200EV HIGH EFFICIENCY 1.28 GPF FLUSH VALVE WITH TRUE MANUAL OVERRIDE BUTTON, FILTERED PISTON OPERATION, HIGH PRESSURE VACUUM BREAKER, VANDAL RESISTANT STOP CAP, SWEAT SOLDER KIT, CAST WALL FLANGE WITH SET SCREW, STOP VALVE WITH ANTI-SIPHON BACK CHECK FEATURE, REPLACEABLE BACKUP BATTERY, ZN1204-N4 WALL CARRIER, 5 YEAR WARRANTY, PROVIDE STOPS, SUPPLIES, TRAP, ETC., TO MAKE A COMPLETE INSTALLATION. 1" CW, 2" VENT, 4" SAN
P-1A	WATER CLOSET, BARRIER FREE		SAME AS ABOVE - MOUNT AT 17" A.F.F. TO RIM
P-1A P-2	URINAL - BARRIER FREE		ZURN ONE NUMBER Z5758.263.00 "THE PINT" HYDROVANTAGE HYDROGENERATOR POWERED HIGH EFFICIENCY URINAL (HEU) SYSTEM. COMPLETE WITH THE ZURN HYDROVANTAGE ZGEN6203EV-ULF EXPOSED URINAL FLUSH VALVE AND Z5798-U VITREOUS CHINA URINAL. TRUE MANUAL OVERRIDE BUTTON, FILTERED PISTON OPERATION, HIGH PRESSURE VACUUM BREAKER, VANDAL RESISTANT STOP CAP, SWEAT SOLDER KIT, CAST WALL FLANGE WITH SET SCREW, STOP VALVE WITH ANTI-SIPHON BACK CHECK FEATURE, REPLACEABLE BACKUP BATTERY, AND WITH UNIVERSAL RETROFIT BRACKET, TOP SPUD, 2" OUTLET CONNECTION AND VANDAL RESISTANT DOMED OUTLET STRAINER, 5 YEAR WARRANTY PROVIDE STOPS, SUPPLIES, TRAP, ETC., TO MAKE A COMPLETE INSTALLATION. 3/4" CW, 2" VENT, 2" SAN

**PLUMBING FIXTURE SCHEDULE**

Item Mark	Fixture Type	Quantity	Make and Model
P-3A	LAVATORY		BRADLEY MODEL SS-1N/BIR3 - CONSTRUCTED OF TERREONRE SOLID SURFACE, HIGH IMPACT POLYMER P-TRAP COVER, PREASSEMBLED SPRAYHEAD WITH AN INDEPENDENT STREAMFORMER SERVED BY AN INDEPENDENT BATTERY IR SENSOR AND BATTERY, SENSOR-OPERATED SOAP DISPENSER WITH BATTERIES, 0.5 GPM AERATOR, PROVIDE STOPS, SUPPLIES, TRAP, ETC., TO MAKE A COMPLETE INSTALLATION. 1/2" CW, 2" VENT, 2" SAN
P-3B	LAVATORY		BRADLEY MODEL SS-2N/BIR3 - CONSTRUCTED OF TERREONRE SOLID SURFACE, HIGH IMPACT POLYMER P-TRAP COVER, PREASSEMBLED SPRAYHEAD WITH AN INDEPENDENT STREAMFORMER SERVED BY AN INDEPENDENT BATTERY IR SENSOR AND BATTERY, SENSOR-OPERATED SOAP DISPENSER WITH BATTERIES, 0.5 GPM AERATOR, PROVIDE STOPS, SUPPLIES, TRAP, ETC., TO MAKE A COMPLETE INSTALLATION. 1/2" CW, 2" VENT, 2" SAN.
P-3C	LAVATORY		BRADLEY MODEL SS-3N/BIR3 - CONSTRUCTED OF TERREONRE SOLID SURFACE, HIGH IMPACT POLYMER P-TRAP COVER, PREASSEMBLED SPRAYHEAD WITH AN INDEPENDENT STREAMFORMER SERVED BY AN INDEPENDENT BATTERY IR SENSOR AND BATTERY, SENSOR-OPERATED SOAP DISPENSER WITH BATTERIES, 0.5 GPM AERATOR, PROVIDE STOPS, SUPPLIES, TRAP, ETC., TO MAKE A COMPLETE INSTALLATION. 1/2" CW, 2" VENT, 2" SAN.
P-4	MOP SINK		FIAT, PRECAST TERRAZZO NO. TSB-3010, 24X24X12" WITH 6" DROP FRONT, STAINLESS STEEL THRESHOLD, DRAIN. NO. 830-AA SERVICE SINK FAUCET WITH VACUUM BREAKER. PROVIDE STOPS, SUPPLIES, TRAP, ETC., TO MAKE A COMPLETE INSTALLATION. 1/2" CW, 1/2"HW, 2" VENT, 3" SAN.

**PLUMBING FIXTURE SCHEDULE**

Item Mark	Fixture Type	Quantity	Make and Model
P-5	WATER HEATER		RHEEM, NO. EGSP20, 20 GALLON , 2.5KW NON-SIMULTANEOUS DUAL ELEMENTS, 208 VOLT, SINGLE PHASE. HEAT TRAPS, EXPANSION TANK AND CODE APPROVED DRAIN PAN. SEE DETAIL. 3/4" CW, 3/4" T&P, 1" DRAIN PAN DRAIN PIPING.
WH	WALL HYDRANT		ZURN NO. Z-1305, ENCASED FLUSH WALL HYDRANT, NICKEL BRONZE BOX AND HINGED COVER WITH OPERATING KEY LOCK AND "WATER" CAST ON COVER. 3/4" CW
FCO	FLOOR CLEANOUT		ZURN NO. Z-1444, POLISHED BRONZE ACCESS COVER, DURA-COATED CAST IRON BODY. MATCH TO PIPE SIZE.
WCO	WALL CLEAN-OUT		ZURN, #Z-1441, SMOOTH STAINLESS STEEL ACCESS COVER, DURA-COATED CAST IRON BODY. MATCH TO PIPE SIZE.
FD	FLOOR DRAIN		ZURN Z-453B-P-VP WITH "TYPE B" ADJUSTABLE STRAINER TOP WITH ROUND HEELPROOF OPENINGS AND SECURED GRATE. DURA COATED CAST IRON BODY WITH TRAP PRIMER CONNECTION. SIZE TO PIPE SIZE
TP	TRAP PRIMER		ZURN Z-1022 SANI-GUARD. CONNECT TO CW W/VALVE, EXTEND TPP TO FLOOR DRAIN AS REQUIRED. 1/2" CW

**TOILET ACCESSORIES SCHEDULE**

<b>Item Mark</b>	<b>Fixture Type</b>	<b>Quantity</b>	<b>Make and Model</b>
GB1	GRAB BAR FOR TOILET – 36		B-5806X36, 33" AFF
GB2	GRAB BAR FOR TOILET – 42		B-5806X42, 33" AFF
MIR	MIRROR W/ANGLED FRAME		BOBRICK B-290 18X30, 40" AFF TO BOTTOM OF MIRROR SS FRAME
TPD-1	PAPER TOWEL DISPENSER, SURFACE MOUNT		ELECTRA T246, AUTO CUT, ROLL TOWEL DISPENSER (BOBRICK B-26252", AFF TO TOP OF CABINET, MANUAL OPTION)
HD	ELECTRIC HAND DRYER		DYSON AIRBLADE #A-B04, GREY, 34.25" AFF TO TOP OF UNIT
BC	BABY CHANGING TABLE, SURFACE MOUNT		BOBRICK KB200-01, GREY, 53" AFF TO TOP OF UNIT
SNV	SANITARY NAPKIN VENDOR		BOBRICK B-282-25, 60.25" AFF TO TOP OF UNIT
SNV	SANITARY NAPKIN DISPOSAL		BOBRICK B-270, 25-30" AFF TO TOP OF UNIT
SCD	SEAT COVER DISPENSER		BOBRICK B-221, 53" AFF TO TOP OF UNIT
SSS	STAINLESS STEEL SHELF		BOBRICK B-298

SECTION 01230 - ALTERNATES

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 administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that will be added or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost for each alternate is the net addition or subtraction to the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

## 3.1 SCHEDULE OF ALTERNATES

## A. DEDUCTIVE Alternate No. One:

Reduce the building length and delete plumbing fixtures. Reduce the building length and delete 4 plumbing fixtures. The contractor shall supply a deductive alternate to remove four plumbing stalls and reduce the length of the building. The base bid shall have 18 regular women's stalls, 1 ADA woman's stall, 2 regular men's stalls, 1 ADA man's stall, and 14 men's urinals, and 2 family restrooms. Alternate number one shall have 16 regular women's stalls, 1 ADA woman's stall, 2 regular men's stalls, 1 ADA man's stall, 12 men's urinals and two family restrooms. This alternate reduces the length of the building by approximately 6'-8". This alternate is illustrated on the architectural floor plans sheet.

## DEDUCTIVE Alternate No. Two:

Reduce the length of the building and delete eight plumbing fixtures. The contractor shall supply a deductive alternate to remove four plumbing stalls and reduce the length of the building. The base bid shall have 18 regular women's stalls, 1 ADA woman's stall, 2 regular men's stalls, 1 ADA man's stall, 14 men's urinals, and 2 family restrooms. Alternate number two shall have 14 regular women's stalls, 1 ADA woman's stall, 2 regular men's stalls, 1 ADA man's stall, 10 men's urinals and two family restrooms. This alternate reduces the length of the building by approximately 12'-0". This alternate is illustrated on the architectural floor plans sheet.

## B. DEDUCTIVE Alternate No. Three:

Substitute the ceiling mounted toilet partitions for floor mounted units. The contractor shall supply a deductive price to change the ceiling mounted toilet partitions to floor mounted units. This alternate will also eliminate the need for the structural steel in the Men's and Woman's toilet rooms. This deductive change will only be priced for the base bid with 18 regular women's stalls and 14 men's urinals.

## C. DEDUCTIVE Alternate No. Four:

Change the Dyson hand dryers to paper towel dispensers. The contractor shall supply a deductive price to change all hand dryers to paper towel dispensers. Supply a single unit price for the hand dryer and the paper towel dispenser as indicated on the architectural floor plan. Also provide a total deductive price for all units. There are 14 Dyson hand dryers and 2 paper towel dispensers indicated on the drawings.

## D. DEDUCTIVE Alternate No. Five:

Supply a deductive price for the Florida State Fairgrounds Authority to provide all electrical trim out. The contractor would install all conduits, Junction boxes, electrical panels and breakers, main runs, transformers, power connections, conductors and pull strings where necessary throughout the building. The Authority would supply and install all switches, convenience outlets, light fixtures, fans, and cover plates. This deductive change will only be priced for the base bid restroom configuration.

## E. DEDUCTIVE Alternate No. Six:

Supply a deductive price to eliminate the standing seam metal roof and replace with asphalt shingles. This alternate is based on "Marquis Weather Max", 3-Tab, with 30 Warranty by GAF shingles on 30 lb self adhesive felt with a continuous ridge vent and standard galvanized sheet metal drip flashings.

## F. ADDITIVE Alternate No. Seven:

Submit a price for the project without any Alternates and no Owner furnished equipment. This alternate would supply a complete "turn-key" project and the Contractor would be responsible for all construction components and costs of the work.

END OF SECTION 01230



## SECTION 01250 - SUBSTITUTION PROCEDURES

### 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 administrative and procedural requirements for substitutions.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use as created by the Contractor and approved by the Architect.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from FBC 2007.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within five days of receipt of a request for substitution. Architect will notify the Contractor of acceptance or rejection of proposed substitution within five days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

## 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fourteen days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within fourteen days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

## SECTION 01290 - PAYMENT PROCEDURES

### 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 administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### 1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

#### 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
  5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Section 01100 "Summary."
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  2. Arrange schedule of values consistent with format of AIA Document G703.
  3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      - 1) Labor.
      - 2) Materials.
      - 3) Equipment.
  4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents.
    - a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
  5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

- a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the first of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
  1. Submit draft copy of Application for Payment five days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit five signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.



4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Schedule of unit prices.
  7. Submittal schedule (preliminary if not final).
  8. List of Contractor's staff assignments.
  9. List of Contractor's principal consultants.
  10. Copies of building permits.
  11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  12. Initial progress report.
  13. Report of preconstruction conference.
  14. Certificates of insurance and insurance policies.
  15. Performance and payment bonds.
  16. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

## SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

## 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.
- B. Pasco County's Invitation to Bid and general conditions.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

- 1. Startup construction schedule.
- 2. Contractor's construction schedule.
- 3. Construction schedule updating reports.
- 4. Daily construction reports.
- 5. Material location reports.
- 6. Site condition reports.
- 7. Special reports.

- B. Related Requirements:

- 1. Section 01330 "Submittal Procedures" for submitting schedules and reports.
- 2. Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.

## 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic file.
  - 3. Eight paper copies upon request.
- B. Startup construction schedule.
  - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.

4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at each construction progress meeting.
- H. Material Location Reports: Submit at each construction progress meeting.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Special Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

## 1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013300 "Submittal Procedures." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  1. Review software limitations and content and format for reports.
  2. Verify availability of qualified personnel needed to develop and update schedule.
  3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
  4. Review delivery dates for Owner-furnished products.
  5. Review schedule for work of Owner's separate contracts.
  6. Review submittal requirements and procedures.
  7. Review time required for review of submittals and resubmittals.
  8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
  10. Review and finalize list of construction activities to be included in schedule.
  11. Review procedures for updating schedule.

## 1.6 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## PART 2 - PRODUCTS

## 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 21 days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 01330 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer 14 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 14 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.

- g. Seasonal variations.
    - h. Environmental control.
  - 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
  - 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
  - 9. Other Constraints: All other buildings on site must remain operational at all times.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion and the following interim milestones:
- 1. Temporary enclosure and space conditioning.
  - 2. Occupancy of Midway Restroom.
  - 3. Completion of concrete tie beams.
  - 4. Dry-in of building.
  - 5. Plumbing and electrical trim out.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and Contract Time.

- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  - 1. Use Microsoft Project or Primavera software, for Windows XP, Windows Vista, or Windows 7 operating system.

## 2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 14 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer completion, indicate an estimated completion percentage in 10 percent increments within time bar.

## 2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
  - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for commencement of the Work.



- a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
  2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by Contractor's activities.
    - i. Testing and commissioning.
    - j. Punch list and final completion.
    - k. Activities occurring following final completion.
  2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
  5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, LEED documentation, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
    - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
    - b. Total cost assigned to activities shall equal the total Contract Sum.

- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
  2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
  3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
  4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
    - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

## 2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.

2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## 2.6 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner and Architect within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

## 2.7 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.

- C. Photography Type: Digital; electronic files.
- D. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Architect.
- E. In addition to periodic, recurring views, take photographs of each of the following events:
- F. Views:
  - 1. Provide aerial photographs from four cardinal views at each specified time, until Date of Substantial Completion.
  - 2. Provide factual presentation.
  - 3. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
  - 1. Delivery Medium: Via email.
  - 2. File Naming: Include project identification, date and time of view, and view identification.
  - 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
  - 4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
  - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At Bi-Weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate final completion percentage for each activity.

- C. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

## SECTION 01330 - SUBMITTAL PROCEDURES

## 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 requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. It is the preference of this project to use electronic submittals whenever possible. The Contractor shall establish a project FTP site for the design/construction team's mutual use.
- C. Related Requirements:
  - 1. Section 01290 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 01320 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section 01782 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section 01783 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Section 01790 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

## 1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard

Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled date of fabrication.
    - h. Scheduled dates for purchasing.
    - i. Scheduled dates for installation.
    - j. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

- a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
  - b. Digital Drawing Software Program: The Contract Drawings are available in Autocad 2010 using Microsoft PC operating system.
  - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement].
  - d. PDF drawings are available or as is site free of charge. A full set of Architectural Autocad drawings on DVD are available for \$250 through the Architect's office. Single Architectural Autocad drawing sheet can be purchased for \$20 each. Autocad drawings from each engineer will be handled directly through each engineer.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.



1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:
  - a. Project name.
  - b. Date.
  - c. Name of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of subcontractor.
  - g. Name of supplier.
  - h. Name of manufacturer.
  - i. Submittal number or other unique identifier, including revision identifier.
    - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
  - j. Number and title of appropriate Specification Section.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
  - a. Transmittal Form for Paper Submittals: Use AIA Document G810 or submit a sample of suggested form for approval.
  - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
    - 1) Project name.
    - 2) Date.
    - 3) Destination (To:).
    - 4) Source (From:).
    - 5) Name and address of Architect.
    - 6) Name of Construction Manager.
    - 7) Name of Contractor.
    - 8) Name of firm or entity that prepared submittal.
    - 9) Names of subcontractor, manufacturer, and supplier.

- 10) Category and type of submittal.
- 11) Submittal purpose and description.
- 12) Specification Section number and title.
- 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 14) Drawing number and detail references, as appropriate.
- 15) Indication of full or partial submittal.
- 16) Transmittal number, numbered consecutively.
- 17) Submittal and transmittal distribution record.
- 18) Remarks.
- 19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
  - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
  - a. Project name.
  - b. Date.
  - c. Name and address of Architect.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of firm or entity that prepared submittal.
  - g. Names of subcontractor, manufacturer, and supplier.
  - h. Category and type of submittal.
  - i. Submittal purpose and description.
  - j. Specification Section number and title.
  - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - l. Drawing number and detail references, as appropriate.
  - m. Location(s) where product is to be installed, as appropriate.
  - n. Related physical samples submitted directly.
  - o. Indication of full or partial submittal.
  - p. Transmittal number, numbered consecutively.
  - q. Submittal and transmittal distribution record.
  - r. Other necessary identification.
  - s. Remarks.

- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
  - 4. The Architect reserves the right to charge the contractor to review submittals after three revisions.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals as PDF electronic files directly to Project FTP site specifically established for Project by the Contractor.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Submit electronic submittals via email as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 3. Action Submittals: Submit 8 paper copies of each submittal unless otherwise indicated. Architect will return 3 copies.

4. Informational Submittals: Submit 4 paper copies of each submittal unless otherwise indicated. Architect will not return copies.
  5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
    - b. 8 paper copies of Product Data unless otherwise indicated. Architect will return 3 copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
  3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
    - b. 8 opaque (bond) copies of each submittal. Architect will return 4 copies.
    - c. 8 opaque copies of each submittal. Architect will retain 4 copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit 4 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit 4 sets of Samples. Architect will retain 3 Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least 4 sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.
    - b. 4 paper copies of product schedule or list unless otherwise indicated. Architect will return 1 copy.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01320 "Construction Progress Documentation."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01400 "Quality Requirements."

- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01770 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 01782 "Operation and Maintenance Data."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.

- T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file, 4 paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.



- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01770 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals that have not been reviewed by the contractor are not acceptable. Evidence that the submittal has been "rubber stamped" without contractor review will be returned without review. Time compensation for "rubber stamping" will be entirely at the contractor's expense. No additional time will be granted for lack of proper review by the contractor, schedule recovery and expense will be the contractor responsibility.
- F. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01330

SECTION 01400 - TESTING AND QUALITY CONTROL

**The Contractor shall arrange for and pay for all field tests to ensure construction quality.** It shall be the Contractor's responsibility to coordinate all required field-testing operations and to ensure that all required field tests and results are obtained and distributed.

It shall be the Contractor's responsibility to provide all certifications, designs, shop drawings, materials, tests, etc., called for or requested of all materials brought to the site.

Testing will be accomplished by an independent and certified testing laboratory, approved by the County/Engineer/Architect, and any failures in tests will be corrected and retested prior to the continuation of work at that location. The project will not be acceptable until all tests and verification thereof have been submitted to and approved by the County/Engineer/Architect. Any costs of any re-tests performed due to the failure of the Contractor's workmanship, work, or materials shall be paid for by the Contractor.

If there is a conflict between the testing schedule and the individual specification sections, the more stringent will apply.

TESTING SCHEDULE

ITEM	TEST	TEST IDENTIFICATION	TEST REQUIREMENTS	TEST FREQUENCY
Base	Maximum Density Optimum Moisture	AASHTO T-180C ASTM D1557-C	N/A	One Per Source Density test per 10,000 Sq. Ft. of Parking Area
	Thickness, Field Density	AASHTO T191,T238 ASTM D1556, D2922	98% of Maximum Density AASHTO T-180-C	Each 6" Course every 300' Left & Right of C/L
	Gradation, Atterburg Limits	Florida DOT	Florida DOT Section 911	One Per Source
Stabilized Subgrade	Bearing Values	Florida DOT LBR	Minimum 40 LBR	One Per Material Type**
	Maximum Density Optimum Moisture	AASHTO T-180-C ASTM D1557	N/A	One Per Material Type
	Field Density & Thickness	AASHTO T191,T238 ASTM D1556,D2922	98% of Maximum Density AASHTO T-180	**
Concrete	Slump Test	AASHTO T119-82 ASTM C143	Florida DOT	One per set of cylinders
	Comp. Strength	AASHTO T23-80 ASTM D1556, D 2937, D2922	Florida DOT AASHTO T-99	One set of 4 cylinders for 50 CY or fraction thereof placed each day as called for by the Engineer (1 to be tested at 7 days, 1 at 18 days, 1 at 28 days and 1 hold).
	Air Content	AASHTO T199-82	Florida DOT	Florida DOT, one per set of cylinders
ITEM	TEST	TEST IDENTIFICATION	TEST REQUIREMENTS	TEST FREQUENCY

Asphaltic Concrete	Aggregate Analysis	Florida DOT	Florida DOT	One Per Design
	Design Mix	Florida DOT	Florida DOT	One Per Type
	Bitumen Content	AASHTO T164 Florida DOT Modified	Florida DOT	One Per Day
	Graduation Stability Flow	Florida DOT	Florida DOT	One Per Day
	Field Density	ASTM 02950-81	95% of Lab Density	One density each course every 300 LF or one density per 10,000 SF of parking area
	Properties of in-place materials	Marshall (Asphalt Institute MS-2)	Florida DOT	One Per Day
	Thickness	Florida DOT	Florida DOT	One Thickness each course every 300 FL
Embankment	Maximum Density Optimum Moisture	AASHTO T99 ASTM D698-78	Florida DOT Sec. 120	Per Soil Type
	Field Density	AASHTO T199 ASTM D1556, D2937, D2922	100% of Maximum Density AASHTO T-99	One per 500' horizontally alternating lifts (1 ft.)
ITEM	TEST	TEST IDENTIFICATION	TEST REQUIREMENTS	TEST FREQUENCY
Utility Trench Backfill Under Roadways and Structures	Maximum Density Optimum Moisture	AASHTO T-99 ASTM D698-78	N/A	Per Soil Type
	Field Density	AASHTO T191, T204, T238; ASTM D1556, D2937, D2822	100% of maximum density AASHTO T-99	*
Backfill of Structure	Maximum Density Optimum Moisture	AASHTO T99 ASTM D698-78	N/A	Per Soil Type
	Field Density	AASHTO T191, T104, T238; ASTM D1556, D2937, D2922	100% of maximum density AASHTO T-99	Each lift, but not to exceed 1' vertically

\* Test shall be located no more than 500' apart. Tests shall be performed on each lift, except that tests shall not be further apart than two feet vertically and centerline of each roadway. Field Densities shall be taken over all road crossings. Field Densities for Sanitary lines shall be staggered to include results over service laterals. There shall be a minimum of one test series for each one foot of lift over pipeline between manholes.

\*\* There shall be no less than one test per trench.

END OF SECTION 01400

## SECTION 01500 – TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to work of this Section.

## 1.2 SUMMARY

- A. This section specifies certain minimum temporary facilities and temporary utilities to be provided, regardless of methods and means selected for performance of the Work, but not by way of limitation and not assured for compliance with governing regulations. Temporary facilities are defined to exclude tools and construction machines, testing, demolition, alterations, soil borings, mock-ups and similar items.
- B. Costs: Contractor is responsible for costs of materials and labor required to bring temporary electrical power, telephone, and water to the site. The Contractor will bear the cost of electricity and water consumed by the Contractor during construction. All costs of labor, materials and usage charges for temporary telephone services shall be borne by the Contractor.
- C. Should any impact fees be assessed as a result of this project, they will be paid by the Owner.

## 1.3 QUALITY ASSURANCE

- A. General: In addition to compliance with governing regulations and rules/recommendations of franchised utility companies, comply with specific requirements indicated and with applicable local industry standards for construction work (published recommendations by local consensus building councils).
- B. ANSI Standards: Comply with applicable provisions of ANSI A10-Series standards on construction safety, including A10.3, A10.4, A10.5, A10.6, A10.7, A.10.8, A10.9, A10.10, A10.11, A10.12, A10.13, A10.14, A10.15, A10.17, A.10.18, A.10.20, and A10.22.
- C. NFPA Code: Comply with NFPA Code 241, Building Construction and Demolition Operations.
- D. Conservation: Install and operate temporary facilities and perform construction activities in a manner which reasonably will be conservative and avoid waste of energy and materials including water.

## 1.4 JOB CONDITIONS

- A. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the work. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced the need.
  - B. Conditions of Use: Install, operate, maintain and protect temporary facilities in a manner and at locations which will be safe, non-hazardous, sanitary and protective of persons and property, and free of deleterious effects.
  - C. Temporary Heating and Cooling: Where permanent M/E systems of project cannot be used to provide temporary heating and cooling, provide space conditioning units which are UL labeled and approved. Provide adequate ventilation and thermostatic control.
  - D. Humidity Control: Delay work which is indicated to be performed or maintained under controlled humidity conditions, until permanent HVAC system is operable and can be maintained in operation to provide required conditions.
  - E. Power Distribution: Provide weatherproof, grounded circuits with ground-fault interruption feature, with proper power characteristics and either permanently wired or plug-in connections as appropriate for intended use. Provide overload protected disconnect switch for each circuit at distribution panel. Space 4-gang convenience outlets (20 amp circuit) so that every portion of work can be reached with 100' extension cord.
    - 1. Where permitted by governing regulations, temporary wiring not exceeding 120 volt 20 amp circuits may be by nonmetallic sheathed cables; otherwise, provided metal conduit or armored cables.
  - F. Temporary Lighting: Provide lighting of intensity and quality sufficient for proper and safe performance of the work, and for access thereto.
    - 1. In areas where work is being performed, provide not less than one 200-watt incandescent lamp per 1000 square feet of floor area, when daylighting is not sufficient.
  - G. Water Distribution: Minimum 1" pipe size, with 3/4" hose outlets and vacuum breakers, spaced to reach points of use with 100' maximum length of hose. Maintain 3/4" x 100' hose at each outlet, for both general use and incidental fire protection.
    - 1. Protect water distribution from freezing, by drainage, insulation or temporary heating.
  - H. Dewatering: Maintain site and construction work free of water accumulation. Do not endanger the work or adjacent properties. Maintain protection against flooding.
- 1.5 TEMPORARY UTILITY SERVICES
- A. The types of services required include, but not by way of limitation, water, surface drainage, electrical power and telephones. Where possible and reasonable, connect to existing franchised utilities for required services; and comply with service companies'

recommendations on materials and methods, or engage service companies to install services. Locate and relocate services (as necessary) to minimize interference with construction operations.

1. Power: Connect temporary electrical service to the power source as directed by electric company officials. Provide a meter and disconnect switch at temporary power pole. The Contractor shall bear the cost of electricity consumed from Notice-to-Proceed through Substantial Completion.
2. Water: Obtain water service from the nearest water main, as permitted by the local water authority. Provide a meter and shut-off valve near connection to the water main.
3. Telephones: Engage local telephone company to install and maintain two permanent telephone lines in the field office trailer.
  - a. One phone line shall be located in office dedicated for a fax machine. Second phone is for Contractor's general use.
  - b. Contractor shall provide one portable telephone for his superintendent to carry when away from the field office.
  - c. Post listing of operational and emergency telephone numbers at each telephone.
  - d. Contractor shall bear all costs of temporary telephone service from Notice-to-Proceed through Final Completion.

#### 1.6 TEMPORARY SUPPORT FACILITIES

- A. General: Provide whatever facilities and services may be needed to properly support primary construction process and meet compliance requirements and governing regulations. Do not use permanent facilities except as otherwise indicated, and except after time of substantial completion.
- B. Drinking Water: provide cooled water in closed lid dispenser with adequate supply of dispensable cups. Space containers at site so that personnel will travel no more than 300' to reach a dispenser and/or will not have to leave a secured area.
- C. Toilets: Where permitted by governing regulation, provide single-occupant, self-contained units of either chemical aerated recirculation type or combustion type; glass fiber reinforced polyester enclosure; equipped with both urinal and stool fixtures. Supply units with tissue and, where not located near separate wash facilities, supply with wet-type hand towels and waste containers. Locate units so that personnel will travel no more than 300' to reach a unit.
  1. Do not use toilet facilities within new buildings.
- D. Rodent and Pest Control: engage an experienced and recognized expert exterminator service, to maintain full control of insects, rodents and other pests, until time of substantial completion.
- E. Contractor's Field Office: Provide and maintain adequate office space for field office personnel plus one spare work station for incidental use by subcontractor's personnel,

suitably finished, furnished, equipped and air conditioned. Also provide and maintain the following:

1. Office Furnishings:
  - a. Reference Board 36" x 60", minimum
  - b. Plan Rack, 6 set capacity, minimum
  - c. File Cabinet, legal size, 2 drawer minimum
  - d. Side Chairs (2)
  - e. Desk, 30" x 60", minimum
2. One air conditioned conference area with conference table and eight chairs.
3. Fax machine, accessible to Owner's representative.
4. Plain paper copying machine, accessible to Owner's representative.
5. Storage room, separate from office facilities.
6. Project computer/laptop for general use to access the project's FTP site and other construction information.

F. Project Identification Sign: shall be provided by the Contractor per the County's standard design.

1. Temporary signs: Prepare signs to provide directional information to construction personnel and visitors.
2. Contractor, Subcontractor, Banks, Vendors and all forms of advertizing or self promotion will not be allowed on the project.

## 1.7 SECURITY AND PROTECTION

- A. General: Provide facilities and services as necessary to effectively protect project from losses and persons from injury during the course of construction.
- B. Fire Protection: Provide fire extinguishers of types and sizes recommended by NFPA No. 10. Provide Type A extinguishers in Field Offices and for similar exposures; Type ABC in construction areas. Post warning and quick instructions at each extinguisher location, and instruct personnel at project site, at time of their first arrival on proper use of extinguishers and other available facilities at project site. Post local fire department call number on each telephone instrument at project site.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- D. Enclosure Fence: Before excavation begins, the entire site or the portion determined sufficient to accommodate construction operations must be fully fenced. Fence must prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

1. The existing fence and gates may be reused and modified as necessary for the temporary enclosure fence. It shall be removed and disposed of off-site upon project completion.
  2. Any new fencing required shall be open-mesh, chain link fencing with posts set in a compacted mixture of gravel and earth, 6'-0" high minimum
- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- F. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.
- 1.8 OPERATION, TERMINATION, AND REMOVAL
- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the Contractors property. The Owner reserves the right to take possession of project identification signs.
  2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove



soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
  - a. Replace air filters and clean inside of ductwork and housings.
  - b. Replace significantly worn parts and parts subject to unusual operating conditions.
  - c. Replace lamps burned out or noticeably dimmed by hours of use.

PART 2 - PRODUCTS NOT APPLICABLE

PART 3 - EXECUTION NOT APPLICABLE

END OF SECTION 01500

## SECTION 01600 – PRODUCT REQUIREMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

## 1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.
2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

## 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
  1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
6. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation. Damaged products will be rejected and replaced at the contractor's expense. Loss of time because of damaged products will be compensated for by the contractor.
  1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
- B. Conflicting/Overlapping Requirements: In the event of inconsistencies between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall: (1) provide the better quality and/or greater quantity of work: or (2) comply with the more stringent requirement: either or both in accordance with the Architect's interpretation. The terms and conditions of this Paragraph however, shall not relieve the Contractor of any of its obligations to comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities bearing on performance of the work.
  1. With respect to any inconsistencies, the following rules shall govern:
    - A. On the Drawings, given dimensions shall take precedence over scaled measurements and large scale drawings over small scale drawings.
    - B. Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for resolution before proceeding with the Work.
    - C. If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for approval by the Architect before making the change.

- C. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
1. Proprietary Specification Requirements: Where Specifications name only a single product or manufacturer, provide the product indicated. No substitutions will be permitted.
  2. Semiproprietary Specification Requirements: Where Specifications name 2 or more products or manufacturers, provide 1 of the products indicated. No substitutions will be permitted.
  3. Approved Equal Clause: See Instructions, Terms and Conditions Article 13. QUALITY GAURANTEE and Article 38.17. OR – EQUAL APPROVAL PROCESS. The contractor may make a written request for a substitution of an unnamed product or manufacturer provided such request shall be submitted in writing to the architect not less than ten (10) days prior to installations. Substitution requests submitted after bid opening will be considered only under either of the following three conditions:
    - a. Substitution will lead to a cost savings to the Owner.
    - b. Substitution is necessary to avoid delays in construction, assuming Contractor attempted to order specified product in a timely fashion with due consideration for product lead time requirements and can document this attempt to the satisfaction of the Architect.
    - c. Substitution is necessary to avoid delays in construction and is verifiable by the Architect/Owner.
  4. Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with provisions noted above concerning "substitutions" to obtain approval for use of an unnamed product.
  5. Basis of Design Clause: In Divisions 15 and 16 of the Specification, where one named product or manufacturer is followed by the words Basis of Design, the Contractor shall comply with ten (10) day prior to bid date policy as described above to obtain approval for use of any other product or manufacturer listed. Substitution requests submitted after bid opening will be subject to the conditions noted under Paragraph 3 above.
  6. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
  7. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
  8. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
  9. Visual Selection: Where specified product requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product and manufacturer that complies with other specified

requirements. The Architect will select the color, pattern, and texture from the product line selected.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
  - 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01730 - EXECUTION

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 general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

- 1. Construction layout.
- 2. Field engineering and surveying.
- 3. Installation of the Work.
- 4. Cutting and patching.
- 5. Coordination of Owner-installed products.
- 6. Progress cleaning.
- 7. Starting and adjusting.
- 8. Protection of installed construction.
- 9. Correction of the Work.

- B. Related Requirements:

- 1. Section 01100 "Summary" for limits on use of Project site.
- 2. Section 01330 "Submittal Procedures" for submitting surveys.
- 3. Section 01770 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor and professional engineer.

- B. Certificates: Submit certificate signed by land surveyor and professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 5 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Certified Surveys: Submit 8 copies signed by land surveyor and professional engineer.
- E. Final Property Survey: Submit 8 copies showing the Work performed and record survey data.

## 1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.

- d. Fire-suppression systems.
  - e. Mechanical systems piping and ducts.
  - f. Control systems.
  - g. Communication systems.
  - h. Fire-detection and -alarm systems.
  - i. Conveying systems.
  - j. Electrical wiring systems.
  - k. Operating systems of special construction.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
  - b. Membranes and flashings.
  - c. Exterior curtain-wall construction.
  - d. Sprayed fire-resistive material.
  - e. Equipment supports.
  - f. Piping, ductwork, vessels, and equipment.
  - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.



1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
  1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  1. Description of the Work.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Architect and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices. The contractor shall pay for all costs to engage a land surveyor.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey. The contractor shall pay for all costs to engage a land surveyor.
  - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
  - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

## 3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as

invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
  1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
  2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

## 3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01500 "Temporary Facilities". Section 01740 "Construction Waste Management".
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.9 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01400 "Quality Requirements."

### 3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01730



SECTION 01740 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous construction waste.
  - 2. Recycling nonhazardous construction waste.
  - 3. Disposing of nonhazardous construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 75 percent by weight of total waste generated by the Work.
- B. Salvage/Recycle Requirements: Owner's goal is to salvage and recycle as much nonhazardous construction waste as possible including the following materials:
  - 1. Construction Waste:
    - a. Site-clearing waste.

- b. Masonry and CMU.
- c. Lumber.
- d. Wood sheet materials.
- e. Wood trim.
- f. Metals.
- g. Roofing.
- h. Insulation.
- i. Carpet and pad.
- j. Gypsum board.
- k. Piping.
- l. Electrical conduit.
- m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
  - 1) Paper.
  - 2) Cardboard.
  - 3) Boxes.
  - 4) Plastic sheet and film.
  - 5) Polystyrene packaging.
  - 6) Wood crates.
  - 7) Plastic pails.

#### 1.5 SUBMITTALS

- A. Waste Management Plan: Submit 8 copies of plan within 30 days of date established for the Notice to Proceed.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit six copies of report. Include separate reports for construction waste. Include the following information:
  - 1. Material category.
  - 2. Generation point of waste.
  - 3. Total quantity of waste in tons.
  - 4. Quantity of waste salvaged, both estimated and actual in tons.
  - 5. Quantity of waste recycled, both estimated and actual in tons.
  - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
  - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit six copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

## 1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Waste Management Pre-Construction Conference: Review methods and procedures within 5 working days of Notice-to-Proceed, related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

## 1.7 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
  2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
  3. Total cost of disposal (with no waste management).
  4. Revenue from salvaged materials.
  5. Revenue from recycled materials.
  6. Savings in hauling and tipping fees by donating materials.
  7. Savings in hauling and tipping fees that are avoided.
  8. Handling and transportation costs. Include cost of collection containers for each type of waste.
  9. Net additional cost or net savings from waste management plan.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
  2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
1. All County Hauling & Recycling  
1 N Dale Mabry Hwy, Ste 820  
33602 Tampa, FL
  2. Quicksilver Recycling Services  
1102 N. Rome Avenue  
Tampa, FL 33607-55422
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

### 3.3 RECYCLING CONSTRUCTION WASTE

#### A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

#### B. Site-Clearing Wastes: Chip brush, branches, and trees on-site or at landfill facility.

#### C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

#### D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

### 3.4 DISPOSAL OF WASTE

#### A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

#### B. Burning: Do not burn waste materials.

#### C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01740

## SECTION 01770 – CLOSEOUT PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specifications sections, apply to work of this section.

## 1.2 PROJECT/WORK IDENTIFICATION

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
  - 1. Inspection procedures.
  - 2. Project record document submittal.
  - 3. Operating and maintenance manual submittal.
  - 4. Submittal of warranties.
  - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 - through 16.

## 1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
  - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
  - 2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
  - 3. Advise Owner of pending insurance and utility change-over requirements.
  - 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents specifically required in each section of the specifications.
  - 5. Submit record drawings and Operation and Maintenance Manuals and Project Closeout Manuals in proposed form at Substantial Completion.
    - a. Refer to Section 01782 – Operation and Maintenance Data for quantities of O&M manuals to be submitted.
  - 6. Deliver tools, spare parts, extra stock, and similar items.

7. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel at least 7 calendar days prior to substantial completion. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
9. Prepare and submit contractor's punch list at least 7 calendar days prior to substantial completion.
  - a. Architect and Owner will subsequently prepare punch lists supplementing Contractor's punch list.
10. Submit all required permits, certifications and final approvals for site utility installations.
11. Complete final clean-up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes. Clear and remove all site debris for Owner's safe and full utilization of site except for items required to achieve final completion.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirement. The Architect will prepare the Certificate of Substantial Completion on A.I.A. Form G704 following inspection, or advise the Contractor of construction that must be completed or corrected and reinspected before the certificate will be issued.

1. The Architect will repeat inspection when requested and assured that the Work has been substantially completed. Contractor shall bear cost of Architect's reinspection, including labor and expenses as follows:
  - Registered Professional - \$165/hour
  - Construction Inspector - \$90/hour
  - Secretarial time - \$45/hour
  - Mileage, round trip - \$.50/mile; tolls at cost
  - Copies - \$.25/each
2. Results of the completed inspection will form the basis of requirements for final acceptance.

#### 1.4 FINAL INSPECTION

A. When Contractor considers the Work has reached final completion, he shall submit:

1. Written certification that:
  - a. Contract Documents have been reviewed.
  - b. Work has been inspected for compliance with Contract Documents.
  - c. Work has been completed in accordance with Contract Documents.
  - d. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
  - e. Work is completed and ready for final inspection.



- 2. Revised Operation and Maintenance Manual(s) and project Closeout Manuals in final form five days prior to Final Inspection.
  - a. Refer to Section 01782 – Operation and Maintenance Data for quantities of O&M manuals to be submitted.
- B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Architect consider that the Work is incomplete or defective:
  - 1. Architect will promptly notify the Contractor in writing, listing the incomplete or defective Work.
  - 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the Work is complete.
  - 3. Inspection will be repeated. Contractor shall bear cost of Architect’s reinspection, including labor and expenses as set forth in paragraph 1.3.B.1.
- D. When the Architect finds that the work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

1.5 PROJECT CLOSEOUT MANUALS

- A. Collect, identify and collate the following materials from the subcontractors to be bound in a hard cover, 3-ring "D" style lay flat binder. Deliver two copies of the finished manuals to the Architect, for delivery to the Owner for approval, as a condition precedent to final certification of payment.
- B. Indexing: Information shall be provided as follows. The individual entries are to be organized and indexed per the specification Table of Contents.
- C. Listing of Contractor and Subcontractors: Provide a listing of subcontractors performing work, both on and off site, with the Contractor heading the list. Required information shall include the following: (Example)

Division 1

Contractor	DBPR License Number
Company Name	Representative’s Name and Title
Address	Phone Number

Division 2

Termite Control	DBPR License Number
Company Name	Representative’s Name and Title
Address	Phone Number

- D. Certificate of Substantial Completion: Insert, at this point, a copy of the fully executed Certificate of Substantial Completion, AIA document G704, as future reference for Owner.

- E. Testing, Inspections and Certificate of Occupancy: Provide copies of tests, and test and balance reports. See Divisions 15 and 16. Provide copies of Certificates of Inspections from authorities having jurisdiction for each trade, division or portion of work, as required. Provide a copy of the final executed Certificate of Occupancy.
  - F. Contractor's Affidavit of Payment of Debts and Claims: Provide certification, on AIA Document G706 that work covered by Contract Documents has been completed, and that payrolls, bills of materials and other indebtedness connected with the Work for which the owner or his property might in any way be responsible, have been paid or otherwise satisfied.
  - G. Contractor's Affidavit of Release of Liens: Provide certification, on AIA Document G706A, that liens that are or may be filed arising from work covered by Contract Documents have been released or waived, with any exception noted. Provide additional certification from subcontractors, and material and equipment suppliers, with any exceptions noted. Provide a bond satisfactory to cover exceptions.
  - H. Lien Waivers: Provide releases and waivers of liens, from the Contractor and Subcontractors as supporting documents to AIA Document G706A.
  - I. Consent of Surety: Provide a Consent of Surety to Final Payment, on AIA Document G707.
  - J. Warranties, Guarantees, and Bonds: Provide warranties, guarantees, and bonds called for in the Contract Documents.
  - K. Certificate of Insurance for Products and Completed Operations.
  - L. Cover: Identify each binder with typed or printed title PROJECT CLOSEOUT MANUAL; and list title of project.
  - M. All information to submit for final LEED certification and date entry into the required credit template as directed by the LEED project administrator.
- 1.6 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ARCHITECT
- A. Project Closeout Manuals, as identified herein.
  - B. Project Record Documents, as identified in Section 01783.
  - C. Keys and Keying Schedule, as identified in Section 08710 Hardware.
- 1.7 FINAL APPLICATION FOR PAYMENT
- A. Submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 - PRODUCTS NOT APPLICABLE

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Prior to Substantial Completion, arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures.

1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2 FINAL CLEANING

A. General: General cleaning during construction is required by the General Conditions.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturers' instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
  - a. Remove labels that are not permanent labels.

- b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
  - c. Clean exposed exterior and interior hard surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
  - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
  - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even textured surface.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance; comply with regulations of authorities having jurisdiction and safety standards of cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of a in a lawful manner.
- E. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01770

## SECTION 01782 - OPERATION AND MAINTENANCE DATA

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Maintenance manuals for the care and maintenance of products, materials, finishes, systems, and equipment.
- B. Related Sections include the following:
  - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
  - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 4. Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

## 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

## 1.4 SUBMITTALS

- A. Initial Submittal: Submit 3 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion, except as noted below. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

1. HVAC-related O&M manuals are highly time-critical due to HVAC System Commissioning requirements. Comply with the following schedule:
  - a. Draft copies of O&M manuals shall be submitted no later than 120 days prior to Substantial Completion.
  - b. Final submittal review copies shall be submitted no later than 60 days prior to Substantial Completion.
  - c. Final, fully corrected manuals must be submitted no later than 15 days prior to Substantial Completion.
- B. Final Submittal: Submit one copy of each manual in final form at least 30 days before final inspection. Architect will return copy with comments within 15 days before final inspection.
  1. Correct or modify each manual to comply with Architect's comments. Submit three copies (except HVAC system manuals) of each corrected manual within 15 days of receipt of Architect's comments. Submit four corrected, final copies of HVAC systems manual.

## 1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
  1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

## 2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name, address, and telephone number of Contractor.
  - 6. Name and address of Architect.
  - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
  - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide

essential information for proper operation or maintenance of equipment or system.

- b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software CD's for computerized electronic equipment.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
  5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.
  3. Water leak.
  4. Power failure.
  5. Water outage.
  6. System, subsystem, or equipment failure.
  7. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
  1. Instructions on stopping.



2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions.
  2. Performance and design criteria if Contractor is delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents.

For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

- C. **Manufacturers' Maintenance Documentation:** Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
  2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- D. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training videotape, if available.
- E. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. **Scheduled Maintenance and Service:** Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. **Maintenance and Service Record:** Include manufacturers' forms for recording maintenance.
- F. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. **Maintenance Service Contracts:** Include copies of maintenance agreements with name and telephone number of service agent.
- H. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

## 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."
- G. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

## SECTION 01783 - PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Definitions: Record documents are defined to include those documents or copies relating directly to performance of the work, which Contractor is required to prepare or maintain for Owner's records, recording the work as actually performed. In particular, record documents show changes in the work in relation to that which is shown and specified by original contract documents; and show additional information of value to Owner's records, but indicated by original contract documents. Record documents include marked up copies of contract drawings, shop drawings, specifications, addenda and change orders, marked up product data submittals, record samples, and field records for variable and concealed conditions.

## 1.3 RECORD DRAWINGS

- A. Mark-up procedure: During progress of the work, maintain a white-print set (blueline or blackline) of contract drawings and notations of actual installations which vary substantially from the work as originally shown. Mark whatever drawing is most capable of showing actual physical condition, fully and accurately. Give particular attention to information on work concealed, which would be difficult to identify or measure and record at a later date. Note alternate numbers, change order numbers and similar identification. Label each sheet Project Record in 2 inch high letters.
  - 1. Update project record prints as variations arise. Review progress of updates with Architect at each monthly application for payment review meeting to confirm that record prints are up-to-date. Architect may decline to certify contractor's application for payment if record drawings have not been updated.
  - 2. In preparation for certification of substantial completion on last major portion of the work, review completed mark up of record drawings with Architect. Architect may decline to certify substantial completion if record drawings have not been updated.

## 1.4 RECORD SPECIFICATIONS

- A. General:
  - 1. During progress of the work, maintain one copy of specifications, including addenda, change orders and similar modifications issues in printed form during construction, and mark up variations (of substance) in actual work in comparison with text of

specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, submit to Architect for Owner's records. Label front cover Project Record in 2 inch high letters.

1.5 RECORD PRODUCT DATA

- A. General: During progress of the work, maintain one copy of each product data submittal, and mark up significant variations in the actual work in comparison with submitted information. Include both variations in product as delivered to site, and variations from manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark up record drawings and specifications accordingly. Upon completion of mark up, submit complete set to Architect for Owner's records. Label each data submittal Project Record in 2 inch high letters.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01783

## SECTION 02230 - SITE CLEARING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Please refer to General Notes and Legend Sheet and the associated construction plans for site-specific specifications and standards. Any specifications herein that conflict, the construction plans will take precedence.

## 1.2 SUMMARY

- A. This Section includes the following:

1. Clearing and grubbing.
2. Stripping and stockpiling topsoil.
3. Removing above- and below-grade site improvements.
4. Disconnecting, capping or sealing, and removing site utilities.
5. Temporary erosion and sedimentation control measures.

- B. Related Sections include the following:

1. Division 1 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures.
2. Division 1 Section "Execution Requirements" for verifying utility locations and for recording field measurements.
3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
4. Division 2 Section "Sodding" for finish grading including preparing and placing planting soil mixes and testing of topsoil material.

## 1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

#### 1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### 1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings, according to Division 1 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

#### 1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

#### 1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.



## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."
  - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, the paving, grading and drainage plans and details, a sediment and erosion control plan, specific to the site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
  2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Architect not less than two days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.
- E. Removal of underground utilities is included in Division 2 Sections covering site utilities.

### 3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
  4. Use only hand methods for grubbing within tree protection zone.
  5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

### 3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within tree protection zones.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### 3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
  2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

### 3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
  1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 02230

## SECTION 02300 - EARTHWORK

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Please refer to General Notes and Legend Sheet and the associated construction plans for site-specific specifications and standards. Any specifications herein that conflict, whichever is more stringent will preside.

## 1.2 SUMMARY

- A. This Section includes the following:

1. Preparing subgrades for slabs-on-grade, walks and pavements.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for slabs-on-grade.
4. Subbase course for concrete walks and pavements.
5. Excavating and backfilling for utility trenches.

- B. Related Sections include the following:

1. Division 1 Section "Allowances" for quantity allowance provisions related to unit-price rock excavation and authorized additional excavation.
2. Division 1 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
3. Division 2 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
4. Division 2 Section "Sodding" for finish grading, including preparing and placing topsoil and planting soil for lawns.
5. Division 3 Section "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
6. Divisions 2, 15, and 16 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

## 1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices and changes in the Work.
  - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
  - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
  - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
  - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent geotechnical testing agency, according to ASTM D 1586.
- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

- K. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- M. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Each type of plastic warning tape.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D 698 and ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.
- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

#### 1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

#### 1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify Architect not less than five days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
  - 3. Contact utility-locator service for area where Project is located before excavating.

## PART 2 - PRODUCTS

## 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM and AASHTO M 145 Soil Classification Groups A-1, A-2-4, A-2-5, and A-3, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 and A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
- B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

### 3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
  - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:



- a. 24 inches outside of concrete forms other than at footings.
  - b. 12 inches outside of concrete forms at footings.
  - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
  - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
  - e. 6 inches beneath bottom of concrete slabs on grade.
  - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.
1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
    - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
  2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 24 inches outside of concrete forms other than at footings.
    - b. 12 inches outside of concrete forms at footings.
    - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
    - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    - e. 6 inches beneath bottom of concrete slabs on grade.
    - f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

### 3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

### 3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
  - 1. Clearance: 12 inches each side of pipe or conduit or as indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
  - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
  - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### 3.6 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices and changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

### 3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.9 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  2. Surveying locations of underground utilities for Record Documents.
  3. Testing and inspecting underground utilities.
  4. Removing concrete formwork.
  5. Removing trash and debris.
  6. Removing temporary shoring and bracing, and sheeting.
  7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

## 3.10 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 3 Section "Cast-in-Place Concrete".
- D. Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.
- E. Place and compact initial backfill of subbase material and satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.
- G. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- H. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- J. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

## 3.11 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use satisfactory soil material.
  - 4. Under building slabs, use satisfactory soil material.
  - 5. Under footings and foundations, use satisfactory soil material..

### 3.12 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 and ASTM D 1557:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

### 3.14 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch.

- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
  - 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

### 3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 02300

SECTION 02361 – TERMITE CONTROL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Soil treatment with termiticide.

1.3 PERFORMANCE REQUIREMENTS

- A. Service Life of Soil Treatment: Soil treatment by use of a termiticide that is effective for not less than five years against infestation of subterranean termites.

1.4 SUBMITTALS

- A. Product Data: For termiticide.
  - 1. Include the EPA-Registered Label for termiticide products.
- B. Product Certificates: For termite control products, signed by product manufacturer.
- C. Qualification Data: For Installer of termite control products.
- D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
  - 1. Date and time of application.
  - 2. Moisture content of soil before application.
  - 3. Brand name and manufacturer of termiticide.
  - 4. Quantity of undiluted termiticide used.
  - 5. Dilutions, methods, volumes, and rates of application used.
  - 6. Areas of application.
  - 7. Water source for application.
- E. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.



- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- C. Source Limitations: Obtain termite control products through one source.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

## 1.7 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

- 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Termiticides:
    - a. Aventis Environmental Science USA LP; Termidor.
    - b. Bayer Corporation; Premise 75.
    - c. Dow AgroSciences LLC; Dursban TC; Equity.
    - d. FMC Corporation, Agricultural Products Group; Talstar, Prevail FT, Torpedo.
    - e. Syngenta; Demon TC.

## 2.2 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
  - 1. Proceed with application only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
  - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

### 3.3 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

## 3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
  2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
  3. Masonry: Treat voids.
  4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 02361

SECTION 02751 – CONCRETE SIDEWALKS AND APRON

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes exterior cement concrete pavement for the following:
  - 1. Sidewalks and apron immediately adjacent to buildings.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Admixtures.
  - 4. Curing compounds.
  - 5. Joint fillers.
- D. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

- B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

### 2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

### 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:
  - 1. Portland Cement: ASTM C 150, Type I, gray.
    - a. Fly Ash: ASTM C 618, Class F.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

## 2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use plasticizing and retarding admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements as follows:]
  - 1. Fly Ash or Pozzolan: 25 percent.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), 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/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  1. For concrete mixes 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 concrete mixes 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, mixing time, quantity, and amount of water added.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
  1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
  2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

#### 3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

#### 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. General: Form construction and expansion joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
  - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
  - 2. Provide tie bars at sides of pavement strips where indicated.
  - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Expansion Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
  - 1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.
  - 2. Extend joint fillers full width and depth of joint.
  - 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
  - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.



5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Control Joints: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints as indicated on drawings.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/8-inch (10-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

### 3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- D. Do not add water to fresh concrete after testing.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- G. Screed pavement surfaces with a straightedge and strike off.
- H. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- I. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) 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. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  1. Medium Textured Broom Finish

### 3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.

### 3.9 PAVEMENT TOLERANCES

#### A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/4 inch (6 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Control Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

### 3.10 FIELD QUALITY CONTROL

#### A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

#### B. Testing Services: 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 at least 1 composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.
  - 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 mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
  - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

#### C. Strength of each concrete mix will be satisfactory if average of any 3 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 (3.4 MPa).

- D. Test results shall be reported in writing to Architect, 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.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. 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 Architect.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.11 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 02930 - SODDING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide sodded lawns as shown and specified. The work includes:
  - 1. Soil preparation.
  - 2. Sodding lawns.
  - 3. Maintenance.

1.2 QUALITY ASSURANCE

- A. Sod: Comply with American Sod Producers Association (ASPA) classes of sod materials.
- B. Provide and pay for materials testing. Testing agency shall be acceptable to the Landscape Architect. Provide the following data:
  - 1. Test representative materials samples proposed for use.
  - 2. Soil analysis of existing conditions.
    - a. Soil pH and recommendations for correction. Ideal pH for Bahia is 5.0 - 6.5 and St. Augustine 'Floritam' is 5.0 – 7.0.
    - b. Nematode infestation check and recommendation for eradication.
    - c. Organic matter check and recommendation.
    - d. Starter fertilizer check and recommendations.

1.3 SUBMITTALS

- A. Submit sod growers certification of grass species. Identify source location.
- B. Submit the following material samples:
  - 1. Topsoil.
- C. Submit the following material certification:
  - 1. Submit certificates of inspection as required by governmental authorities and manufacturers or vendors certified analysis for soil amendments, herbicides, insecticides and fertilizer materials; submit other data substantiating that materials comply with specified requirements.
- D. Submit soil analysis report.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Cut, deliver and install sod within a 24-hour period.

1. Do not harvest or transport sod when moisture content may adversely affect Sod survival.
2. Protect sod from sun, wind, and dehydration prior to installation.
3. Do not tear, stretch, or drop sod during handling and installation.

#### 1.5 PROJECT CONDITIONS

- A. Work notification: Notify The Authority representative at least 7 working days prior to start of sodding operations.
- B. Protect existing utilities, paving and other facilities from damage caused by sodding operations.
- C. Perform sodding work only after planting and other work affecting ground surface has been completed.
- D. Existing soil to be amended as determined necessary from soil analysis, including: soil pH, nematode infestation, organic matter check and starter fertilizer check.
- E. Restrict traffic from lawn areas until grass is established.
- F. Provide hose and lawn watering equipment as required.
- G. The irrigation system will be installed prior to sodding. Locate, protect and maintain the irrigation system during sodding operations. Repair irrigation system components damaged during sodding operations at this contractor's expense.

#### 1.6 WARRANTY

- A. Provide a uniform stand of grass by watering, mowing and maintaining lawn areas until final acceptance and for a period of 30 days after acceptance. Resod areas, with specified materials, which fail to provide a uniform stand of grass until all affected areas are accepted by the The Authority representative.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Sod: An "approved" nursery grown sod composed of either St Augustine 'Floritam' or Argentine Bahia, as specified on drawings.
  1. Provide well-rooted, healthy sod, free of diseases, nematodes and soil borne insects. Provide sod uniform in color, leaf texture, density, and free of weeds, undesirable grasses, stones, roots, thatch, and extraneous material; viable and capable of growth and development when planted.
  2. Furnish sod machine stripped and of supplier's standard width, length, and Thickness: Uniformly 1" to 1-1/2" thick with clean cut edges. Mow sod before stripping.
- B. Fertilizer:

1. Granular, non-burning product composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer.
  - a. Type A: Starter fertilizer containing 16% nitrogen, 4% phosphoric acid, and 8% potash by weight or similar approved composition.
  - b. Type B: Top dressing fertilizer containing 31% nitrogen, 3% phosphoric acid, and 10% potash by weight or similar approved composition.
  - c. Ground Limestone: Containing not less than 85% of total carbonates and ground to such fineness that 50% will pass through a 100 mesh sieve and 90% will pass through a 20 mesh sieve.

C. Stakes

1. Steel, tee shaped pins, 4" head x 8" leg.

D. Water: Free of substance harmful to sod growth. Hoses or other methods of Transportation furnished by contractor.

E. Topsoil: Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, reasonably free from clay lumps, coarse sand stones, plants, roots and other foreign materials with an acidity level as specified by type of sod.

1. Identify source location of topsoil.
2. Topsoil shall be fertilized.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine finish surfaces, grades, topsoil quality, and depth.  
Do not start sodding work until unsatisfactory conditions are corrected.

### 3.2 PREPARATION

- A. If area to be sodded has existing grass or vegetative cover, apply a non-selective Herbicide (Round-up) to area. Wait ten (10) days before continuing with prep work.
- B. Loosen topsoil of lawn areas to minimum depth of 8". Remove stones over 1" in any dimension and sticks, roots, rubbish, and extraneous matter.
- C. Add 2" topsoil or organic material as required from organic matter check. Till into top 8" of existing soil.
- D. Grade lawn areas to smooth, free drainage and even surface with a loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions as required to drain.
- E. Apply limestone at rate determined by the soil test, to adjust pH of topsoil as

specified in sod type. Distribute evenly by machine and incorporate thoroughly into topsoil.

- F. Apply "Type A" fertilizer as specified by manufacturer. Apply fertilizer by mechanical rotary or drop type distributor, thoroughly and evenly incorporated with the soil to a depth of 3" by discing or other approved methods. Fertilize areas inaccessible to power equipment with hand tools and incorporate it into soil.
- G. Dampen dry soil prior to sodding.
- H. Restore prepared areas to specified condition if eroded, settled or otherwise Distributed after fine grading and prior to sodding.

### 3.3 INSTALLATION

- A. Lay sod to form a solid mass with tightly-fitted joints. Butt ends and sides of sod Strips. Do not overlay edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with adjacent curbs, sidewalks, drains and seed areas.
- B. Do not lay dormant sod or install sod on saturated soil.
- C. Install initial row of sod in a straight line, beginning at bottom of slopes, perpendicular to direction of the sloped area. Place subsequent rows parallel to and lightly against previously installed row.
- D. Peg sod on slopes greater than 3 to 1 to prevent slippage at a rate of 2 stakes per yd. of sod.
- E. Water sod thoroughly with a fine spray immediately after laying.
- F. Roll with light lawn roller to ensure contact with subgrade.
- G. Sod indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.
- H. Top dress all seams of sodded area with specified topsoil.

### 3.4 MAINTENANCE

- A. Maintain sodded lawns for a period of at least 90 days after completion and acceptance of sodding operations.
- B. Maintain sodded lawn areas, including watering, spot weeding, mowing, Application of herbicides, fungicides, insecticides and resodding until a full, uniform stand of grass free of weed, undesirable grass species, disease, and insects is achieved and accepted by the The Authority representative.
  - 1. Water sod thoroughly ever 2 to 3 days, as required to establish proper rooting.



2. Repair, rework, and resod all areas that have washed out or are eroded. Replace undesirable or dead areas with new sod.
3. Mow lawn areas as soon as lawn top growth reaches a 3" height. Cut back to 2" height. Repeat mowing as required to maintain specified height. Not more than 40% of grass leaf shall be removed at any single mowing.
4. Apply "Type B" fertilizer to lawns approximately 30 days after sodding at a rate specified by the manufacturer. Apply with a mechanical rotary or drop type distributor. Thoroughly water into soil.
5. Apply herbicides as required to control weed growth or undesirable grass species.
6. Apply fungicides and insecticides as required to control disease and insects.

### 3.5 ACCEPTANCE

- A. Inspection to determine acceptance of sodded lawns will be made by the Landscape architect, upon contractor's request. Provide notification at least 5 working days before requested inspection date.
  1. Sodded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, even colored viable lawn is established, free of weeds, undesirable grass species, disease, and insects.
- B. Upon acceptance contractor shall maintain area for 90 days. At the end of this period contractor shall request a final maintenance inspection for acceptance.
- C. Upon acceptance at end of maintenance period the The Authority will assume lawn maintenance.

### 3.6 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the Work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from sodding operations.

END OF SECTION 2930

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Concrete paving and walks are specified in Division 2.

1.3 SUBMITTALS

- A. General - Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.
- C. Shop drawings for reinforcement, prepared by registered Professional Engineer for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Shop drawings for formwork, prepared by a registered Professional Engineer for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually. Formwork shop drawings must be signed and sealed by a professional engineer In the State of Florida.
  - 1. Architect's review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.

- E. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
  - 1. Normal weight aggregates.
  - 2. Fibrous reinforcement.
  - 3. Reglets.
  - 4. Waterstops.
  - 5. Vapor retarder.
- F. Laboratory test reports for concrete materials and mix design test. Provide test data sample with standard deviation calculations for each mix submitted.
- G. Materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

#### 1.4 QUALITY ASSURANCE

- A. Codes and Standards - Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
  - 1. ACI 318, "Building Code Requirements for Reinforced Concrete."
  - 2. ACI 301 "Specifications for Structural Concrete for Buildings."
  - 3. ACI 304 "Recommended Practice for Measuring, Transporting, and Placing Concrete."
  - 4. ACI 311 "Recommended Practice for Concrete Inspection."
  - 5. ACI 315 "Manual of Standard Practice for Detailing Concrete Structures"
  - 6. ACI 347 "Recommended Practice for Concrete Formwork"
  - 7. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- B. Concrete Testing Service - Engage a testing laboratory acceptable to Architect to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
- D. Full cooperation shall be given to mechanical, electrical, and plumbing installers to allow them time to coordinate and install all items of their work which are to be encased or built into concrete. Contractor to assure that other work such as sleeves, electrical conduits, pipes, anchors, etc., are properly placed and secured in position before concrete is placed. Items that require inspection shall have

been inspected and tested for both material and mechanical operation and shall have been completed before concrete is placed.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep reinforcement steel under cover and off the ground using supports. Protect reinforcing steel from rusting, oil, grease, or distortion.

## PART 2 - PRODUCTS

### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete : Unless otherwise shown or specified, construct all formwork for exposed concrete surfaces with a rigid non-absorptive material to offer optimum appearance and leave a smooth, stain-free surface. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without objectionable bow or deflection. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
  - 1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
  - 2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete - Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings - Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties - Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
  - 1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

- E. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

## 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars - Reinforcing steel must be correctly rolled to section and free from all surface defects and shall be in accordance with ASTM A615 Grade 60 as evidenced by manufacturer's certificates. The grade of steel shall be intermediate, new billet stock. All bars shall be deformed and rolled with raised symbols to identify the manufacturer and the size of the bar.
- B. Galvanized Reinforcing Bars - ASTM A 767, Class II (2.0 oz. zinc psf) hot-dip galvanized, after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars - ASTM A 775.
- D. Steel Wire - ASTM A 82, plain, cold-drawn steel.
- E. Welded Wire Fabric - ASTM A 185, welded steel wire fabric.
- F. Welded Deformed Steel Wire Fabric - ASTM A 497.
- G. Supports for Reinforcement - Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.
  - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

## 2.3 CONCRETE MATERIALS

- A. Portland Cement - ASTM C 150, Type I.
  - 1. Use one brand of cement throughout project unless otherwise acceptable to Architect.
- B. Fly Ash - ASTM C 618, Type C or Type F., 20% max.
- C. Normal Weight Aggregates - ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.

1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
  2. Local aggregates not complying with ASTM C 33 but that special tests or actual service have shown to produce concrete of adequate strength and durability may be used when acceptable to Architect.
- D. Lightweight Aggregates - ASTM C 330.
- E. Water - Drinkable.
- F. Admixtures, General - Provide admixtures for concrete that contain not more than 0.05 percent chloride ions.
- G. Air-Entraining Admixture - ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Air-Tite," Cormix.
    - b. "Air-Mix" or "Perma-Air," Euclid Chemical Co.
    - c. "Darex AEA" or "Daravair," W.R. Grace & Co.
    - d. "MB-VR" or "Micro-Air," Master Builders, Inc.
    - e. "Sealtight AEA," W.R. Meadows, Inc.
    - f. "Sika AER," Sika Corp.
- H. Water-Reducing Admixture - ASTM C 494, Type A.
1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Chemtard," ChemMasters Corp.
    - b. "PSI N," Cormix.
    - c. "Eucon WR-75," Euclid Chemical Co.
    - d. "WRDA," W.R. Grace & Co.
    - e. "Pozzolith Normal" or "Polyheed," Master Builders, Inc.
    - f. "Prokrete-N," Prokrete Industries.
    - g. "Plastocrete 161," Sika Corp.
- I. High-Range Water-Reducing Admixture (Super Plasticizer) - ASTM C 494, Type F or Type G. May be used in all pumped concrete and concrete with a water-cement ratio below 0.50.
1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

- a. "Super P," Anti-Hydro Co., Inc.
  - b. "PSI Super," Cormix.
  - c. "Eucon 37," Euclid Chemical Co.
  - d. "WRDA 19" or "Daracem," W.R. Grace & Co.
  - e. "Rheobuild," Master Builders, Inc.
  - f. "PSP," Prokrete Industries.
  - g. "Sikament 300," Sika Corp.
- J. Water-Reducing, Accelerating Admixture - ASTM C 494, Type E.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Q-Set," Conspec Marketing & Manufacturing Co.
    - b. "Gilco Accelerator," Cormix.
    - c. "Accelguard 80," Euclid Chemical Co.
    - d. "Daraset," W.R. Grace & Co.
    - e. "Pozzutec 20," Master Builders, Inc.
- K. Water-Reducing, Retarding Admixture - ASTM C 494, Type D.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "PSI-R Plus," Cormix.
    - b. "Eucon Retarder 75," Euclid Chemical Co.
    - c. "Daratard-17," W.R. Grace & Co.
    - d. "Pozzolith R," Master Builders, Inc.
    - e. "Protard," Prokrete Industries.
    - f. "Plastiment," Sika Corporation.
- L. Fibrous Reinforcement - Engineered polypropylene fibers designed for secondary reinforcement of concrete slabs.
- 1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Fiberstrand 100," Euclid Chemical Co.
    - b. "Fibermesh," Fibermesh, Inc.
    - c. "Forta CR," Forta Corp.
    - d. "Grace Fibers," W.R. Grace & Co.

## 2.4 RELATED MATERIALS

- A. Joint Filler: Expansion joint fillers shall be asphalt impregnated fiber board conforming to ASTM D-1751. Joint fillers shall extend full depth of slab or joint

and be thickness and lengths indicated on drawings.

- B. Anchor Slots: Hot-Dipped galvanized, #22 ga. metal, felt filled, equal to No. 305 made by Hohman & Bernard or approved equal.
- C. Inserts: Inserts shall be either adjustable, threaded or wedge types depending on use as manufactured by Hohman & Bernard or approved equal.
- D. Reglets - Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217 inch thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- H. Granular Base - Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.
- I. Sand Cushion - Clean, manufactured or natural sand.
- J. Vapor Retarder - Provide vapor retarder cover over prepared base material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154, as follows:
  - 1. Water-resistant barrier consisting of heavy Kraft papers laminated together with glass-fiber reinforcement and overcoated with black polyethylene on each side.
- K. Vapor Barrier - Premoulded membrane, seven-ply construction consisting of reinforced core and carrier sheet with fortified bitumen layers, protective weathercoating, and plastic antistick sheet. Water vapor transmission rate of 0.00 grains/sq. ft./hr. when tested in accordance with ASTM E 96, Method B. Provide manufacturer's recommended mastics and gusset tape.
  - 1. Product - "Sealtight Premoulded Membrane With Plasmatic Core," W.R. Meadows, Inc.
  - 2. Absorptive Cover - Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- L. Moisture-Retaining Cover - One of the following, complying with ASTM C 171.
  - 1. Waterproof paper.
  - 2. Polyethylene film.
  - 3. Polyethylene-coated burlap.
- M. Water-Based Acrylic Membrane Curing Compound - ASTM C 309, Type I, Class B.



1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
  - a. "Conhard," Conspec Marketing and Mfg. Co.
  - b. "Safe Cure and Seal," Dayton Superior Corp.
  - c. "Aqua-Cure," Euclid Chemical Co.
  - d. "Dress & Seal #18WB," L&M Construction Chemicals, Inc.
  - e. "Masterseal W," Master Builders, Inc.
  - f. "Intex," W.R. Meadows, Inc.
  - g. "Sika Membrane," Sika Corp.
  
- N. Evaporation Control - Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
  1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Eucobar," Euclid Chemical Co.
    - b. "E-Con," L&M Construction Chemicals, Inc.
    - c. "Confilm," Master Builders, Inc.
  
- O. Underlayment Compound - Free-flowing, self-leveling, pumpable, cement-based compound for applications from one inch thick to feathered edges.
  1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "K-15," Ardex, Inc.
    - b. "Conflow," Conspec Marketing and Mfg. Co.
    - c. "LevelLayer II," Dayton Superior Corp.
    - d. "Flo-Top," Euclid Chemical Co.
    - e. "Levelex," L&M Construction Chemicals, Inc.
    - f. "Pourcrete," Master Builders, Inc.
    - g. "Stoncrete UL1," Stonhard, Inc.
    - h. "Thoro Underlayment Self-Leveling," Thoro System Products.
  
- P. Bonding Compound - Polyvinyl acetate or acrylic base.
  1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Polyvinyl Acetate (Interior Only):
      1. "Superior Concrete Bonder," Dayton Superior Corp.
      2. "Euco Weld," Euclid Chemical Co.

3. "Weld-Crete," Larsen Products Corp.
  4. "Everweld," L&M Construction Chemicals, Inc.
- b. Acrylic or Styrene Butadiene:
1. "Acrylic Bondcrete," The Burke Co.
  2. "Strongbond," Conspec Marketing and Mfg. Co.
  3. "Day-Chem Ad Bond," Dayton Superior Corp.
  4. "SBR Latex," Euclid Chemical Co.
  5. "Daraweld C," W.R. Grace & Co.
  6. "Hornweld," A.C. Horn, Inc.
  7. "Everbond," L & M Construction Chemicals, Inc.
  8. "Acryl-Set," Master Builders Inc.
  9. "Intralok," W.R. Meadows, Inc.
  10. "Sonocrete," Sonneborn-Rexnord.
  11. "Stonlock LB2," Stonhard, Inc.
- Q. Epoxy Adhesive - ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.
1. Available Products - Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. "Burke Epoxy M.V.," The Burke Co.
    - b. "Spec-Bond 100," Conspec Marketing and Mfg. Co.
    - c. "Euco Epoxy System #452 or #620," Euclid Chemical Co.
    - d. "Epoxite Binder 2390," A.C. Horn, Inc.
    - e. "Epabond," L&M Construction Chemicals, Inc.
    - f. "Concresive 1001," Master Builders, Inc.
    - g. "Sikadur 32 Hi-Mod," Sika Corp.
- R. Non-Shrink Grout: Non-Shrink Grout: Pre-mixed non-shrink grout as called for on drawings shall be manufactured by:
1. The Euclid Chemical Company - "Euco N-S Group" (All exposed grout).
  2. The Euclid Chemical Company - "Firmix".
  3. Master Builders - "Embeco 885".
  4. Anto-Hydro Company - "Axpandcrete Metallica."
  5. Sonneborn - "Ferrolith G".
  6. Lambert Corporation - "Vibropruf #11"
- S. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicate per gal.

## 2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batches are selected as the method of proportioning, the mix design shall be proportioned to achieve an average 28-day compressive strength of 1200 psi in excess of the design strength indicated on the Contract drawings, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
1. Limit use of fly ash to not exceed 20 percent of cement content by weight.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
1. 5000-psi, 28-day compressive strength; W/C ratio, 0.42 maximum (non-air-entrained), 0.40 maximum (air-entrained).
  2. 4000-psi, 28-day compressive strength; W/C ratio, 0.45 maximum (non-air-entrained), 0.42 maximum (air-entrained)
  3. 3500-psi, 28-day compressive strength; W/C ratio, 0.48 maximum (non-air-entrained), 0.45 maximum (air-entrained).
  4. 3000-psi, 28-day compressive strength; W/C ratio, 0.52 maximum (non-air-entrained), 0.48 maximum (air-entrained).
  5. 2500-psi, 28-day compressive strength; W/C ratio, 0.56 maximum (non-air-entrained), 0.54 maximum (air-entrained).
  6. Maximum water-cement (W/C) ratio for the following conditions should be as follows:
    - a. Subjected to freezing and thawing; W/C 0.45.
    - b. Subjected to brackish water, salt spray, or deicers; W/C 0.40
    - c. Concrete required to be watertight; W/C 0.40.
- D. Lightweight Concrete - Proportion mix as specified. Design mix to produce strength and modulus of elasticity as noted on drawings, with a splitting tensile strength factor (Fct) of not less than 5.5 for 3000-psi concrete and a dry weight of not less than 95 lbs. or more than 110 lbs. after 28 days. Limit shrinkage to 0.03 percent at 28 days.
- E. Maximum Slump:
1. Concrete containing the specified high range water reducing admixture (superplasticizer) shall have a maximum slump of 8 inches after addition of

- HRWR, unless otherwise approved by the Architect.
2. Ramps Slabs, and sloping surfaces – Not more than 3 inches.
  3. Reinforced foundations system – Not less than 1 inch and not more than 4 inches.
  4. All other concrete shall have a maximum slump of 4 inches, +/- 1 inch.
- F. Adjustment to Concrete Mixes - Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

## 2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (Superplasticizer) in concrete as required for placement and workability.
- B. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture (HRWR) in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1.5% within following limits:
  - E.
    1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
      - a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) 1-1/2-inch max. aggregate.
      - b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) 1-inch max. aggregate.
      - c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) 3/4-inch max. aggregate.
      - d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) 1/2-inch max. aggregate.
    2. Other concrete (not exposed to freezing, thawing, or hydraulic pressure) or to receive a surface hardener: 3% air.
- F. Use admixtures for water reduction and set control in strict compliance with

manufacturer's directions.

## 2.7 CONCRETE MIXING

- A. Job-Site Mixing - Mix materials for concrete in appropriate drum-type batch machine mixer. For mixers of one cu. yd. or smaller capacity, continue mixing at least 2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum and maximum mixing time by 15 seconds for each additional cu. yd. or fraction thereof.
- B. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- C. Ready-Mix Concrete - Comply with requirements of ASTM C 94, and as specified.
- D. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

### 3.2 FORMS

- A. General - Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Provisions for Other Trades - Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- H. Cleaning and Tightening - Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

### 3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. General - Following leveling and tamping of granular base for slabs on grade, place vapor retarder/barrier sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.
- C. After placement of vapor retarder/barrier, cover with sand cushion and compact to depth as shown on drawings.

### 3.4 PLACING REINFORCEMENT

- A. General - Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
- B. Avoid cutting or puncturing vapor retarder during reinforcement placement and concreting operations.

- C. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- E. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- F. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. Construction Joints - Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- F. Waterstops - Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions.
- G. Isolation Joints in Slabs-on-Ground - Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

- G. Joint filler and sealant materials are specified in Division 7 Sections of these specifications.
- H. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by 1/4 slab depth or inserts 1/4 inch wide by 1/4 of slab depth, unless otherwise indicated.
  - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
  - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
  - 3. If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
- I. Joint Spacing: Unless otherwise noted, the maximum spacing of construction joints shall be as follows:
  - 1. Foundation walls, walls: Forty-five (45) feet.
  - 2. Slabs : Fifteen (15)feet.

### 3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General - Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Forms for Slabs - Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

### 3.7 PREPARATION OF FORM SURFACES

- A. General - Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before reinforcement is placed.



- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

### 3.8 CONCRETE PLACEMENT

- A. General: Concrete shall be conveyed from the mixer to the forms as quickly as possible by method which will prevent segregation and loss of materials. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid re-handling. Special care shall be exercised to prevent splashing of forms or reinforcement with concrete in advance of pouring. Concrete shall be deposited in a continuous manner until a given unit of construction, as approved by the Architect, has been completed.

Placement of the following concrete shall be prohibited:

1. Partially hardened concrete.
  2. Contaminated concrete.
  3. Re-tempered concrete.
  4. Concrete that has been re-mixed after initial set.
- B. Inspection - Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work.
  - C. General - Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
  - D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
  - E. Placing Concrete in Forms - Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
  - F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.

1. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators 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 set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- G. Placing Concrete Slabs - Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
  3. Maintain reinforcing in proper position during concrete placement.
- H. Cold-Weather Placing - Comply with provisions of ACI 306 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 air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement. Water shall not be heated over 180 deg. F.
  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, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
  4. Concrete work shall be protected by wind breaks, curing compounds, and blanket covers if necessary in order to maintain the concrete in-place temperatures of at least 50 deg. F. for a period of seven (7) days after placing. If high early strength concrete is used, this time period may be reduced to three (3) days
- I. Hot-Weather Placing - When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, when acceptable to Architect.

### 3.9 FINISH OF FORMED SURFACES

- A. Rough Form Finish - For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth Form Finish - For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth Rubbed Finish - Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal.
  1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-Cleaned Finish - Provide grout-cleaned finish to scheduled concrete surfaces that have received smooth form finish treatment.
  1. Combine one part portland cement to 1-1/2 parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final

- color of dry grout will match adjacent surfaces.
2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces - At tops of walls, horizontal offsets, and similar unformed surfaces occurring 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.

### 3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish - Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated. After placing slabs, plane surface to tolerances for floor flatness (Ff) of 15 and floor levelness (Fl) of 13. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish - Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated. After screening, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish - Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - Fl 17. Grind smooth surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish - Where ceramic or quarry tile is to be installed with

thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

- E. Nonslip Broom Finish - Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.  
Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- D. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
- E. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose nonslip aggregate.

### 3.11 CONCRETE CURING AND PROTECTION

- A. General - Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods - Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.
- D. Provide moisture curing by following methods.
  - 1. Keep concrete surface continuously wet by covering with water.
  - 2. Use continuous water-fog spray.
  - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
- E. Provide moisture-cover curing as follows:
  - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete,

placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- F. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:
  - 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces - Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces - Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces, by application of appropriate curing method.
- I. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

### 3.12 SHORES AND SUPPORTS

- A. General - Comply with ACI 347 for shoring and reshoring in multistory construction, and as herein specified.
- B. Extend shoring from ground to roof for structures 4 stories or less, unless otherwise permitted.
- C. Extend shoring at least 3 floors under floor or roof being placed for structures over 4 stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.
- D. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to support work without

excessive stress or deflection.

- E. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

### 3.13 REMOVAL OF FORMS

- A. General - Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

### 3.14 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

### 3.15 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In - Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

- B. Reinforced Masonry - Provide concrete grout for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

### 3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas - Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
- B. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
- C. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- D. Repair of Formed Surfaces - Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.
- E. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
- F. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- G. Repair of Unformed Surfaces - Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
- H. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.



- I. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
- J. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
- K. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- L. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- M. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- N. Repair methods not specified above may be used, subject to acceptance of Architect.

### 3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General - The Owner will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.
  - 1. Sampling Fresh Concrete - ASTM C 172, except modified for slump to comply with ASTM C 94.
  - 2. Slump - ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to

- have changed.
3. Air Content - ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
  4. Concrete Temperature - Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.
  5. Compression Test Specimen - ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.
- C. Compressive Strength Tests - ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
- D. When frequency of testing will provide fewer than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
- E. When total quantity of a given class of concrete is less than 50 cu. yds., Architect may waive strength test if adequate evidence of satisfactory strength is provided.
- F. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- G. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- H. Test results will be reported in writing to Architect, Structural Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- I. Nondestructive Testing - Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

- J. Additional Tests - The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with
- K. ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION 03300

## SECTION 04230 - GLASS UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Glass block set in mortar.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design glass-block grid systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Glass-block grid systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Wind Load: Uniform pressure of 120 MPH acting inward or outward.
  - 2. Floor Live Load: 60 PSF
  - 3. Roof Live Load: 20 PSF

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for glass unit masonry, including vertical and horizontal coursing, anchors, reinforcement, and expansion strips.
- C. Samples for Initial Selection: Manufacturer's actual glass-block units and joint materials involving color selection.
- D. Samples for Verification: Glass-block units.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, documentation including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations for Glass Block: Obtain glass block through single source from single manufacturer.
- B. Source Limitations for Accessory Materials: Obtain each cementitious material admixture, and accessory component through single source from single manufacturer and each aggregate from single source or producer.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup of typical exterior panel, 48 by 48 inches in size.
  - 2. Build mockup of typical exterior wall area containing glass unit masonry assembly as shown on Drawings.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store glass block in unopened cartons on elevated platforms, under cover, and in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store glass-block grid materials in unopened cartons in an enclosed, dry location.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.8 PROJECT CONDITIONS

- A. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F (5 deg C) or when joint substrates are wet.
- B. Weather Limitations: Proceed with installation of glass unit masonry assemblies only when ambient and material temperatures are 40 deg F (5 deg C) or higher.

1. Maintain temperature in installation areas at 40 deg F (5 deg C) or above for 48 hours after installing.

## 1.9 SEQUENCING AND SCHEDULING

- A. Sequence and coordinate completion of glass unit masonry assemblies so sealants can be installed immediately after mortar has attained final set.

## PART 2 - PRODUCTS

### 2.1 GLASS BLOCK

- A. Hollow Glass Block GB-#1: Hollow units made from transparent glass, with manufacturer's standard edge coating.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide Pittsburgh Corning, Decora, LX pattern, 8" x 8" X 4" with the fibrous glass insert or comparable product by one of the following:
    - a. Oberland Glas AG, Bauglas Div.; Solaris Glasstein (Distributed by Glass Blocks Unlimited and North America Glass).
    - b. Pittsburgh Corning Corporation.
    - c. Seves (Distributed by Glass Blocks Unlimited, International Product Supply, and Seves North America).
  3. Glass Color: Colorless.
  4. Pattern: Smooth, undistorted inner and outer faces.
  5. Pattern: Wavy, light-diffusive design on inner faces, and smooth outer faces.
  6. Pattern: Fluted, light-diffusive design, horizontal on one inner face, vertical on other, and smooth outer faces.
  7. Pattern: Linear prismatic design, horizontal on one inner face, vertical on other, and smooth outer faces.
  8. Pattern: Prismatic pyramid, light-diffusive design on inner faces, and smooth outer faces.
  9. Pattern: As indicated by manufacturer's designation.
  10. Pattern: Manufacturer's standard decorative pattern to match Architect's sample.
  11. Pattern: As selected by Architect from manufacturer's full range.
  12. Pattern: Custom decorative pattern to match Architect's design.
  13. Edge-Coating Color: White.
    - a. Provide one color throughout for each pattern indicated.
    - b. Provide multiple colors as indicated for each size and pattern.
  14. Sizes: Manufacturer's standard sizes corresponding to nominal sizes indicated on Drawings.
  15. Square-Block Size: 7-3/4 inches (197 mm)] square by 3-1/8 inches thick.

- B. Sealant: Product recommended by glass-block grid system manufacturer.
1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II. Provide natural color or white cement as required to produce mortar color indicated.
1. Where joints are indicated to be raked out and pointed, gray cement may be used for setting mortar.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Capital Materials Corporation; Flamingo Color Masonry Cement.
    - b. Cemex S.A.B. de C.V.
    - c. Holcim (US) Inc.; Mortamix Masonry Cement
    - d. Lafarge North America Inc.; Lafarge Masonry Cement
    - e. Lehigh Cement Company; Lehigh Masonry Cement
    - f. National Cement Company, Inc.; Coosa Masonry Cement.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Davis Colors; True Tone Mortar Colors.
    - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
    - c. Solomon Colors, Inc.; SGS Mortar Colors.
- F. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Colored Portland Cement-Lime Mix:
- G. Aggregate: ASTM C 144, with 100 percent passing No. 8 (2.36-mm) sieve.
1. For pointing mortar and joints narrower than 1/4 inch (6 mm), use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
  2. White Aggregates: Natural white sand or crushed white stone.
  3. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Water-Repellent Admixture: Liquid polymeric water-repellent mortar admixture that does not reduce flexural bond strength of mortar.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. ACM Chemistries; RainBloc for Mortar.
    - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
    - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
- I. Water: Potable.

## 2.3 GLASS UNIT MASONRY ACCESSORIES

- A. Panel Reinforcement: Ladder-type units, butt welded, not lapped and welded; complying with ASTM A 951 in straight lengths of not less than 10 feet (3 m), and as follows:
1. Exterior Walls: Hot-dip galvanized, carbon-steel wire.
  2. Wire Size: W1.7 or 0.148-inch (3.8-mm) diameter.
  3. Width: 1-5/8 inches (40 mm).
  4. Spacing of Cross Rods: Not more than 16 inches (407 mm) apart.
- B. Panel Anchors: Glass-block manufacturer's standard perforated steel strips, 0.0359 inch (0.9 mm) by 1-3/4 inches (44 mm) wide by 24 inches (600 mm) long, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
- C. Fasteners, General: Unless otherwise indicated, provide Type 304 or Type 316 stainless-steel fasteners at exterior walls and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at interior walls. Select fasteners for type, grade, and class required.
- D. Carbon-Steel Bolts: ASTM A 307, Grade A with hex nuts, if applicable.
- E. Stainless-Steel Bolts: ASTM F 593 (ASTM F 738M), Alloy Group 1 or 2 with hex nuts, ASTM F 594 if applicable.



- F. Postinstalled Anchors: Provide powder-actuated fasteners or metal impact expansion anchors of type and size necessary for installation indicated, according to manufacturer's written instructions unless otherwise indicated.
- G. Asphalt Emulsion: Cold-applied asphalt emulsion complying with ASTM D 1187 or ASTM D 1227.
- H. Mineral-Fiber Expansion Strips: Comply with requirements of fire-rated assembly listing and glass-block manufacturer.
  - 1. Use for fire-rated assemblies.
- I. Plastic-Foam Expansion Strips: Polyethylene foam complying with requirements of glass-block manufacturer; 3/8 inch (9 mm) thick by 2-1/2 inches (63 mm) wide.
  - 1. Use plastic-foam expansion strips for non-fire-rated assemblies.
- J. Sealants: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Section 07901 "Joint Sealants."
  - 1. Single-component, neutral-curing silicone sealant.
  - 2. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 3. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- K. Sealant Accessories: Provide sealant accessories, including primers, bond-breaker tape, and cylindrical sealant backing, that comply with applicable requirements in Section 07901 "Joint Sealants."

## 2.4 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, or antifreeze compounds unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar.
  - 2. For mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.
  - 3. For pointing mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.
  - 4. Limit cementitious materials in mortar to portland cement and lime.
- B. Mortar for Glass Unit Masonry Assemblies: Provide mortar, mixed according to glass-block manufacturer's listing with testing and inspecting agency, for fire-resistance rating indicated.

- C. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
  - 1. Mix to match Architect's sample.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine sills, jambs, and heads surrounding glass unit masonry assemblies for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLING GLASS BLOCK WITH MORTAR

- A. Apply a heavy coat of asphalt emulsion to sill and adhere expansion strips to jambs and heads with asphalt emulsion. Allow asphalt emulsion to dry before placing mortar. Trim expansion strips to width required to fit glass block and to full lengths of heads and jambs.
- B. Set glass block with completely filled bed and head joints, with no furrowing, accurately spaced and coordinated with other construction. Maintain 3/8-inch (10-mm) exposed joint widths unless otherwise indicated.
- C. Install panel reinforcement in horizontal joints at spacing indicated and continuously from end to end of panels; comply with the following requirements:
  - 1. Vertical Spacing of Panel Reinforcement for Exterior Panels: Every other course but not more than 16 inches (407 mm) o.c., starting with first course above sill.
  - 2. Vertical Spacing of Panel Reinforcement for Interior Panels: Not more than 16 inches (407 mm) o.c.
  - 3. Do not bridge expansion joints with panel reinforcement.
  - 4. Place panel reinforcement in joints immediately above and below all openings within glass unit masonry assemblies.
  - 5. Lap panel reinforcement not less than 6 inches (150 mm) if more than one length is necessary.
  - 6. Embed panel reinforcement in mortar bed by placing lower half of mortar bed first, pressing panel reinforcement into place and covering with upper half of mortar bed.
- D. Install panel anchors at locations indicated and in same horizontal joints where panel reinforcement occurs. Extend panel anchors at least 12 inches (300 mm) into joints, and bend within expansion joints at edges of panels and across the head. Attach panel anchors as follows:

1. For in-place unit masonry assemblies and concrete, attach panel anchors with 1/4-inch- (6-mm-) diameter bolt-size, postinstalled anchors, two per panel anchor.
  2. For new unit masonry assemblies, embed other ends of panel anchors, after bending portions crossing expansion joint, in horizontal mortar joints closest in elevation to joints in glass unit masonry assemblies containing panel anchors.
  3. For steel members, attach panel anchors with 1/4-inch- (6-mm-) diameter through bolts and nuts or bolts in tapped holes in steel members.
- E. Use rubber mallet to tap units into position. Do not use steel tools, and do not allow units to come into contact with metal accessories and frames.
- F. Use plastic spacers in mortar joints to produce uniform joint widths and to prevent mortar from being squeezed out of joints.
1. If temporary wedges are used, remove them after mortar has set and fill voids with mortar.
- G. Keep expansion joints free of mortar.
- H. Rake out joints indicated to be pointed to a uniform depth sufficient to accommodate pointing material, but not less than joint width.
1. If temporary wedges are used, remove them before raking out and pointing joints.
  2. Point joints at both faces of exterior panels with mortar.
- I. Point joints with mortar by filling raked joints and voids. Place and compact pointing mortar in layers not more than 3/8 inch (10 mm) thick. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
1. Tool exposed joints slightly concave when pointing mortar is thumbprint hard. Use a smooth plastic jointer larger than joint width.
- J. Point joints by filling with sealant to comply with requirements in Section 07901 "Joint Sealants."
- K. Clean glass unit masonry assemblies as work progresses. Remove mortar fins and smears immediately, using a clean, wet sponge or a scrub brush with stiff fiber bristles. Do not use harsh cleaners, acids, abrasives, steel wool, or wire brushes when removing mortar or cleaning glass unit masonry assemblies.
- L. Install sealant at jambs, heads, mullions and other locations indicated. Prepare joints, including installation of primer and bond-breaker tape or cylindrical sealant backing, and apply elastomeric sealants to comply with requirements in Section 07901 "Joint Sealants."
- M. Construction Tolerances: Set glass block to comply with the following tolerances:
1. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet or more.

2. Variation from Level: For bed joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet (3 mm in 3 m) or more.
3. Variation of Location in Plan: For location of elements in plan do not vary from that indicated by more than plus or minus 1/4 inch (6 mm).
4. Variation in Mortar-Joint Thickness: Do not vary from joint thickness indicated by more than plus or minus 1/16 inch (1.5 mm).
5. For faces of adjacent exposed units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

### 3.3 CLEANING

- A. On surfaces adjacent to glass unit masonry assemblies, remove mortar, sealants, and other residue resulting from glass-block installation, in a manner approved by manufacturers of materials involved.
- B. Remove excess sealants with commercial solvents according to sealant manufacturer's written instructions. Exercise care not to damage sealant in joints.
- C. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Start at top of panel using generous amounts of clean water. Remove water with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION 04230

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Concrete masonry units.
  - 2. Mortar and grout.
  - 3. Reinforcing steel.
  - 4. Masonry joint reinforcement.
  - 5. Miscellaneous masonry accessories.
- B. Related Sections include the following:
  - 1. Division 7 Section "Bituminous Dampproofing" for dampproofing applied to interior face of exterior wall.
  - 2. Division 7 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.

#### 1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths 2,000psi at 28 days. Determine compressive strength of masonry by testing masonry prisms according to ASTM C 1314.
  - 1. For Concrete Unit Masonry: As indicated.

#### 1.5 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
  - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." [Show elevations of reinforced walls.]

- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
  - 1. Each type of masonry unit required.
  - 2. Mortar complying with property requirements of ASTM C 270.
  - 3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
- E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
  - 1. Each type of masonry unit required.
  - 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  - 3. Each material and grade indicated for reinforcing bars.  
Each type and size of joint reinforcement.
- F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
  - 1. When ambient temperature exceeds 100 deg F or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 0.1 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.

1. Provide special shapes for lintels, control joints (sash blocks), bonding, and other special conditions.
2. Provide square-edged units for outside corners.

B. Concrete Masonry Units: ASTM C 90 and as follows:

1. Weight Classification: Normal weight.
2. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on Drawings:
  - a. 8 inch nominal: 7-5/8 inch actual.
  - b. 8 inch nominal: 7-5/8 inch actual, bullnose corner units.
3. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
4. Compressive strength = 2000 psi, minimum, based on net area; f'm = 1500 psi minimum.

0.2 WATER LEAKAGE-CONTROLLING PLAIN AND SPLIT-FACE CONCRETE MASONRY UNITS

A. Comply with ASTM C 90 and as follows:

1. Compressive strength = 2000 psi, minimum, based on net area; f'm = 1500
2. psi minimum.
3. Weight Classification: Normal weight.
4. Provide Type II, moisture-controlled units.
5. Sizes:
  - a. Sizes; Split-Face Block Regular 8 inch Deep: 7-5/8" x 7-5/8" x 15-5/8" plain and integral colored.
  - b. Sizes; Split-Face Block Corner 8 inch Deep: 7-5/8" x 7-5/8" x 15-5/8" plain and integral colored.
  - c. 8 inch nominal: 7-5/8 inch actual units, plain and integral colored.
6. Finish: Split-face finish.
7. Color: The exterior concrete masonry units both Regular and Split-Face are currently colored. As selected by Architect from manufacturer's standard color range.
8. Integral Water Repellent: Provide units produced with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of the test specimen.

B. Products:



1. Control-Blok including Rheomix Rheopel polymeric, integral water-repellent admixture system.
2. Dry-Block including Dry-Block integral water repellent admixture for block and/or mortar.

C. Source Quality Control

1. Tests: Perform one test for each production set-up and each 10,000 units for this project.
  - a. Test in accordance with ASTM C 140 for compressive strength, density, and absorption.
  - b. Test in accordance with licensor's quality control program for water permeation resistance.

2.3 REINFORCING STEEL

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60 (Grade 400).

2.4 MASONRY JOINT REINFORCEMENT

- A. General: ASTM A 951 and as follows:
1. Mill galvanized, carbon- steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls.
  2. Wire Size for Side Rods: W2.8 or 0.188-inch diameter.
  3. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
  4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
- B. For single-wythe masonry, provide truss or ladder type with single pair of side rods and cross rods spaced not more than 16 inches o.c.

2.5 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- C. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.
- D. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056,

Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from PVC.

- B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication.
  - 1. Provide units with either two loops or four loops as needed for number of bars indicated.

## 2.7 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

## 2.8 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
  - 1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
  - 2. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
  - 3. For masonry below grade, in contact with earth, and where indicated, use Type M.
  - 4. For reinforced masonry and where indicated, use Type S.
  - 5. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or

coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
  2. Verify that foundations are within tolerances specified.
  3. Verify that reinforcing dowels are properly placed.
  4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

### 3.2 INSTALLATION, GENERAL

- A. Thickness: Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  1. Mix units from several pallets or cubes as they are placed.

### 3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20

feet, nor 1/2 inch maximum.

- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
  - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal width dimensions at corners or jambs.
- D. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

- H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- I. Build non-load-bearing interior partitions to height indicated.
  - 1. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
  - 1. With full mortar coverage on horizontal and vertical face shells.
  - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
  - 3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

### 3.6 MASONRY JOINT REINFORCEMENT

- A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 24 inches beyond openings.
    - a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span

through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

- B. Form control joints in concrete masonry as follows:
  - 1. Install preformed control-joint gaskets designed to fit standard sash block.

### 3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
  - 1. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
  - 1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

### 3.9 FIELD QUALITY CONTROL

- A. Contractor will engage a qualified independent testing agency to perform field quality-control testing indicated below.
  - 1. Payment for these services will be made by Contractor.
  - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar properties will be tested per ASTM C 780
- D. Grout will be sampled and tested for compressive strength per ASTM C 1019.
- E. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.

### 3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
  - 4. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

### 3.11 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810

## SECTION 05500 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Steel framing and supports.
  - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- B. Related Sections include the following:
  - 1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
  - 2. Division 4 Section "Unit Masonry Assemblies" for installing , anchor bolts, and other items indicated to be built into unit masonry.

#### 1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
  - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  - 2. Provide templates for anchors and bolts specified for installation under other Sections.

#### 1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

#### 1.5 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.



## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. requirements apply to product selection:
  - 1. Products: Subject to compliance with requirements, provide one of the products specified.

## 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

## 2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

## 2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).

## 2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
  - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2. Products:

- a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
  - b. Carboline Company; Carbozinc 621.
  - c. ICI Devoe Coatings; Catha-Coat 313.
  - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
  - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
  - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
  - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

## 2.8 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.

## 2.9 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

## 2.10 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
  - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

### 3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500

## SECTION 06100 - ROUGH CARPENTRY

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Wood furring, grounds, nailers, and blocking.

## 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

## PART 2 - PRODUCTS

## 2.1 LUMBER, GENERAL

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  - 1. Provide dressed lumber, S4S, unless otherwise indicated.
  - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

## 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
- B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft.

### 2.3 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

### 2.4 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

### 2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. CABO NER-272 for power-driven staples, P-nails, and allied fasteners.
  - 2. Published requirements of metal framing anchor manufacturer.
  - 3. "Table 1705.1--Fastening Schedule," of the Standard Building Code.
- E. Use galvanized wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.
- F. Use hot-dip galvanized or stainless-steel nails where rough carpentry is in ground contact, or in area of high relative humidity.

### 3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide pressure treated wood grounds in gypsum drywall partitions for support of plumbing fixtures, toilet accessories, wall-mounted fixtures and furnishings and hardware.
  - 1. Provide solid wood grounds, minimum 2 x 4 lumber, in all partitions scheduled to receive wall-mounted door bumpers. Position directly behind and centered on bumpers. Screw attach securely to metal studs or masonry as applicable.

END OF SECTION 06100

## SECTION 07100 - UNDERSLAB WATERPROOFING BARRIER MEMBRANE

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A All of the Contract Documents, including General and Supplementary Conditions and Division I General Requirements apply to the work of this section.

## 1.2 SCOPE

- A The work of this section includes, but is not limited to, the following:
- 1 Installation of waterproofing barrier membrane where indicated in the drawings.
- B Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
- 1 Section 03300 - Cast-In-Place Concrete

## 1.3 REFERENCE STANDARDS

American Society for Testing and Materials (ASTM):

D146	Sampling and Testing Bitumen Saturated Felts and Fabrics
D412	Tests for Rubber Properties in Tension
D570	Test Method for Water Absorption of Plastics
E96(b)	Tests for Water Vapor Transmission of Materials in Sheet Form
E154	Test for Puncture Resistance
F2130	Resistance to Penetration by Pesticides
D4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
D4533	Test Method for Trapezoid Tearing Strength of Geotextiles
D1434	Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting

General Services Administration, Public Building Service: GSA-PBS-07115 Guide Specification for Elastomeric Waterproofing.

Texas A & M Method - Resistance to penetration by termites.

Radon Reduction Technology Laboratory:

Resistance to Permeance by Radioactive Radon Gas

Resistance to Diffusion by Radioactive Radon Gas

Qualifies under LEED:

IAQ Credit 5 - Indoor Chemical and Pollutant Source Control (below grade toxin barrier / reduced pesticide usage).

SS 3 - Brownfield redevelopment (can be used for pesticide contaminated sites)

Can be considered for ID 1 - Innovation in design.

## 1.4 SUBMITTALS

- A. General: Submit in accordance with General Conditions.
- B. Product Data: Submit manufacturer's product literature and installation instructions.



- C. Samples: Submit representative samples of the following for approval:  
Sheet Membrane  
Fabric Tape and Accessories
- D. Subcontractor's approval by Manufacturer: Submit document stating manufacturer's acceptance of subcontractor.
- E. Warranty: Submit a sample of manufacturer's warranty identifying the terms and conditions stated in 1.09.
- F. Substitutions: To be accepted as an equal a product must have demonstrated in documented field trials over a minimum 5 year period the ability to reduce cracking and to maintain a seal even if the slab above it has cracked.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Sheet Membrane Waterproofing Barrier System must be manufactured by a company with a minimum of 10 years experience in the production and sales of membrane waterproofing materials.
- B. Applicator Qualifications: A firm having at least 3 years experience in applying these types of specified materials and specifically accepted in writing by the membrane system manufacturer.
- C. Materials: For each type of material required to complete the work of this section, provide primary materials which are the products of a single manufacturer.
- D. Pre-Application Conference: A pre-application conference shall be held to establish procedures and to review conditions, installation procedures and coordination with other related work. Meeting agenda shall include review of special details and flashing.
- E. Manufacturer's Representative: Arrange to have trained representative of the manufacturer on site periodically to review installation procedures.

#### 1.6 DELIVERY, STORAGE, HANDLING

- A. Materials should be delivered to site in manufacturer's original, unopened containers with original labels attached and bearing the following information:  
Name of material.  
Manufacturer's batch codes including date of manufacture.  
Materials Safety Data Sheets.
- B. Membrane and accessories should be unloaded and stored carefully. Cartons and containers must be protected from weather, sparks, flames, excessive heat, cold and lack of ventilation. Do not stack membrane higher than 5 feet vertically, nor double stack cartons. Cartons should be stored on pallets and covered to protect from water damage. Any damaged material must be removed from the site and disposed of in accordance with applicable regulations.

#### 1.7 PROJECT CONDITIONS

- A. Work should be performed only when existing and forecasted weather conditions are within the limits established by the membrane manufacturer. Do not apply membrane if the temperature is below - 25°F.
- B. Proceed with installation only when substrate construction and preparation work is complete. Ensure that subsoil is approved by architect or geotechnical firm.
- C. Warn personnel against breathing of vapors and contact with skin and eyes; wear appropriate protective clothing and respiratory equipment.
- D. Keep flammable products away from spark or flame. Post "No Smoking" signs. Do not allow spark producing equipment to be used during application and until all vapors have dissipated.
- E. Maintain work area in a neat and workmanlike condition. Remove empty cartons and rubbish from the site daily.

### 1.8 WARRANTY

- A. Provide a written 5 year material warranty from the manufacturer upon completion and acceptance of the installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide Polyguard Underseal™ XT 850 Underslab Waterproofing Barrier System as manufactured by Polyguard Products, Inc., Ennis, Texas 75120-0755, phone: 800-541-4994.

### 2.2 PRODUCTS

- A. High Strength Waterproofing: Shall be Polyguard Underseal™ XT 850 Underslab Waterproofing Barrier Membrane, a 95 mil rubberized asphalt membrane consisting of a strong sheet membrane with a facing of extremely high strength polyethylene backing laminated to a thick layer of proprietary stress absorbing / waterproofing formulation, with a top layer of nonwoven geotextile fabric:
- B. Accessory Products:
  - Fabric Tape: Shall be Polyguard Underseal™ XT Fabric Tape
  - Surface Primer: Shall be Polyguard 650 LT Liquid Adhesive or California Sealant
  - Liquid Membrane: Shall be Polyguard LM95

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Before starting any waterproofing work, the applicator shall thoroughly inspect all surfaces for any conditions detrimental to the proper completion of the work. Should any deficiencies exist, the General Contractor should be made aware of such in writing immediately. Do not proceed with application until all unsatisfactory conditions are corrected.

### 3.2 SURFACE PREPARATION:

- A. Refer to manufacturer's product literature for surface preparation requirements. Surfaces should be structurally sound. Remove debris or any other foreign materials which may damage the membrane system. Use repair materials that are acceptable by the sheet membrane manufacturer.
- B. Soil Condition  
Level, tamp or roll aggregate, sand or earth base.

### 3.3 INSTALLATION:

- A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1634-98.
- B. Membrane Installation - Horizontal Surfaces:
  - 1. Unroll waterproofing barrier membrane with longest dimension parallel with direction of pour.
  - 2. Place extremely high strength backing to the soil and fabric to the concrete.
  - 3. Lap waterproofing barrier membrane over footings and seal to foundation walls.
  - 4. Overlap side seams using the 4" edge trim seal. Clean polyethylene backing of waterproofing barrier membrane prior to application on the 4" edge seal with 30% Isopropyl Alcohol.
  - 5. End laps should be overlapped a minimum of 6" and addressed by applying a coat of liquid adhesive approximately 150-200 sq. ft. per gallon to fabric side of waterproofing barrier membrane and placing adjacent sheet on top. Roll to assure full adhesion.
  - 6. After application of end lap use liquid adhesive to prime seam and apply a 12" piece of fabric tape centered over seam to seal.
  - 7. If annular space of pipe through opening is 1/2" or less apply liquid adhesive to fabric side of membrane. Apply a 3/4" cant/fillet around pipe penetration extending onto fabric side of waterproofing barrier membrane and pipe a minimum of 3".
  - 8. If annular space of pipe through opening exceeds 1/2" then a patch of fabric seal tape is required. Apply a heavy coat approximately 150 - 200 sq. ft. per gallon liquid adhesive onto the fabric side of the waterproofing barrier membrane extending 6" beyond pipe. Apply a patch 6" larger than pipe diameter. Press or roll patch firmly to obtain full adhesion to waterproofing barrier membrane. Apply another coat of liquid adhesive to the fabric side of the fabric tape patch and apply liquid membrane.
  - 9. Steel reinforcements will be applied directly over the waterproofing barrier membrane. It is utmost important that reinforcement (rebar) chairs that are used are compatible with the system. Steel chairs and bolster be plastic dipped or have plastic caps.
  - 10. Precaution should be taken to protect the waterproofing barrier membrane during placement of reinforcing or concrete. Visually inspect waterproofing barrier membrane prior to pouring of concrete for any punctures or damage to membrane which needs to be repaired. Patch any damaged areas by ap-

plying the liquid adhesive at a rate of 150-200 sq. ft. per gallon to fabric side of waterproofing barrier membrane and apply a patch of fabric tape.

11. Prior to slab pour all standing water must be removed from the membrane.

END OF SECTION 07100

## SECTION 07190 - WATER REPELLENTS

## PART 1 GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 RELATED SECTIONS

- A. Section 04810 – Unit Masonry Assemblies: Unpainted Concrete Block walls to receive water repellent.
- B. Section 07190, Joint Sealants, is to be applied to all non-painted, exterior concrete masonry unit walls from the top of the foundation to the top of the cmu wall to create a water resistant condition.

## 1.3 SUBMITTALS

- A. Submit in accordance with Section 01330 – Submittal Procedure.
- B. Product Data: Submit manufacturer's product data sheet for the specified clear water repellent material. Submit description for protection of surrounding areas and non-masonry surfaces, surface preparation, application, and final cleaning.
- C. Applicator Qualifications: Submit qualifications of applicator; stating applicator has a minimum of three (3) years experience using the specified or a similar product. Provide a list of several most recently completed projects, including project name and location, names of owner and architect, and description of products used, substrates, and method of application.
- D. Environmental Regulations: Submit applicable environmental regulations.
- E. VOC Certification: Submit certification that water repellents furnished comply with regulations controlling content of volatile organic compounds (VOC).

## 1.4 QUALITY ASSURANCE

- A. Applicator Qualifications:
  - 1. Experience in the application of the specified or similar products.
  - 2. Employs persons trained for the application of the specified or similar products.
- B. Pre-Application Meeting: Convene a pre-application meeting one (1) week before the start of application of water repellents. Require attendance of parties directly affecting work of this section, including the Contractor, Architect and Applicator. Review environmental regulations, test panel procedures, protection of surrounding areas and non-masonry surfaces, surface preparation, application, field quality control, final cleaning, and coordination with other work.

## 1.5 ENVIRONMENTAL REGULATIONS

- A. Comply with applicable federal, state, and local environmental regulations.

#### 1.6 TEST PANELS

- A. Before full-scale application, apply water repellent to test panels constructed of substrate materials to be used on actual project to determine coverage rates, compatibility, effectiveness, and aesthetics.
- B. Apply water repellents to test panels in accordance with manufacturer's written instructions. Allow 24 hours or until test panels are thoroughly cured before evaluating final appearance and results. Do not begin full-scale application until test panels are inspected and approved by the Architect.
- C. Allow 7 days of cure time prior to testing using RILEM or MAT methods.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to the job site in original, tightly sealed, unopened containers, with labels clearly identifying product name and manufacturer. Verify that the product matches that of the original sample applied on the test panel.
- B. Storage and Handling: Store containers upright in a cool, dry place. Keep away from sparks and open flame. Store and handle materials in accordance with manufacturer's written instructions.

#### 1.8 PROJECT CONDITIONS

- A. Surface Preparation: Contractor or Applicator shall be responsible for providing a clean, dry substrate free from oil, dirt, grease, efflorescence, form release agents or any other coating, which may inhibit penetration and adhesion of water repellent. This requirement applies to new construction, renovation or remedial projects. Substrate must be completely dry prior to applying product.
- B. Environmental Requirements:
  - 1. Temperature: Product may be applied at any temperature providing that there is no frozen moisture present in the substrate. When applied at temperatures below 40 degrees Fahrenheit the product may cure at a slower rate. Optimal temperature range for application is between 40° F (5° C) and 95° F (35° C).
  - 2. Do not apply material if the substrate is wet or contains frozen moisture. Allow substrate to dry for a minimum of 48 hours after rain or 72 hours after power washing.
  - 3. Do not apply material during inclement weather or if precipitation is expected within 2 hours.
  - 4. Do not use spray methods of application under windy conditions.

## C. Protection:

1. Special precautions should be taken to avoid fumes from entering the building being treated. Ventilation systems and fresh air intakes should be turned off and covered.
2. Protect shrubs, metal, glass, vehicles, and other building hardware from over-spray.

## 1.9 WARRANTY

## A. 5 Year Horizontal Warranty &amp; 10 Year Vertical Warranty:

1. Prior to commencement of application of product, submit Sections 1 and 2 of manufacturer's Warranty Application Form to manufacturer for pre-approval of warranty.
2. After completion of the project, submit Section 3 to manufacturer for final approval. Manufacturer will provide written warranty to building owner upon approval.

## PART 2 PRODUCTS

## 2.1 MANUFACTURER

Professional Products of Kansas, Inc., 4456 S. Clifton, Wichita, KS 67216, (800) 676-7346, (316) 522-9300, Fax (316) 522-9346, [www.watersealant.com](http://www.watersealant.com)

## 2.2 WATER REPELLENTS

A. Penetrating silicone rubber water repellent for use on vertical porous concrete, porous brick, sandstone, limestone, wood, and stucco. Penetrates without altering the natural appearance of the substrate (In some cases, the substrate may be slightly darkened or enhanced). Will not form a surface film or gloss. Inorganic, it is not affected by UV rays, salts, acid rain, etc. Breathable, it allows moisture vapor to escape while preventing liquid penetration. Flexible, it bridges hairline cracks and allows for building movement. Inhibits mold and mildew.

1. Form: Liquid
2. Color: Clear
3. Active Substance: RTV Silicone Rubber
4. Percent Active Material: 15%
5. Flash Point: 105°

B. The water sealant product listed above is selected as a standard of quality. Application procedure and coverage rates must be in conformance with results of testing samples submitted, recommendation of application rates suggested, approved manufacturers standards and as a minimum, that specified herein.

1. Proposed alternate products must be equal in terms of chemical composition and performance standards. Products must be a penetrating, permanent waterproofing treatment using a silicone rubber base and not contain any paraffin waxes, ure-

thanes or polysiloxanes. Silane and siloxane based products will not be considered due to of their lack of elastomeric properties.

2. The concentrate of the water repellent may be reduced to 8% if the water absorption of the CMU is determined to be low enough to allow the reduction. The method of testing shall be the RILEM II.4 test on the CMU units to be used on the project. A sample block can be sent to a local dealer who performs the test, or to the Manufacturer for testing. Local testing can be performed by Mr. Alan George of Conspec Materials, Inc. - 5403 West Crenshaw Street – Tampa, FL 33634. Telephone No (813)888-9893.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify the following:
  1. The required joint sealants have been installed.
  2. New masonry and mortar has cured a minimum of 28 days.
  3. Surface to be treated is clean, dry, and contains no frozen moisture.
  4. Environmental conditions are appropriate for application.

### 3.2 PROTECTION

- A. Protect surrounding areas, glass, landscaping, building occupants, pedestrians, vehicles, and non-masonry surfaces during the work from contact with water repellents.
- B. Special precautions should be taken to prohibit fumes from entering the building being treated. Ventilation systems and fresh air intakes should be turned off and covered.

### 3.3 SURFACE PREPARATION

- A. Clean all dirt, oil, grease, mold, mildew, efflorescence, form release agents, curing compounds, or any other coating or material from surfaces that interfere with penetration, performance, adhesion, or aesthetics of water repellents. Rinse thoroughly, to remove cleaner residues. Allow surfaces to dry completely before application of water repellents. Extremely dense concrete surfaces should be prepared using soda, sand, or shot blasting to facilitate penetration.
- B. Repair, patch, and fill all cracks, voids, defects, and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of water repellents.
- C. Seal all open joints.
- D. Allow new masonry and concrete construction and repointed surfaces to cure for a minimum of 28 days before application of water repellents.

### 3.4 APPLICATION



- A. Apply water repellents to substrate in accordance with manufacturer's written instructions, environmental regulations, and application procedures determined from the test panel results and as approved by the Architect.
- B. Apply to clean, dry, cured, and properly prepared surfaces approved by Architect.
- C. Apply material as shipped by the manufacturer. Do not dilute.
- D. Do not apply to below-grade surfaces.
- E. Do not apply to painted surfaces.
- F. Do not apply to compensate for structural or material defects in substrates.
- G. Do not apply to substrates such as asphalt or polystyrene, which may be affected by the solvent carrier.
- H. Apply material using a high-volume, low pressure, pump-up sprayer (between 40-50 psi), with a fan tip and solvent resistant fittings. Roller, or brush of natural bristle or foam may be used in areas where spray application is not appropriate. Do not use Airless spray equipment.
  - 1. Vertical Applications: Apply in a flood coat, from top to bottom, being sure to obtain a 4 to 6 inch rundown of product from the point where the spray makes contact with the surface. Work all the way down the building covering the rundown as you go. Avoid excessive overlapping.
    - a. Some substrates may require back rolling after product is applied to smooth out any rundown lines.
    - b. Brush any excess product that may accumulate on ledges and other areas that may hold excess material.
  - 2. Horizontal Applications: If surface pooling or puddling appears, back-roll, brush, wipe up, or broom away excess material. Complete penetration must occur. Avoid excessive overlapping. Material curing on surface may cause whiting or slickness.

### 3.5 FIELD QUALITY CONTROL

- A. Inspection: Inspect the water repellent work with the Contractor, Architect and applicator. Compare with test panel results approved by the Architect. Determine if the substrates are suitably protected by the water repellents.

### 3.6 FINAL CLEANING

- A. Upon completion of all work covered in a specification, the Contractor shall remove all equipment, material and debris, leaving the area in an undamaged and acceptable

condition. Dispose of water repellent containers according to state and local environmental regulations.

B. Repair, restore, or replace to the satisfaction of the Architect, all materials, landscaping, and non-masonry surfaces damaged by exposure to water repellents.

END OF SECTION 7190

## SECTION 07411 - METAL ROOF AND FASCIA PANELS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Factory-formed and field-assembled, standing-seam metal roof and fascia panels.
  - 2. Continuous ridge vent
  - 3. Underlayment
  - 4. Sheathing

#### 1.3 DEFINITIONS

- A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.
- B. Steel Sheet Thickness: Minimum thickness of base metal without metallic coatings or painted finishes.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of roof area when tested according to ASTM E 283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: Negative 1.57 lbf/sq. ft. (75 Pa).
- C. Water Penetration: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).

2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. (720 Pa) and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
  3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.
- E. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
1. Wind Loads: Determine loads based on the following minimum design wind pressures:
    - a. Uniform pressure of 70 lbf/sq. ft., acting inward or outward.
- F. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- G. Product shall have current approval from the State of Florida Building Commission or a Miami-Dade Notice of Acceptance.

## 1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
    - a. Flashing and trim.
  2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
  - 1. Metal Roof Panels: 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other metal roof panel accessories.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:
  - 1. Metal Roof Panels: Include reports for air infiltration, water penetration, and structural performance.
- E. Warranties: Special warranties specified in this Section.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
  - 1. Installer's responsibilities include fabricating and installing metal roof panel assemblies.
  - 2. Engineering Responsibility: Preparation of data for metal roof panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal roof panels and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

#### 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal roof panels without field measurements, or allow for field-trimming of panels. Coordinate roof construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

#### 1.9 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations.
- B. Coordinate metal panel roof assemblies with flashing, trim, and construction of decks, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including rupturing, cracking, or puncturing.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Products: Subject to compliance with requirements, provide one of the products specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
  3. Basis-of-Design Product: The design for each metal roof panel specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

### 2.2 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet with Coil Coating: Steel sheet metallic coated by the hot-dip process to comply with ASTM A 755/A 755M.
1. Aluminum Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
  2. Surface: Smooth, flat finish.
  3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
  4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Panel Sealants:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
  2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in

metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.

3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

### 2.3 UNDERLAYMENT MATERIALS (where indicated)

- A. Self-Adhering, Polyethylene-Faced Sheet: ASTM D 1970, 40 mils (1.0 mm) thick minimum, consisting of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.

1. Products:

- a. Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc.; Dri-Start "A."
- b. Grace, W. R. & Co.; Grace Ice and Water Shield.
- c. Henry Company; Perma-Seal PE.
- d. Johns Manville International, Inc.; Roof Defender.
- e. NEI Advanced Composite Technology; AC Poly Ice and StormSeal.
- f. Owens Corning; WeatherLock.
- g. Polyguard Products, Inc.; Polyguard Deck Guard.
- h. Protecto Wrap Company; Rainproof TM.

- B. Slip Sheet: Building paper, minimum 5 lb/100 sq. ft. (0.24 kg/sq. m), rosin sized.

### 2.4 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating.

1. Fasteners for Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM or neoprene sealing washer.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.

- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

### 2.5 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.



1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.
1. Basis-of-Design Product: D.C.S.M. VS-150 Series, 16" O.C. Standing Seam or a comparable product of one of the following:
  2. Manufacturers:
    - a. D.C.S.M. 5700 Washington Street, Naples, FL 34109 (239) 594-0530
    - b. Berridge Manufacturing Company.
    - c. Atas International, Inc.
    - d. Or a product by another manufacturer approved as equal by the architect.
  3. Material: Galvalume steel sheet, 0.028 inch 24 ga. thick.
    - a. Exterior Finish: Unpainted, Galvalume, Z4ga.
    - b. Color: As selected by Architect from manufacturer's full range.
  4. Clips Floating to accommodate thermal movement.
    - a. Material: 0.050 inch – 18 ga. thick, stainless steel sheet.
  5. Joint Type: Double fold.
  6. Panel Coverage: 16 inches (406 mm).
  7. Panel Height: 2.5 inches (64 mm).
  8. Uplift Rating: UL 90.

## 2.6 METAL FASCIA PANELS

- A. General: Provide factory-formed metal fascia panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Metal Fascia Panels: Match profile and material of metal roof panels.
1. Finish: Galvalume, 24 ga.
  2. Sealant: Factory applied within interlocking joint.

## 2.7 ACCESSORIES

- A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
  2. Clips: Minimum 0.0500-inch- (18 ga.) thick, stainless-steel panel clips designed to withstand negative-load requirements.
  3. Cleats: Mechanically seamed cleats formed from minimum 0.0250-inch- (0.64-mm-) thick, stainless-steel or nylon-coated aluminum sheet.
  4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
- C. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- D. Continuous Ridge Vent: Standing seam profile to accommodate 1 ½" standard seam roof panels, 24 ga., Galvalume by D.C.S.M., Naples, FL. Provide all necessary accessories and attachments.

## 2.8 FABRICATION

- A. General: Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.
  - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

## 2.9 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
  1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Substrate (Plywood Sheathing): Install plywood sheathing over roof structure where indicated in drawing details.

- C. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

### 3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment (where indicated): Install self-adhering sheet underlayment, wrinkle free, on insulation under metal roof panels. Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof, in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
- B. Install flashings to cover underlayment to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."
- C. Apply slip sheet over underlayment before installing metal roof panels.

### 3.4 METAL ROOF PANEL INSTALLATION, GENERAL

- A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Field cutting of metal roof panels by torch is not permitted.
  - 2. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.
  - 3. Provide metal closures at each side of ridge and hip caps.
  - 4. Flash and seal metal roof panels with weather closures at eaves, and at perimeter of all openings. Fasten with self-tapping screws.
  - 5. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 6. Install ridge and hip caps as metal roof panel work proceeds.
  - 7. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.
- B. Fasteners:
  - 1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types

of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

### 3.5 FIELD-ASSEMBLED METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
- B. Fascia Panels: Align bottom of panels and fasten with clips similar to roof panels. Flash and seal panels with weather closures along lower panel edges, and at perimeter of all openings.

### 3.6 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

- C. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

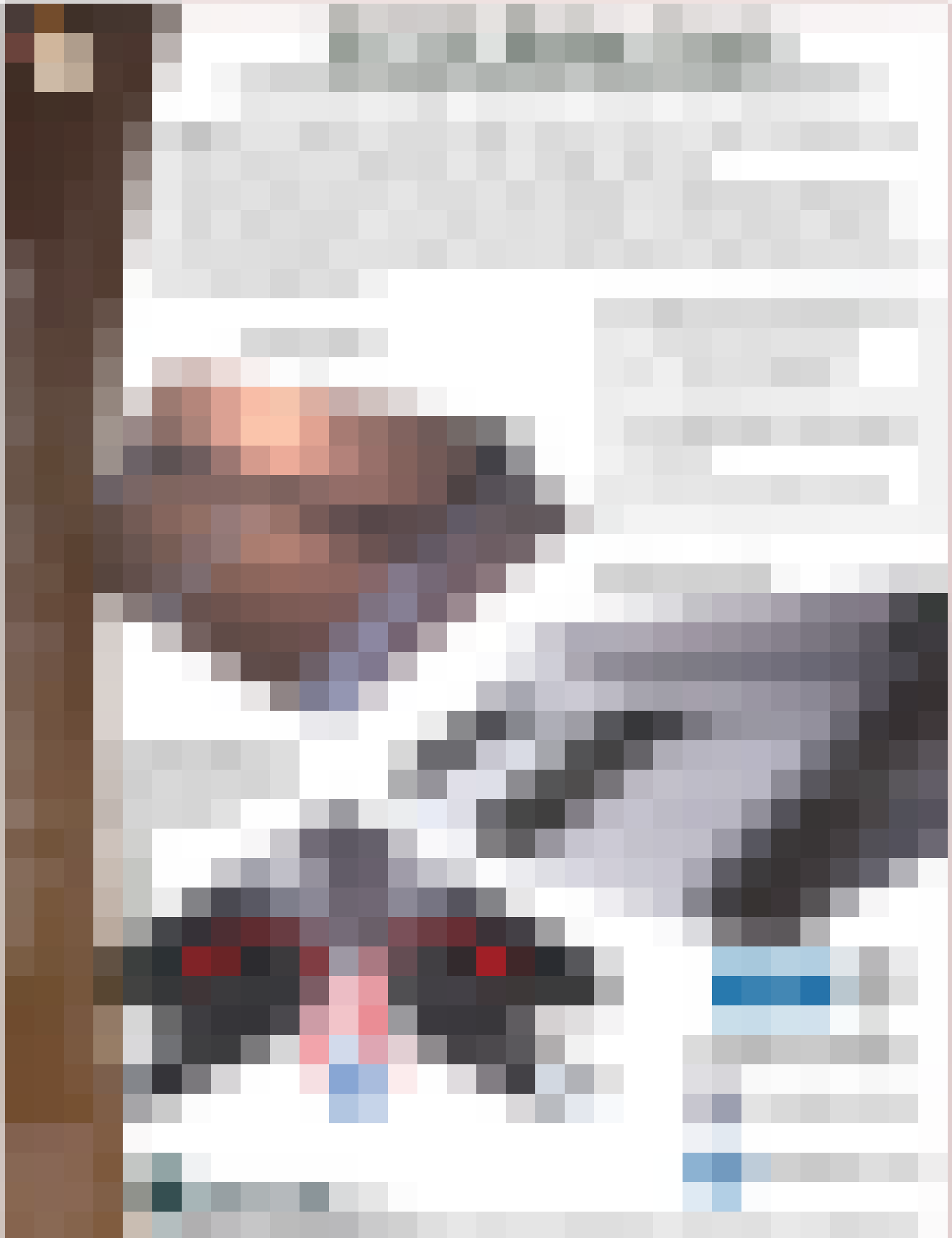
### 3.7 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.8 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07411



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## SECTION 07620 - SHEET METAL FLASHING, FASCIA, AND TRIM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes sheet metal flashing and trim in the following categories:
  - 1. Metal flashing.
  - 2. Reglets

#### 1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.
- B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone:
  - 1. Wind Zone 2: Wind pressures of 31 to 45 psf.

#### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.
- C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

#### 1.6 PROJECT CONDITIONS

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

## PART 2 - PRODUCTS

## 2.1 METALS

- A. Mill-Finish Aluminum Sheet: ASTM B 209, 3003-H14, with a minimum thickness of 0.040 inch, unless otherwise indicated.
- B. Galvanized Steel Sheet: ASTM A 526, G 90, commercial quality, or ASTM A 527, G 90, lock-forming quality, hot-dip galvanized steel sheet with 0.20 percent copper, mill phosphatized where indicated for painting; not less than 0.0396 inch thick, unless otherwise indicated.

## 2.2 REGLETS

- A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
- B. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- C. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
- D. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
- E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Fry Reglet Corporation.
  - 2. Hickman: W.P. Hickman Co.
  - 3. Atas International, Inc.

## 2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
- B. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
- C. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- D. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

- E. Epoxy Seam Sealer: 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- G. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- H. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

#### 2.4 FABRICATION, GENERAL

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- D. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- E. Expansion Provisions: Space movement joints at minimum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
  - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

## 2.5 SHEET METAL FABRICATIONS

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
- B. Copings with fascia: Fabricate from the following material:
  - 1. Aluminum: 0.063 inch thick
- C. Copings: Fabricate from the following material:
  - 1. Aluminum: 0.050 inch thick.
- D. Counterflashing: Fabricate from the following material:
  - 1. Aluminum: 0.0320 inch thick.
- E. Drip Edges w/ fascia: Fabricate from the following material:
  - 1. Aluminum: 0.050 inch thick.
- F. Fascia w/ integral gutter: Fabricate from the following material
  - 1. Aluminum: 0.063 inch thick

## 2.6 ALUMINUM FINISHES

- A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.
  - 1. All aluminum fabrications to be mill finished.
- B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.
  - 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 605.2.
    - a. Color and Gloss: As selected by Architect from manufacturer's full range of choices for color and gloss.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.
- B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.
- D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.
  - 1. Use joint adhesive for nonmoving joints.
- F. Seams: Fabricate nonmoving seams in aluminum with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
  - 1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
  - 2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.
- H. Install reglets to receive counterflashing according to manufacturer's instructions.
- I. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seam, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION 07620

## SECTION 07901 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes joint sealants for the following locations:
  - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
    - a. Perimeter joints between masonry and steel materials and frames of doors and windows.
    - b. Joints in sheet metal flashing and trim.
    - c. Other joints as indicated.
  - 2. Exterior joints in horizontal traffic surfaces as indicated below:
    - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
    - b. Other joints as indicated.
  - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
    - a. Perimeter joints of exterior openings where indicated.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
- C. Work Excluded: Firestopping and Smoke sealing.

#### 1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

#### 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract.
- B. Product data from manufacturers for each joint sealant product required.
- C. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- D. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
  - 3. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
  - 4. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

#### 1.8 SEQUENCING AND SCHEDULING



- A. Sequence installation of joint sealants in existing interior concrete pavement to occur prior to application of clear concrete sealing compound where indicated or scheduled on drawings.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
  - 1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

### 2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
- B. Products: Subject to compliance with requirements, provide one of the products specified.
- C. Single Part Pourable Urethane Sealant for Use T; Type S, Grade P, Class 25, and Uses T, M, A, and as applicable to joint substrates indicated, O. Provide one of the following:
  - 1. "Vulkem 45"; Mameco International, Inc.
  - 2. "NR-201 Urexpan"; Pecora Corp.
  - 3. "Sonolastic SL1"; Sonneborn Building Products.
- D. One-Part Nonsag Urethane Sealant for Use NT: Type S; Grade NS; Class 25; and Uses NT, M, A, and, as applicable to joint substrates indicated, O. Provide one of the following:
  - 1. "Vulkem 921"; Mameco International, Inc.
  - 2. "Dynatrol I"; Pecora Corp.
  - 3. "Sikaflex-la"; Sika Corp.
  - 4. "Sonolastic NP 1"; Sonneborn Building Products.

### 2.3 LATEX JOINT SEALANTS

- A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent. Provide one of the following:

1. "AC-20"; Pecora Corp.
2. "Sonolac"; Sonneborn Building Products.
3. "Chem-Calk 600"; Bostik Inc.
4. "NuFlex 330"; NUCO Industries, Inc.
5. "LC 160 All Purpose Acrylic Caulk"; Ohio Sealants, Inc.
6. "TremFlex 834"; Tremco.

## 2.4 SEALANTS FOR PLUMBING FIXTURES

1. Mildew-Resistant Silicone Sealant: At perimeters of wall-mounted fixtures, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject on in-service exposures of high humidity and temperature extremes. Provide one of the following:
  1. "786 Mildew Resistant"; Dow Corning.
  2. "Sanitary 1700"; GE Silicones.
  3. "NuFlex 302"; NUCO Industries, Inc.
  4. "898 Silicone Sanitary Sealant"; Pecora Corporation
  5. "PSI-611"; Polymeric Systems, Inc.
  6. "Tremsil 600 White"; Tremco.

## 2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of either material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
  2. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 g/cc per ASTM C 1083.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
    - a. Do not leave gaps between ends of joint fillers.
    - b. Do not stretch, twist, puncture, or tear joint fillers.
    - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
  - 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

### 3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

### 3.6 JOINT SEALANT SCHEDULE

- A. Provide the following joint sealants for installation in all joint constructions and locations described herein, whether or not joint sealants are shown or indicated on the Drawings for these joint constructions and locations:
- B. One-Part Nonsag Urethane Sealant, Exterior Use: for the following exterior joints in vertical surfaces and non-traffic horizontal surfaces:
  - 1. Perimeter joints between unit masonry and steel and frames of doors and windows.
  - 2. Sealing joints in flashing and sheet metal.
  - 3. Other joints as indicated.
- C. One-Part Nonsag Urethane Sealant, Interior Use: For the following exterior joints in vertical surfaces and non-traffic horizontal surfaces:
  - 1. Perimeter joints between exterior wall assemblies and frames of doors and windows.
  - 2. Other joints as indicated.
- D. One-Part Pourable Urethane Sealant, Exterior Use: For the following exterior joints in horizontal traffic surfaces:
  - 1. Control, expansion and isolation joints in cast-in-place concrete slabs and floors and paving.
  - 2. Other joints as indicated.
- E. Acrylic Emulsion Sealant, Interior Use: For the following interior joints in vertical surfaces and horizontal non-traffic surfaces:
  - 1. Perimeter joints between interior surfaces and frames of interior doors and windows.
- 6. Mildew-Resistant Silicone Sealant: For the following interior joints:
  - 1. Perimeter joints around wall-mounted plumbing fixtures to seal fixtures to surrounding walls.

END OF SECTION

## SECTION 08110 - STEEL DOORS AND FRAMES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes steel doors and frames.

## 1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.
- C. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
- D. Door Schedule: Submit schedule of doors and frames.

## 1.4 QUALITY ASSURANCE

- A. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. All exterior doors and frames the products used shall have a current Notice of Acceptance from Miami-Dade County, Florida, which includes a rating for small and large missile impact,

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

- B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to promote air circulation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Doors and Frames:
    - a. Amweld Building Products, Inc.
    - b. Ceco Door Products.
    - c. Copco Door Co.
    - d. Curries Co.
    - e. Metal Products, Inc.
    - 6. Republic.
    - 7. Steelcraft.

### 2.2 MATERIALS

- A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569.
- B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366, commercial quality, or ASTM A 620, drawing quality, special killed.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526, commercial quality, or ASTM A 642, drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 coating designation, mill phosphatized.
- D. Supports and Anchors: Fabricated from not less than 0.0478-inch-thick steel sheet; 0.0516-inch-thick galvanized steel where used with galvanized steel frames.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

### 2.3 DOORS

- A. Steel Doors: Provide 1-3/4-inch-thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:



1. Exterior Doors: Grade III, extra heavy-duty, Model 2, seamless design, minimum 16 gage galvanized steel sheet faces; flush top. See Quality Assurance heading for impact requirements.

## 2.4 FRAMES

- A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16 gage cold-rolled steel sheet.
  1. Fabricate frames with mitered and continuously welded corners.
  2. Form all frames from galvanized steel sheet.
- B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
- C. Plaster Guards: Provide minimum 0.0179-inch-thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
- D. Grout: When required in masonry construction, as specified in Division 4 Section "Unit Masonry."
- E. Bituminous Coating: On all frames to be located in masonry or concrete walls, provide a bituminous coating on the inside face of the frames.

## 2.5 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
  1. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:
    - a. Resin-impregnated paper honeycomb.
    - b. Rigid polyurethane conforming to ASTM C 591.
    - c. Rigid polystyrene conforming to ASTM C 578.
    - d. Vertical steel stiffeners.
  2. Clearances: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom.
    - a. Fire Doors: Provide clearances according to NFPA 80.
- B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.

- C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- E. Galvanized Steel Doors: For all locations, fabricate doors from galvanized steel sheet according to SDI 112. Close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch-thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.
- F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- G. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.
- H. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- I. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
- J. Glazing Stops: Minimum 20 gage steel or 0.040-inch thick aluminum.
  - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
  - 2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.
- C. Apply primers and organic finishes to doors and frames after fabrication.

## 2.7 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited

to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.
- B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.
1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
  2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry strap and stirrup anchors.
  3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
  4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.
  5. Install fire-rated frames according to NFPA 80.
- C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.
1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
  2. Smoke-Control Doors: Comply with NFPA 105.

#### 3.2 ADJUSTING AND CLEANING

- A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

- B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110

## SECTION 08710 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.02 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 8 Section "Standard Steel Doors and Frames" for silencers integral with hollow metal frames.

#### 1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract.
- B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
    - a. Type, style, function, size, and finish of each hardware item.
    - b. Name and manufacturer of each item.
    - c. Fastenings and other pertinent information.

- d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
  - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
  - f. Mounting locations for hardware.
  - g. Door and frame sizes and materials.
  - h. Keying information.
- D. Samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
- 1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
- E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

#### 1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) as certified by the Door and Hardware Institute who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
- 1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
- C. Disabled Accessibility: Provide hardware that complies with all accessibility codes as they pertain to this project including the Americans with Disabilities Act Accessibility Guidelines and the Florida Accessibility Code for Building Construction.



2.02 HINGES

- A. Hinges shall be stainless steel edge mounted continuous hinges with a minimum 1/4" diameter pin.
- B. Acceptable Manufacturers:
  - 1. McKinney
  - 2. Markar
  - 3. Pemko.

2.03 LOCKSETS

- A. Locksets shall be one of the following manufacturers or approved equal and shall be furnished in the function as specified in the hardware sets.
- B. All knobs or levers, escutcheons, locksets and cylinders shall be products of one manufacturer.
- C. Provide 3/4" minimum latch throw for mortise locks, 1/2" throw for cylindrical locks and 1" throw for deadlocks.
- D. Provide locks with manufacturer's standard 6-pin cores, with construction key feature, which voids use of construction keys without cylinder removal.
- E. Provide locks with a solid cast or forged levers and occupancy indicator on the outside.

E.	Acceptable Manufacturers	Design	Series
	Corbin Russwin	PSR	ML2000
	Sargent	LNP	8200
	Schlage	17C	L
	Yale	PBR	8800

2.04 CLOSERS

- A. All closers shall be fully adjustable type with complete spring power adjustment, sizes 1 through 6; field adjustable according to door size and frequency of use.



- B. Adjust all reduced spring power closers on doors to meet disabled accessibility requirements including but not limited to the following:
  - 1. The sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least five seconds to move to a point three inches from the latch, measured to the leading edge of the door.
  - 2. Maximum force for pushing or pulling open a door shall be 5 lbf. for interior hinged doors and 8.5 lbf. for exterior hinged doors.
- C. Where closers are indicated to be closer/stop, provide units with a rigid arm assembly and a heavy duty bracket with built-in spring cushion and a stop lug to provide a means of positive stop. Stop lug shall be located on closer arm, not on soffit bracket, to provide additional arm protection.
- D. Where closers are indicated to be delayed action (DA and DEL), provide units designed with an adjustable delay that holds the door open before the closing cycle begins.
- E. All closers shall be of one manufacturer, matching design. All closers shall have adjustable backcheck to provide a cushioning effect toward the end of the opening cycle.
- F. Furnish parallel arm brackets for all closers opening out. Where overhead stops and holders are listed, provide proper bracket for clearance. Furnish flush mount transom bracket where no transom bar exists. Furnish top jamb closer and bracket where required by job conditions. Indicate in hardware schedule all doors requiring parallel arm, flush mount or top jamb brackets.
- G.
 

Acceptable Manufacturers	Series
Corbin Russwin	DC8200 x A11
Norton	UNI-7500
Yale	UNI-4400

2.05 DOOR TRIM UNITS

- A. Door trim units shall be of type and design as listed below or in hardware sets.
- B. Fabricate protection plates (armor, kick or mop) not more than 2" less than door width on stop side and not more than 1" less than door width on pull side. Height shall be 8" or as indicated on drawings.
  - 1. Metal Plates: Stainless Steel, .050" (US 18 ga.).

- C. Door trim units shall be type and design as listed in hardware sets.

## 2.05 DOOR STOPS AND HOLDERS

- A. In general, door stops shall be Rockwood 400 series wall stops, either convex or concave with proper anchorage as required. Where two doors interfere with one another, stops shall be Rockwood 455 or 456. Where wall stops are not practical, use dome stops of proper height as required. Where wall or floor stops are not practical, use overhead stops in size and function as required. Other stops are listed in hardware sets as required.
- B. Wall mounted or floor mounted holders shall be as listed in hardware sets and be automatic type with adjustable holding force. Furnish proper strike as required.
- C. Overhead door holders shall be surface or recessed in desired function as listed in hardware sets. Furnish flush mounted transom brackets and intermediate bracket as required.
- D. Acceptable Manufacturers:
  - 1. Rockwood
  - 2. Hager.
  - 3. Ives.
  - 4. Trimco
  - 5. Sargent
  - 6. Rixson
  - 7. Glynn Johnson
  - 8. McKinney

## 2.06 THRESHOLDS AND WEATHERSTRIP

- A. Except as otherwise indicated on plans or in hardware sets, provide thresholds and weatherstrip of the type, size and profile as follows:
  - 1. Thresholds 177AS, 180AS, 181AS or as required.
  - 2. Handicap Thresholds 2005AS, 171A or as required.
  - 3. Door Sweeps 315CN
  - 4. Weatherstrip S88D
  - 5. Soundseal 296CR
  - 6. Auto Dr. Bottoms 4301CRL, or as listed
  - 7. Astragal Strips 305CN or as listed

8. Overlap Astragals 357SP, 355CS

B. Acceptable Manufacturers:

1. Pemko.
2. McKinney
3. National Guard.
4. Hager.

2.09 KEYING

- A. General: Supplier shall meet with Owner to finalize keying requirements and obtain final instructions in writing.
- B. Submit a proposed keying schedule and written keying explanations for approval based on instructions.
- C. Review the keying system with the Owner and provide the type required (master, grand master or great grand master).
- D. Keys: furnish the following:
  1. 6 Master keys for each group.
  2. 3 Change keys per cylinde.
- E. Stamping: All keys and master keys shall be stamped "DO NOT DUPLICATE". In addition, all keys shall be stamped with key set symbols as listed on approved keying schedule.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
  1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
  2. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of polyurethane sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

### 3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
  - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

### 3.03 HARDWARE SCHEDULE

- A. General: Provide hardware for each door to comply with requirements of Section "Door Hardware," and in the following schedule of hardware sets.

## HW-1

Doors 101 from Main Toilets

Each to have:

1	Continuous Hinge	FM300
1	Deadlock`	DL3017
1	Push Plate	70 16 x 24"
1	Door Pull	70C x 110
1	Door Closer w/ H O	DC8210 x A12
1	Kick Plate	16 x 34 1/2"

## HW-2

Doors: 103 from Family Toilets

Each to have:

1	Continuous Hinge	FM300
1	Lock w/ Indicator	ML2065 x M19N
1	Door Closer w/Stop	DC8210 x A11
1	Kick Plate	16" x 34 1/2"

## HW-3

Doors: 102 to Chase

Each to have:

1	Continuous Hinge	FM300
1	Deadlock	DL3017
1	Wall Stop	As Required

END OF SECTION 08710

## SECTION 09900 - PAINTING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
  - 1. Exposed exterior items and surfaces.
  - 2. Exposed interior items and surfaces.
  - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
  - 4. All unfinished surfaces interior or exterior shall be painted.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from paint manufacturer's standard colors and finishes available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
  - 1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

## 1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
  - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
  - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
  - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.

4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

#### 1.4 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
  1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

#### 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5.
  1. The Architect will select one room surface to represent surfaces and conditions for each type of coating and substrate to be painted.
    - a. Wall Surfaces: Provide samples on at least 100 sq. ft. of wall surface.
    - b. Small Areas and Items: The Architect will designate an item or area as required.
  2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
  3. Mockup exterior colors by providing full-coat sample that extends full height of building and at least one full column-bay width including block columns on each side (e.g. 16'8" wide at west façade or 19'4" wide at north façade).
  4. Final approval of colors will be from job-applied samples.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
  - 1. Product name or title of material.
  - 2. Product description (generic classification or binder type).
  - 3. Manufacturer's stock number and date of manufacture.
  - 4. Contents by volume, for pigment and vehicle constituents.
  - 5. Thinning instructions.
  - 6. Application instructions.
  - 7. Color name and number.
  - 8. VOC content.
  
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
  - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

## 1.7 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
  - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Unless otherwise specified, paint materials and systems specified herein are those of Porter Paint Co. (Porter).



## 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Colors: To be selected by Owner from Manufacturer's full range of available colors.

## 2.3 LEAD CONTENT

- A. The paint shall comply with the latest requirements of the Federal Government for maximum allowable lead content. Such compliance shall be stated on the MSDS and container clearly identifying the product.

## 2.4 VOC COMPLIANCE

- A. The paint shall comply with the latest requirements of Federal, Florida State, City or Local Government requirements for the maximum allowable VOC content at the time of purchase. Such compliance shall be stated on the MSDS and container clearly identifying the product.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
  - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

### 3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
  2. Cementitious Materials: Prepare concrete, concrete masonry block, and cement plaster surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Pressure clean existing cement plaster, concrete, and masonry surfaces with a mildewcide. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
  3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    - a. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
  4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
    - a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
  5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedule.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. Omit primer on metal surfaces that have been shop primed and touchup painted.
  3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel

sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions. All metal surfaces shall be sprayed except that piping, conduit, and ductwork may be brushed or rolled.
  - 1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
  - 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
  - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Electrical items to be painted include, but are not limited to, the following:
  - 1. Exposed conduit and fittings.
  - 2. Exterior switchgear.
- F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- G. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
  - 1. Provide satin finish for final coats.
- J. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

### 3.4 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
  2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
    - a. Quantitative material analysis.
    - b. Abrasion resistance.
    - c. Apparent reflectivity.
    - d. Flexibility.
    - e. Washability.
    - f. Absorption.
    - g. Accelerated weathering.
    - h. Dry opacity.
    - i. Accelerated yellowness.
    - j. Recoating.
    - k. Skinning.
    - l. Color retention.
    - m. Alkali and mildew resistance.
  3. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

### 3.5 MOCK-UP

1. The paint color selections provided in the Contract Documents shall be considered tentative. Contractor shall prepare a paint mock-up of exterior and interior wall paint colors for Owner's approval prior to execution of the painting work. The mock-ups shall be applied as follows:
  - a. Interior: One room corner where one wall receives base wall color and one wall receives accent color. Full height of each wall and six feet out from corner on each wall.
  - b. Exterior: Full height of wall. One full column (masonry pilasters) bay wide, consisting of base wall color and accent color.

### 3.6 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

### 3.7 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
  1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.8 PAINT TYPE SCHEDULE (Interior Surfaces)

- A. General: Provide the following paint systems for the various substrates, as indicated. Note that Porter Paint numbers are used as basis of design only.
  1. Interior Concrete Block; Acrylic Enamel Semi-Gloss (except at rooms designated in item to follow).
    - a. Prime Coat: Block Filler
      - 1) Porter: 896 Acri-Fil Block Filler.
    - b. First and Second Finish Coats: Semi-Gloss Acrylic Enamel Paint.
      - 1) Porter: 919 Advantage Semi-Gloss Acrylic Enamel Paint.
  4. Exterior and Interior Hollow Metal Doors and Frames: Semi-Gloss Acrylic Enamel Finish.
    - a. Prime Coat: Spot Prime Scratched or Abraded Areas Only - Rust Inhibitive Alkyd Metal Primer.
      - 1) Porter: 296 Glyptex Rust Inhibitive Metal Primer.
    - b. First and Second Finish Coats: Semi-Gloss Acrylic Enamel.
      - 1) Porter: 919 Advantage 900 Interior/Exterior Semi-Gloss Acrylic Enamel.
  5. Interior Concrete Floors:
    - a. First and Second Finish Coats: Acrylic Concrete Stain.

- 1) Porter: 3243 Patio Gray Acrylic Concrete Stain
7. Interior Exposed Ferrous Metal: Primer is not required on shop-primed items.
    1. Semi-Gloss Alkyd Enamel: Two finish coats over primer.
      - a. Primer: Synthetic rust-inhibiting primer.
        - 1) Porter: 296 Glyptex Rust Inhibitive Metal Primer.
      - b. First and Second Coats: Gloss Alkyd Enamel.
        - 1) Porter: 2749 Porter Guard Fast Dry Alkyd Enamel.
  8. Interior Exposed Zinc-Coated Metal:
    1. Semi-Gloss Alkyd Enamel: Two finish coats over primer.
      - a. Primer: Galvanized metal primer.
        - 1) Porter: 215 Rust Screen Acrylic Metal Primer.
      - b. First and Second Coats: Gloss Alkyd Enamel.
        - 1) Porter: 2749 Porter Guard Fast Dry Alkyd Enamel.
- 3.9 PAINT TYPE SCHEDULE (Exterior Surfaces)
- A. Exterior Concrete, Exposed Concrete Masonry Units.
    1. Elastomeric Acrylic Finish: 2 coats with total dry film thickness not less than 20 mils.
      - b. Prime Coat: Block Filler
        - 1) Porter: 222 Bloc-Loc Waterproofing Block Filler.
      - a. First and Second Finish Coats: Elastomeric acrylic coating.
        - 1) Porter: 6000 Porter-Flex Elastomeric Coating Smooth Texture.
  - B. Ferrous Metal: Primer is not required on shop-primed items.
    2. Semi-Gloss Alkyd Enamel: Two finish coats over primer.
      - c. Primer: Synthetic rust-inhibiting primer.
        - 1) Porter: 296 Glyptex Rust Inhibitive Metal Primer.
      - d. First and Second Coats: Gloss Alkyd Enamel.

2) Porter: 2749 Porter Guard Fast Dry Alkyd Enamel.

C. Zinc-Coated Metal:

2. Semi-Gloss Alkyd Enamel: Two finish coats over primer.

c. Primer: Galvanized metal primer.

1) Porter: 215 Rust Screen Acrylic Metal Primer.

d. First and Second Coats: Gloss Alkyd Enamel.

1) Porter: 2749 Porter Guard Fast Dry Alkyd Enamel.

D. Aluminum:

1. Semi-Gloss Alkyd Enamel: Two finish coats over primer.

a. Primer: Alkyd-type primer.

1) Porter: 286 U-Prime Fast Dry Universal Primer.

b. First and Second Coats: Gloss Acrylic enamel.

1) Porter: 2749 Porter Guard Fast Dry Alkyd Enamel.

END OF SECTION 09900



SECTION 09930 - STAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and application of wood finishes.
- B. Revise lists below to suit Project.
- C. Interior Substrates:
  - a. Exposed dimension lumber (rough carpentry).
  - b. Dressed lumber (finish carpentry).
  - c. Exposed wood panel products.
- D. Related Requirements:
  - 1. Section 09900 "Painting" for standard paint systems on exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of product indicated.

- C. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
  - 1. Submit Samples on representative samples of actual wood substrates 8 inches (200 mm) long.
  - 2. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the product proposed for use highlighted.
  - 3. VOC content.

### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

### 1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 25 sq. ft.
    - b. Other Items: Architect will designate items or areas required.
  - 2. Final approval of stain color selections will be based on mockups.
    - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

## 1.8 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior finishes in, rain, fog, or mist.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Benjamin Moore & Co.
- 2. Color Wheel Paints & Coatings.
- 3. Coronado Paint.
- 4. ICI Paints.
- 5. Benjamin-Moore Paints.
- 6. M.A.B. Paints.
- 7. PPG Architectural Finishes, Inc.
- 8. Pratt & Lambert.
- 9. Sherwin-Williams Company (The).
- 10. Porter Paints

## 2.2 MATERIALS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
  - 1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
- C. Stain Colors: As selected by Architect from manufacturer's full range.

## 2.3 WOOD FILLERS

- A. Wood Filler Paste MPI 4:

1. PPG/Porter Paints, 6-15

## 2.4 PRIMERS AND SEALERS

- A. Primer, Latex for Exterior Wood, MPI 6:

1. PPG/porter Paints, 17-921 or 184

## 2.5 STAINS

- A. Stain, Exterior, Water Based, Solid Hide MPI 16:

1. PPG, Pittsburgh Paints, Sun-Proof, Acrylic Latex, 77-1110 series

## 2.6 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
  - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
  - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
  - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
  - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Exterior/Interior Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
  - 3. Sand surfaces that will be exposed to view and dust off.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

### 3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for finish and substrate indicated.
  - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
  - 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR/INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Wood substrates, nontraffic surfaces, including wood trim, wood-based panel products, exposed joists.
  - 1. Solid-Color Latex Stain System, MPI 16:
    - a. Prime Coat: Primer, latex for exterior wood,
    - b. Intermediate Coat: Stain, exterior, water based, solid hide, matching topcoat.
    - c. Topcoat: Stain, exterior, PPG, Sun-proof, 77-1110 Series.

END OF SECTION 099300

## SECTION 10155 - TOILET COMPARTMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:

- 1. Solid-polymer toilet compartments configured as toilet enclosures, entrance screens and urinal screens.

- B. Related Sections:

- 1. Section 05500 "Metal Fabrications" for supports that attach ceiling-hung compartments to overhead structural system.
  - 2. Section 10800 "Toilet Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

- 1. Show locations of cutouts for compartment-mounted toilet accessories.
  - 2. Show locations of reinforcements for compartment-mounted grab bars.
  - 3. Show locations of centerlines of toilet fixtures.
  - 4. Show ceiling grid and overhead support or bracing locations.

- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

- 1. Each type of material, color, and finish required for units, prepared on 6-inch-(152-mm-) square Samples of same thickness and material indicated for Work.
  - 2. Each type of hardware and accessory.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment, from manufacturer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Regulatory Requirements: Comply with applicable provisions in [the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities"] [and] [ICC/ANSI A117.1] for toilet compartments designated as accessible.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
  - 1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z (03G).
  - 2. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvanized.



- F. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- G. Stainless-Steel Castings: ASTM A 743/A 743M.
- H. Zamac: ASTM B 86, commercial zinc-alloy die castings.
- I. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.2 SOLID-POLYMER UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - B. Basis-of-Design Product: Subject to compliance with requirements, provide Scranton Products (Sanatana/Comtec/Capitol), ceiling hung, solid plastic (HDPE) or comparable product by one of the following:
    - 1. Accurate Partitions Corporation.
    - 2. Ampco, Inc.
    - 3. Bobrick Corp.
    - 4. Bradley Corporation; Mills Partitions.
    - 5. Comtec Industries/Capitol Partitions.
    - 6. General Partitions Mfg. Corp.
    - 7. Partition Systems Incorporated of South Carolina.
    - 8. Santana Products, Inc.
- C. Toilet-Enclosure Style: Ceiling hung
- D. Entrance-Screen Style: Ceiling hung
- E. Urinal-Screen Style: Wall hung
- F. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) or polypropylene (PP)] panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges and with homogenous color and pattern throughout thickness of material.
  - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
  - 2. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
  - 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- G. Pilaster, Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.

1. Polymer Color and Pattern: Matching pilaster as selected by Architect from manufacturer's full range.

H. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, stainless steel.
2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
  - a. Polymer Color and Pattern: Matching panel as selected by Architect from manufacturer's full range.

- I. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.

## 2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Stainless steel.
2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

## 2.4 FABRICATION

- A. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from

structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch (13 mm).
    - b. Panels and Walls: 1 inch (25 mm).
  - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
    - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
- B. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10155

## SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Fire extinguishers.
  - 2. Fire extinguisher cabinets.

## 1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract.
- B. Product data for cabinets include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.
- C. Samples for initial selection purposes in the form of manufacturer's color charts consisting of actual units or sections of units showing full range of colors, textures, and patterns available for each type of cabinet finish indicated or exposed to view.
- D. Samples for verification purposes in full-size units of each type of cabinet finish indicated, and in sets for each color, texture, and pattern specified, showing the full range of variations.

## 1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain extinguishers and cabinets from one source from a single manufacturer.
- B. UL-Listed Products: Fire extinguishers shall be UL listed with UL listing mark for type, rating, and classification of extinguisher.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. J.L. Industries.
  - 2. Larsen's Manufacturing Co.
  - 3. Modern Metal Products by Muckle.
  - 4. Potter-Roemer, Inc.

5. Samson Metal Products, Inc.

## 2.2 FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers for each cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard, that comply with authorities having jurisdiction.
- B. Multipurpose Dry Chemical Type: UL-rated 2-A:10:B:C, 5-lb nominal capacity, in enameled steel container.

## 2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  1. Color: Red.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

## 2.3 CABINETS

- A. Construction: Manufacturer's standard box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
- B. Fire-Rated Cabinets: UL listed with UL listing mark with fire-resistance rating of wall where it is installed. Provide wherever cabinet is to be installed in a fire-rated wall or partition.
- C. Cabinet Type: Suitable for containing the following:
  1. Fire extinguisher cabinet: Larson F.E.C., Cameo Series, C2409-5R, Semi recessed with protruding bubble and Laren-Loc, Clear with red letters.
- D. Cabinet Mounting: Suitable for the following mounting conditions:
  1. Semi-recessed: Cabinet box (tub) partially recessed in walls of shallow depth.
- E. Trim Style: Fabricate trim in one piece with corners metered, welded, and ground smooth.

1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  - a. Trim Metal: Of same metal and finish as door.
- F. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.
  1. Steel, factory primed.
  2. Door Glazing: Fully tempered float glass complying with ASTM C 1048, Condition A, Type I, Quality q3, Kind FT, Class as follows:
    - a. Class 1 (clear).
- G. Door Style: Manufacturer's standard design.
  2. Full-Glass Panel: Tempered glass, 1/8 inch thick.
- H. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 deg.

## 2.4 FINISHES FOR CABINETS, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying temporary strippable protective covering prior to shipping.

## 2.5 STEEL CABINET FINISHES

- A. Surface Preparation: Solvent-clean surfaces complying with SSPS-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5 (white metal blast cleaning) or SSPC-SP 8 (pickling).
- B. Factory-Priming for Field-Painted Finish: Apply shop primer specified below immediately following surface preparation and pretreatment.
  2. Shop Primer: Manufacturer's or fabricator's standard fast-curing, lead-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for thickness and framing for cabinets to verify cabinet depth and mounting prior to cabinet installation.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Follow manufacturer's printed instructions for installation.
- B. Install in locations indicated. Mount cabinet with bottom edge of trim located 32" above finished floor.
  - 2. Prepare recesses in walls for cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions. Recesses in masonry walls shall be neatly sawcut.
  - 3. Fasten mounting brackets and cabinets to structure, square and plumb.

END OF SECTION 10522-FIRE EXTINGUISHERS

## SECTION 10800 - TOILET AND BATH ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes toilet and bath accessory items as shown on the drawings.

#### 1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gages, profiles, mounting method, specified options, and finishes.
- C. Maintenance instructions including replaceable parts and service recommendations.

#### 1.4 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish accessory manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

#### 1.5 PROJECT CONDITIONS

- A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Specifications are based upon products by Bobrick Washroom Equipment, Inc. unless noted otherwise. Subject to compliance with requirements, equivalent toilet accessories by one of the following manufacturers are also acceptable:
  - 1. Bobrick
  - 2. ASI - American Specialties Inc.
  - 3. Bradley



## 2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034 inch minimum thickness.
- B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16 (ASTM B 16M); Castings, ASTM B 30.
- C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366 (ASTM A 366M), 0.04 inch minimum. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527 G60 (ASTM A 527M Z180).
- E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.
- F. Mirror Glass: Nominal 6.0 mm thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- G. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

## 2.3 FABRICATION

- A. General: Only a maximum 1-1/2 inch diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:

1. Provide galvanized-steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theftproof installation, as follows:
  1. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- F. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of six keys to Owner's representative.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install toilet accessory units according to manufacturers' instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's instructions for type of substrate involved.
- C. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F 446.

#### 3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 10800-TOILET & BATH ACCESSORIES

## SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

## 1.2 SUMMARY

- A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in sections of Division 1.

## 1.3 ACCESSIBILITY

- A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing. Extend all grease fittings to an accessible location.

## 1.4 MECHANICAL INSTALLATIONS

- A. Coordinate mechanical equipment and materials installation with other building components. Verify all dimensions by field measurements. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- B. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.
- C. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, light fixtures, and other installations.
- D. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

## 1.5 DRAWINGS AND SPECIFICATIONS

- A. Separate divisional drawings and specifications shall not relieve the Contractor from full responsibility to complete all work which may be indicated on any of the drawings or in any division of the specification.
- B. The specifications and drawings are complementary and are to be taken together for a complete interpretation of the work.
- C. The drawings of necessity utilize symbols and schematic diagrams to indicate various items of work. Therefore, no interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for a complete installation are excluded.
- D. Certain details appear on the drawings which are specific with regard to the dimensioning and positioning of the work. These details are intended only for the purpose of establishing general feasibility. They do not obviate field coordination for the indicated work.
- E. Examine the architectural, structural, electrical and mechanical drawings and specifications prior to submitting bid. Architectural and structural drawings take precedence over mechanical drawings with reference to building construction, location of plumbing fixtures, and any other similar fixed items.
- F. The Architect shall be notified of any discrepancies, omissions, conflicts or interferences which occur between drawings and specifications. If such notification is received in adequate time additional data or changes will be issued by addendum to all bidders.

## 1.6 CUTTING AND PATCHING

- A. Do not endanger or damage installed Work through procedures and processes of cutting and patching. Do not cut structural members without prior written approval of the structural Engineer or Architect.
- B. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.
- C. Perform cutting, fitting, and patching of mechanical equipment and materials required to: uncover Work to provide for installation of ill-timed Work; remove and replace defective Work; remove samples of installed Work as specified for testing; install equipment and materials in existing structures; upon written instructions from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

- D. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.
- E. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- F. Locate identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to change over.

#### 1.7 MECHANICAL SUBMITTALS

- A. Refer to the Conditions of the Contract (General and Supplementary), Division 1 and Division 15 Section: SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES for submittal definitions, requirements, and procedures. Submittal of shop drawings, product data, and samples will be accepted only when submitted by The Contractor. Data submitted from subcontractors and material suppliers directly to the Architect/Engineer will not be processed.

#### 1.8 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Refer to the Instructions to Bidders, Division 1 and Division 15 Section "PRODUCTS AND SUBSTITUTION" for requirements in selecting products and requesting substitutions.

#### 1.9 PRODUCT LISTING

- A. Prepare listing of major mechanical equipment and materials for the project. Submit this listing as a part of the submittal requirement specified.

#### 1.10 PRODUCTS

- A. When two or more items of same material or equipment are required (plumbing fixtures, pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in Work, except as otherwise indicated. Provide products which are compatible within systems and other connected items.

#### 1.11 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial

number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

#### 1.12 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications: adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

#### 1.13 RECORD DOCUMENTS

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT or PROJECT RECORD DOCUMENTS for requirements. The following paragraphs supplement the requirements of Division 1.
- B. Mark drawings to indicate revisions to piping and ductwork, size and location both exterior and interior: including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair: actual equipment locations, dimensioned for column lines: actual inverts and locations of underground piping: concealed equipment, dimensioned to column lines: mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.): Change Orders: concealed control system devices.
- C. Mark specifications to indicate approved substitutions: Change Orders; actual equipment and materials used.
- D. Reproducible record drawings shall be on mylar, of the same size sheets as the contract documents.

#### 1.14 OPERATION AND MAINTENANCE DATA

- A. In addition to the information required by Division 1 for Maintenance Data, include the following information:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
  - 2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions: regulation, control, stopping, shut-down, and emergency instructions: and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting: disassembly, repair, and reassembly: aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

#### 1.15 WARRANTIES

- A. Refer to the Division 1 Section: SPECIFIC WARRANTIES for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.
- B. Compile and assemble the warranties specified in Division 15, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.
- C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond: duration of warranty or bond: and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

#### 1.16 CLEANING

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT or FINAL CLEANING for general requirements for final cleaning.
- B. Refer to Division 15 Section: TESTING, ADJUSTING, AND BALANCING for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

#### 1.17 MECHANICAL COORDINATION DRAWINGS

- A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4" = 1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing and maintaining insulation, servicing and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.
- B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all installations. Indicate locations where space is limited, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  1. Mechanical equipment room layouts.

2. Specific equipment installations, including:
  - a. Pumps and compressors.
  - b. Tanks and heat exchangers.
  - c. Air handling units.
3. Work in pipe spaces, chases, trenches, and tunnels.
4. Ceiling plenums which contain piping, ductwork, or equipment in congested arrangement.
5. Installations in mechanical riser shafts, at typical sections and crucial offsets and junctures.
6. Numbered valve location diagrams.
7. Manifold piping for multiple equipment units.

END OF SECTION 15010



## SECTION 15015 - PRODUCT SUBSTITUTIONS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this Section.

## 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
- B. Procedural requirements governing the Contractor's selection of products and product options are included in other sections.

## 1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:
  - 1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
  - 2. Revisions to Contract Documents requested by the Owner or Architect.
  - 3. Specified options of products and construction methods included in Contract Documents.
  - 4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

## 1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within sixty days after commencement of the Work. Requests received more than sixty days after commencement of the Work may be considered or rejected at the discretion of the Architect/Engineer.
  - 1. Submit three copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.

2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
  - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
  - b. Samples, where applicable or requested.
  - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
  - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
  - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
  - f. Cost information, including a proposal of the net change, in the Contract Sum.
  - g. Assurance that the substitution is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
- B. Action: Within one week of receipt of the request for substitution, the Architect/Engineer will request additional information or documentation necessary for evaluation of the request. Within two weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. Acceptance will be in the form of a Change Order. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use one of the products specified as approved.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Conditions: The Contractor's substitution request will be received and considered by the Architect/Engineer when one or more of the following conditions are satisfied, as determined by the Architect/Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1. Extensive revisions to Contract Documents are not required.
  2. Proposed changes are in keeping with the general intent of Contract Documents.
  3. The request is timely, fully documented and properly submitted.
  4. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
  5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  6. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
  7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
  8. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
  9. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution can provide the required warranty.
  10. Where a proposed substitution involves more than one Sub Contractor, each Contractor shall cooperate with the other Contractors involved to coordinate the Work, provide uniformity and consistency, and to assure compatibility of products.
- B. The Contractor's submittal and Architect/Engineer's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 15015

## SECTION 15020 - SHOP DRAWINGS AND SUBMITTALS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

## 1.2 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies procedural requirements for non-administrative submittals including shop drawings product data, samples, and other miscellaneous submittals.
- B. Shop drawings are technical drawings and data that have been specially prepared for this project. Information required on shop drawings includes dimensions, identification of specific products and materials which are included in the work, compliance with specified standard and notations of coordination requirements with other work. Provide special notation of dimensions that have been established by field measurement. Indicate deviations from the contract documents on the shop drawings.
- C. Product data includes standard printed information on manufactured products that has not been specially-prepared for this project. General information required specifically as product data includes manufacturer's standard printed recommendations for application and use, compliance with recognized standards of trade associations and testing agencies, and the application of their labels and seals special notation of dimensions which have been verified by way of field measurement, and special coordination requirements for interfacing the material, product or system with other work.
- D. Samples are physical examples of work. Documentation required specifically for sample submittals includes a generic description of the sample, the sample source or the product name or manufacturer, compliance with governing regulations and recognized standards. In addition, indicate limitations in terms of availability, sizes, delivery time, and similar limiting characteristics.
- E. Miscellaneous submittals are work-related, nonadministrative submittals that do not fit in the three previous categories.

## 1.3 SUBMITTAL PROCEDURES

- A. Submit all Division 15 Shop Drawings, product data samples, and related documents in one package. Submittal should be as complete as possible and include the following:
  - 1. Enclose submittal in 3-ring or similar loose leaf booklet.
  - 2. Include title page and table of contents.
  - 3. Include list of subcontractors' qualifications and suppliers.
  - 4. Provide tabs in front of major submittal sections relating back to table of contents.
- B. No individual submittal sections will be considered and will be returned marked "No Action", with the following exceptions:

1. Items with long "Lead Time" may be submitted early if all such items are packaged together.
  2. Sheet metal, piping and control drawings may be submitted after initial submittal due to preparation time required.
- C. Prepare and transmit the submittal to the Architect/Engineer sufficiently in advance of the scheduled performance of related work and other applicable activities. Advise the Architect/Engineer if processing time is critical to the progress of the work.
1. Allow two weeks minimum for the Architect/Engineer's initial processing of each submittal. The Architect/Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
  2. Allow one week for processing each resubmittal.
  3. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.
- D. Mark each submittal with a permanent label for identification. Provide the following information on the label for proper processing and recording of action taken.
1. Project name.
  2. Date.
  3. Name and address of Architect/Engineer, Contractor, subcontractor and supplier.
  4. Name of manufacturer.
  5. Number and title of appropriate specification section.
  6. Drawing number and detail references, as appropriate.
  7. Similar definitive information as necessary.
  8. Provide a space on the label for the Contractor's review and approval markings, and a space for the Architect/Engineer's "Action" marking.
- E. Transmit each submittal from the Contractor to the Architect/Engineer, and to other destinations as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender marked "No Action".

#### 1.4 SPECIFIC SUBMITTAL REQUIREMENTS

- A. Shop Drawings: Provide six prints plus two additional prints where they are required for maintenance manuals. Two prints will be retained; the remainder will be returned. One of the prints returned will be marked-up and maintained by the Contractor as a "Record Document". Provide coordination drawings where required for the integration of the work. Show sequencing and relationship of separate units of work which are located in areas with restricted space. Submit newly prepared information, drawn to accurate scale on sheets not less than 8 inches by 11 inches; except for actual pattern or template type drawings, the maximum sheet size shall not exceed 36 inches by 48 inches. Indicate the name of the firm that prepared each shop drawing and provide appropriate project identification in the title block.

- B. Product Data: Submit six copies. Do not proceed with installation of materials, products and systems until a copy of product data applicable to the installation is in the possession of the installer. Do not permit the use of unmarked copies of product data in connection with the performance of the work.
- C. Samples: Submit three sets of samples for the Architect/Engineer's visual review; one set will be returned with comments. Maintain the reviewed submittal set of samples, as returned by the Architect/Engineer, at the project site, available for quality control comparisons throughout the course of performing the work.
- D. Miscellaneous Submittals:
  - 1. Inspection and Test Reports: Classify each inspection and test report as being either "shop drawings" or "product data" depending on whether the report is specially prepared for the project, or a standard publication of workmanship control testing at the point of production. Process inspection and test reports accordingly.
  - 2. Warranties: Refer to other sections for specific general requirements on warranties, product bonds, workmanship bonds and maintenance agreements. In addition to copies desired for the Contractor's use, furnish two executed copies of such warranties, bonds or agreements. Provide two additional copies where required for maintenance manuals.
  - 3. Standards: Where submittal of a copy of standards is indicated, and except where copies of standards are specified as an integral part of a "Product Data" submittal, submit a single copy of standards for the Architect/Engineer's use.
  - 4. Closeout Submittals: Refer to other sections of these specifications for specific submittal requirements of project closeout information, materials, tools, and similar items.
    - a. Record Documents: Furnish set of original documents as maintained on the project site. Along with original marked-up record drawings, provide two copies of marked-up drawings which may be reduced to not less than half size.
    - b. Operation And Maintenance Data: Include description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts. Also include manufacturer's printed operating procedures, maintenance procedures, and servicing instructions, lubrication charts and schedules.
    - c. Materials and Tools: Refer to individual sections of these specifications for required quantities of spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.

## 1.5 ARCHITECT/ENGINEER'S ACTION

- A. Except for submittals for the record and similar purposes, where action and return on submittals is required or requested, the Architect/Engineer will review each submittal, mark with appropriate "Action Taken", and where possible return within two weeks of

receipt. The Architect/Engineer will stamp each submittal to be returned with a uniform, self-explanatory action stamp, appropriately marked to indicate one of the following:

1. Final Unrestricted Release: Where the submittals are marked "No Exception Taken", the work covered by the submittal may proceed provided it complies with the requirements of the contract documents; acceptance of the work will depend upon that compliance.
2. Final-But-Restricted Release: When the submittals are marked "Exception Taken as Noted", the work covered by the submittal may proceed provided it complies with both the Architect's/Engineer's notations or corrections on the submittal and with the requirements of the contract documents; acceptance of the work will depend on that compliance.
3. Returned for Resubmittal: When the submittal is marked either "Revise and Resubmit" or "Not Accepted Resubmit", do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise the submittal or prepare a new submittal in accordance with the Architect's/Engineer's notations stating the reasons for returning the submittal; resubmit the submittal without delay. Repeat if necessary to obtain a different action marking. Do not permit submittals with this marking to be used at the project site, or elsewhere where work is in progress.
4. Other Action: Where the submittal is returned, marked with the Architect/Engineer's explanation, for special processing or other Contractor activity, or is primarily for information or record purposes, the submittal will be marked "For Information Only".

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 15020

## SECTION 15411 - WATER DISTRIBUTION PIPING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

## 1.2 SUMMARY

- A. This Section specifies the water distribution piping system, including potable cold, hot, recirculated hot water piping, fittings, and specialties within the building to a point five feet outside the building.
- B. Products installed but not furnished under this Section include water meters which will be provided by others, to the site, ready for installation.

## 1.3 DEFINITIONS

- A. Water Distribution Piping: A pipe within the building or on the premises which conveys water from the water service pipe or meter to the points of usage.
- B. Water Service Piping: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.

## 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for water hammer arresters, valves, hydrants, backflow preventors and pressure-temperature relief valves.

## 1.5 QUALITY ASSURANCE

- A. Comply with applicable portions of the local plumbing code and authorities having jurisdiction.

## PART 2 - PRODUCTS

## 2.1 PIPE AND PIPING PRODUCTS

- A. Pipe within building (except below slab), sizes 4" and smaller shall be copper tubing. Conform to ASTM B88, Type L, hard temper, copper tube, ANSI B16.22 streamlined pattern wrought-copper fittings, soldered joints using 95-5 tin-antimony solder.
- B. Pipe inside and outside building, below ground, sizes 4" and smaller shall be copper tubing. Conform to ASTM B88, Type K, soft temper copper tube. All joints below ground are to be silver brazed.
- C. Balance Cocks, Soldered Ends 2" and smaller: Class 125, bronze body, bronze plug, screw driver operated, straight or angle pattern. Acceptable manufacturers include



American Air Filter Co., Bell & Gossett ITT (Fluid Handling Div.), Hammond Valve Corp., Milwaukee Valve Co., Inc., Spirax Sarco., and Taco, Inc.

- D. Provide proper size for relief valve, in accordance with ASME Boiler and Pressure Vessel Codes. Combined pressure-temperature relief valves shall be bronze body with test lever and thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210°F, and pressure relief at 150 psi; suit wall thickness. Acceptable manufacturers include Cash (A.W.) Valve Mfg. Corp., Conbraco Industries, Inc., Watts Regulator Co., and Zurn Industries, and Inc. (Wilkins-Regulator Div).
- E. Backflow Preventors: Acceptable manufacturers include Febco Sales, Inc. (Subs. of Charles M. Bailey Co., Inc.), Hersey Products, Inc., ITT Lawler (Fluid Handling Div.), and Watts Regulator Co.
- F. Water Hammer Arrestors: Provide Plumbing and Draining Institute types A, B, C, D, E, and F. Josam Mfg. Co., Smith (Jay R.) Mfg. Co., Zurn Mfg. Co., and Precision Plumbing Prod.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify all dimensions by field measurements. Verify that all water distribution piping is installed in accordance with pertinent codes and regulations, the original design, and the referenced standards. Examine rough-in requirements for plumbing fixtures and other equipment having water connections to verify actual locations of piping connections prior to installation. Coordinate pipe sleeve locations with other disciplines. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION OF PIPING AND PIPING PRODUCTS

- A. So far as practical, install piping as indicated. Solder copper tubing joints in accordance with the procedures specified in ANSI B9.1.
- B. Extend water distribution piping to connect to water service piping as indicated for service entrance to building. Install shutoff valve at service entrance inside building complete with strainer, pressure gauge, and test tee with valve.
- C. Install sleeve and mechanical sleeve seal at penetrations through foundation wall for watertight installation. Where sleeves penetrate rated partition walls, floors, etc., the integrity of the smoke/fire barrier must be maintained.
- D. Valves:
  - 1. Install sectional valves on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.

2. Install shutoff valves on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
  3. For sectional shutoff valves 2" and smaller, use gate or ball valves; for sectional shutoff valves 2½" and larger, use gate or butterfly valves.
- E. Install balance cocks in each hot water recirculating loop, discharge side of each pump, and elsewhere as indicated.
- F. Install hose bibbs on exposed piping where indicated with vacuum breaker.
- G. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.
- H. Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Plumbing Code.
- I. Install water hammer arresters in locations recommended by manufacturers.

### 3.3 FIELD QUALITY CONTROL

- A. Do not enclose, cover, or put into operation any new, extended, or replaced water distribution piping system until it has been inspected, tested, and approved by the authority having jurisdiction. Work which has been concealed prior to inspection, testing and approval must be uncovered. Notify the plumbing official having jurisdiction at least 24 hours prior to the time such inspection must be made. Prepare inspection reports, signed by the plumbing official. If the piping system will not pass the test or inspection, make the required corrections and arrange for reinspection.
1. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
  2. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
- B. All new water distribution piping systems which have been altered, extended or repaired for leaks and defects must be tested. Perform tests in the presence of the plumbing official. Prepare reports for all tests and required corrective action. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
1. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source and allow to stand for a period of four hours. Leaks and loss in test pressure constitute defects which must be repaired using new materials. Retest system until satisfactory results are obtained.

## 3.4 ADJUSTING AND CLEANING

- A. Purge all new water distribution piping systems and parts of existing systems, which have been altered, extended, or repaired prior to use. Prepare reports for all purging and disinfecting activities.
- B. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction, or in case a method is not prescribed by that authority, the procedure described in either AWWA C601, or AWWA D105, or as described below:
  - 1. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
  - 2. Fill the system to be tested, with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate and allow to stand for 24 hours.
  - 3. Drain the system of the previous solution, and refill with a water/chlorine solution containing at least 200 parts per million of chlorine; isolate and allow to stand for three hours.
  - 4. Following the allowed standing time, flush the system with clean potable water until chlorine does not remain in the water coming from the system.
  - 5. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

END OF SECTION 15411

## SECTION 15420 - DRAINAGE AND VENT SYSTEMS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

## 1.2 SUMMARY

- A. This Section specifies building sanitary and storm drainage and vent piping systems, including drains and drainage specialties.

## 1.3 DEFINITIONS

- A. Building Drain: That part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer.
- B. Building Sewer: That part of the drainage system which extends from the end of the building drain and conveys its discharge to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.
- C. Drainage System: Includes all the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.
- D. Vent System: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap seals from siphonage and back pressure.

## 1.4 SUBMITTALS

- A. Product Data: Submit product data for drainage piping specialties, floor drains, and roof drains.
- B. Coordination Drawings: Prepare and submit coordination drawings for Drainage and Vent Piping.
- C. Quality Control Submittals: Submit reports specified in Part 3 of this Section.

## 1.5 QUALITY ASSURANCE

- A. Comply with applicable portions of local plumbing code and the authorities having jurisdiction.

## 1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the installation of all drains and associated materials, such as flashings, with other work such as roofing, concrete slabs and sanitary storm sewers to ensure proper interface with all project components.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers offering products which may be incorporated in the work include Ancon Inc., Josam Mfg. Co., Smith (Jay R.) Mfg. Co., Tyler Pipe (Subs. of Tyler Corp.), and Zurn Industries Inc. (Hydromechanics Div.).

### 2.2 DRAINAGE AND VENT PIPE AND FITTINGS

- A. Above Ground, All Pipe Sizes: Hubless cast-iron soil pipe. Conform to CISPI Standard 301, service weight, cast-iron soil pipe and fittings, with neoprene gaskets conforming to CISPI Standard 310 and stainless steel clamp and shield.
- B. Underground Pipe Sizes 15" and Smaller: Polyvinyl Chloride (PVC) plastic pipe (type DWV), Schedule 40 pipe and solvent fittings, conforming with ASTM D-2665.
- C. Above Ground, Not In Plenum Returns, and Underground, All Pipe Sizes: Polyvinyl chloride (PVC) DWV, Schedule 40 pipe and socket fittings, conforming to ASTM D-2665. Pipe cement shall be PVC solvent cement conforming to ASTM D-2564.

### 2.3 DRAINAGE PIPING SPECIALTIES

- A. Trap Primers: Bronze body valve with automatic vacuum breaker, with ½" connections matching piping system. Comply with ASSE 1018.
- B. Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.
- C. Floor Cleanouts: Heavy-duty rated cast-iron body and frame, with cleanout plug and adjustable round nickel bronze top, manufacturer's standard cast unit, exposed rim type, with recess to receive ⅛" thick resilient floor finish.
- D. Cast-iron Top: Manufacturer's standard cast unit, exposed flush type, with standard mill finish.
- E. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.
- F. Flashing Flanges: Cast-iron watertight stack or wall sleeve with membrane flashing ring. Provide under-deck clamp and sleeve length as required.
- G. Vent Flashing Sleeves: Cast-iron caulking type roof coupling for cast-iron stacks, cast-iron threaded type roof coupling for steel stacks, and cast-bronze stack flashing sleeve for copper tubing.

- H. Vandal-proof Vent Caps: Cast-iron body full size of vent pipe, with caulked base connection for cast-iron pipes, threaded base for steel pipes.
- I. Roof Drains: See plans for sizes and specifications. Provide static extensions as required.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify all dimensions by field measurements. Verify all existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
- B. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 FOUNDATION PREPARATION FOR UNDERGROUND BUILDING DRAINS

- A. Grade trench bottoms to provide a smooth, firm, and stable foundation, free from rock, throughout the length of the pipe. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with clean sand or pea gravel to indicated invert elevation.
- B. Shape bottom of trench to fit bottom of pipe. Fill unevenness with tamped sand backfill at each pipe bell hole.

#### 3.3 INSTALLATION, GENERAL

- A. Copper Tubing: Solder joints in accordance with the procedures specified in ANSI B9.1.
- B. Cast-Iron Soil Pipe: Make lead and oakum caulked joints, compression joints, and hubless joints in accordance with the recommendations in the CISPI Cast Iron Soil Pipe and Fittings Handbook, Chapter IV.
- C. PVC Pipe: The pipe and socket must be cleaned, burrs removed, primed, and solvent applied to both. They must be assembled quickly and twisted one-quarter turn to spread the solvent.
- D. Make changes in direction for drainage and vent piping using appropriate 45-degree wyes, half-wyes, or long sweep bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn tees where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers

and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

- E. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- F. Install building drain pitched down at minimum slope of  $\frac{1}{4}$ " per foot for piping 3" and smaller and  $\frac{1}{8}$ " for piping 4" and larger unless shown otherwise.
- G. Extend building drain to connect to sewer piping.
- H. Install sleeve and mechanical sleeve seal through foundation wall for watertight installation.
- I. Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the plumbing code. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

### 3.4 INSTALLATION OF PIPING SPECIALTIES

- A. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and:
  - 1. as required by plumbing code;
  - 2. at each change in direction of piping greater than 45 degrees;
  - 3. at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping;
  - 4. at the base of each vertical soil or waste stack.
- B. Cleanout Covers: Install floor and wall cleanout covers for concealed piping, types as indicated.
- C. Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.
- D. Vent Flashing Sleeves: Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

### 3.5 INSTALLATION OF FLOOR DRAINS

- A. Install floor drains in accordance with manufacturer's written instructions at low points of surface areas to be drained, or as indicated. Position drains so that they are accessible and easy to maintain. Trap all drains connected to the sanitary sewer.

- B. Set drain elevation depressed below finished slab elevation as listed below to provide proper slope to drain:

DEPRESSION	RADIUS OF AREA DRAINED
1/2"	5'-0"
3/4"	10'-0"
1"	15'-0"
1 1/4"	20'-0"
1 1/2"	25'-0"

- C. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

3.6 FIELD QUALITY CONTROL

- A. Do not enclose, cover, or put into operation any new, extended, or replaced drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction. Work which has been concealed prior to inspection, testing, and approval must be uncovered. Notify the plumbing official having jurisdiction at least 24 hours prior to the time such inspection must be made. Prepare inspection reports, signed by the plumbing official.

1. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.
2. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.
3. If piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspection.

- B. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. Perform tests in the presence of the plumbing official. Prepare reports for all tests and required corrective action. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.

1. Rough Plumbing: Test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.
2. Finished Plumbing: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Plug the stack openings on the roof and building drain where it leaves the building, and



introduce air into the system equal to a pressure of 1" water column. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.

- C. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.

### 3.7 ADJUSTING AND CLEANING

- A. Clean drain strainers, domes, traps and interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

END OF SECTION 15420

## SECTION 15440 - PLUMBING FIXTURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

## 1.2 SUMMARY

- A. This Section specifies general installation requirements for plumbing fixtures and specific requirements for fittings, trim, and accessories. Refer to plumbing drawings and Plumbing Fixture Schedule for fixture requirements.

## 1.3 QUALITY ASSURANCE

- A. Comply with applicable portions of the latest local plumbing code and the authorities having jurisdiction.

## 1.4 SUBMITTALS

- A. Product Data: Submit product data and installation instructions for each fixture, faucet, specialties, accessories, and trim specified; clearly indicate rated capacities of selected models of water coolers.
- B. Shop Drawings: Submit rough-in drawings, detail dimensions, rough-in requirements, required clearances, and methods of assembly of components and anchorages. Coordinate requirements with other trades as required for installation. Furnish templates as necessary.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements and wiring diagrams for power supply to units. Clearly differentiate between portions of wiring that are factory installed and field installed portions.
- D. Color Charts: Submit manufacturer's standard color charts for cabinet finishes and fixture colors.
- E. Maintenance Data: Include data in maintenance manual as specified in other sections.
- F. Quality Control Submittals: Submit certification of compliance with specified ANSI, UL, and ASHRAE Standards and with performance verification requirements specified in this Section.

## PART 2 - PRODUCTS

## 2.1 FITTINGS, TRIM, AND ACCESSORIES

- A. Supplies and Stops for Lavatories and Sinks: Polished chrome-plated loose-keyed angle stop having  $\frac{1}{2}$ " inlet and  $\frac{3}{8}$ " O.D. by 12" long flexible tubing outlet, and wall flange and

escutcheon. Insulate the trap and hot water supply for handicapped lavatories with insulation kit.

- B. Supplies and Stops for Water Closets: Polished chrome-plated, loose-keyed angle stop having 1/2" inlet and 3/8" O.D. by 12" long flexible tubing outlet with collar, and wall flange and escutcheon.
- C. Traps: Cast brass, 1 1/4" and 1 1/2" adjustable "P" trap with cleanout and waste to wall. All connections at wall shall be slip joint type.
- D. Tub Waste and Overflow Fittings: Concealed lever operated pop-up bath waste and overflow, chrome plated waste spud with universal type outlet connection suitable for one and 1 1/2" I.P.S., or 1 1/2" solder-joint outlet connection on waste tee.
- E. Escutcheons: Chrome-plated cast brass with set screw.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify all dimensions by field measurements. Verify that all plumbing fixtures may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards. Examine rough-in for potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturer's written instructions, rough-in drawings, and pertinent codes and regulations, the original design, and the referenced standards. Fasten plumbing fixtures securely to supports or building structure. Secure behind or within wall construction to provide rigid installation. Comply with the installation requirements of ANSI A117.1 and Public Law 90-480 with respect to plumbing fixtures for the physically handicapped.
- B. Set shower receptor and mop basins in a leveling bed of cement grout.
- C. Install a stop valve in an accessible location in the water connection to each fixture.
- D. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork.
- E. Seal fixtures to walls and floors using silicone sealant as specified in other sections. Match sealant color to fixture color.
- F. Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt in a quantity of one device for each ten fixtures. Furnish faucet repair kits complete with all necessary washers, springs, pins, retainers, packings, O-rings, sleeves, and seats in a quantity of one kit for each forty faucets.

3.3 FIELD QUALITY CONTROL

- A. Inspect each installed unit for damage. Replace damaged fixtures. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning units, then retest.
- B. Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow and stream.
- C. Replace washers of leaking or dripping faucets and stops.

3.4 PROTECTING AND CLEANING

- A. Clean fixtures, trim, and strainers using manufacturer's recommended cleaning methods and materials. Provide protective covering for installed fixtures, water coolers, and trim.
- B. Do not allow use of fixtures for temporary facilities unless expressly approved in writing by the Owner.

END OF SECTION 15440

DIVISION 16 - ELECTRICAL

SECTION 16050 - BASIC MATERIALS & METHODS

1. GENERAL

- A. General Conditions of the entire Specifications apply to work under this section.

1.1 DRAWINGS AND SPECIFICATIONS

- A. Intent of Drawings and Specifications is to obtain a complete and satisfactory installation. An attempt has been made to separate and completely define work of each trade. However, such separations of drawings and specifications should not relieve Contractor from responsibility of compliance with work pertinent to his trade which may be indicated on any drawings or in any Section of the specifications.
- B. Contractor shall carefully examine the Architectural, Civil, Structural, Mechanical, and Electrical drawings and specifications prior to submitting his bid.
- C. Contractor shall furnish, install and connect with appropriate services all items shown on any of the drawings. Architect shall be notified of any discrepancies, omissions, conflicts or interference's which occur between drawings and specifications. Should notification be received in adequate time, additional data or changes will be issued by addendum to all bidders.
- D. Architectural Drawings take precedence over Electrical Drawings with reference to building construction. The drawings are not intended to show in complete detail every fitting which may be required; however, wherever reasonably implied by the nature of the work, such materials or equipment shall be provided as required to complete the work.
- E. The term "provide" shall mean to furnish and install completely unless otherwise indicated.
- F. If Electrical Contractor has questions, or in their opinion, finds omissions or errors on these Electrical Documents, it is their responsibility to bring this to the attention of the Electrical Engineer, Architect and Owner immediately.

1.2 EXAMINATION OF SITE

- A. Bidders are to visit the site and familiarize themselves with existing conditions and satisfy themselves as to the nature and scope of the work. The submission of a bid will be evidence that such an examination has been made. Later claims for labor, equipment, or materials required, or for difficulties encountered which could have been foreseen had an examination been made, will not be allowed.

1.3 CODES

- A. Materials and installation, as a minimum, are to conform with the latest edition of the National Electrical Code, the latest edition of the N.F.P.A., and the latest editions of the local codes and ordinances, including all amendments to the N.E.C. equipment, where applicable, will be listed with the Underwriters' Laboratories, Inc. Quality and workmanship established by drawings and specifications are not to be reduced by the above mentioned codes.
- B. Should a code conflict exist, Contractor shall report conflict to Architect before submitting his bid. Should contractor fail to notify Architect, the change required to comply with codes, ordinances, etc., will be at Contractor's expense.
- C. Comply with applicable requirements of NEMA Standards Publications pertaining to materials and equipment installed.
- D. Comply with applicable requirements of UL safety standards pertaining to electrical systems.  
Provide products and components which have UL listing or labeling.

#### 1.4 INSPECTIONS, PERMITS AND FEES

- A. Contractor shall obtain necessary inspections and permits, including those required to connect to utilities, and pay charges as required. Certificates of inspection issued by authorities having jurisdiction, shall be delivered to the Architect.

#### 1.5 DAMAGE TO OTHER WORK AND PERSONNEL

- A. Contractor shall be responsible for proper protective measures when working overhead or in finished areas. Contractor shall repair, replace, or touch up finished surfaces which are damaged as a result of his work or operations.
- B. Contractor shall carry suitable insurance as prescribed by law and as required under the General Specifications paragraphs for protection of his employees, other persons, materials, and equipment on building site.

#### 1.6 MATERIAL LIST, SHOP DRAWINGS, AND PRIOR APPROVAL

- A. Materials and equipment specified have been used as a basis for design. Products of other manufacturers will be considered for use, if, as determined by the Architect and Engineer, the item requested for substitution is equal to that specified.
- B. Contractor shall ascertain that substituted products meet specifications and that size and arrangement is suitable for installation. Additional cost of installation will be at Contractor's expense.
- C. Request for substitutions shall clearly and specifically indicate any and all differences

between the product specified as basis of design and the product proposed for substitution. Should Contractor fail to call the Architect's attention to differences of approved substitutes, Architect reserves the right to require equal and/or similar features to be added to substitute product at Contractor's expense.

- D. Contractor shall submit six (6) copies of a complete list of material and equipment for approval by the Architect within ten (10) days after notice to proceed. List should describe type of materials, capacities, and catalog numbers of equipment and give such information as is necessary for checking equipment for approval.
- E. Within thirty (30) days after award of contract, Contractor shall submit six (6) copies of equipment shop drawings for Engineer's approval. Submittals should be complete, neatly assembled, bear submitting Contractor's seal of approval, and show information necessary to identify each piece of equipment and illustrate its compliance with specifications.
- F. Contractor shall provide two (2) copies of shop drawing submittals for lighting fixtures, switchgear, wiring devices, emergency generator or transfer equipment and all systems (fire alarm, security, etc.) ten (10) days prior to bid date for Engineer's approval. Engineer's approval of the prior approval package will be considered preliminary. Final approval will be contingent upon review of final shop drawings. All proposed alternates must be industry standard equals to the items specified as the basis of design; however, if the items are not considered equal by the Engineer, it shall be disapproved for submittal. If Electrical Contractor/General Contractor does not submit shop drawings to Electrical Engineer for items listed above, Electrical Engineer will not be responsible for any, and/or omissions or errors due to shop drawings not submitted. Shop drawings will only be reviewed twice as part of this contract. Additional shop drawing reviews shall be invoiced at \$85.00 per hour, billable to the sub-contractor, C.O.D.
- G. Contractor shall provide two (2) copies of the proposed site light fixture package ten (10) days prior to bid date for engineer's approval to submit. Engineer's approval of the prior approval package will be considered preliminary. Final approval will be contingent upon review of final shop drawings. All proposed alternates must be industry standard equals to the site fixtures specified as the basis of design; however, if the site fixture is not considered equal by the engineer, it shall be disapproved for final submittal. Alternate site fixtures shall include a computer generated , point by point photometric calculation based on the plans) fixture characteristics and pole placement shall not be altered). This diagram shall show composite values of the illuminance projected from the arrangement of light sources as shown on plan. Computer plot diagram shall also show the locations of the poles and the mounting height used in the calculations with the fixture catalog number being used.

## 1.7 RECORD DRAWINGS

- A. Contractor shall maintain a complete set of contract drawings at job site with colored markings indicating progress of work. This set of contract drawings is to be separate from and in addition to Contractor's construction set. Every unit of equipment, device, conduit, and wire is to be marked when installed. Use GREEN to indicate installation as shown on drawings. Use RED to indicate field changes.
- B. Upon completion of work, this set of contract drawings is to be turned over to, and become the property of the Architect.

**1.8 SUPERVISION OF WORK**

- A. Contractor's Superintendent shall be experienced, qualified and on the job when work is in progress.
- B. Superintendent who is incompetent, in opinion of Architect, will be immediately replaced upon written request. Satisfactory Superintendent will not be withdrawn without consent of Architect.

**1.9 CONNECTING TO WORK OF OTHERS**

- A. Before starting work under this division of the Specifications and from time to time as work progresses, Contractor shall examine work and materials installed under other divisions of the Specifications insofar as they apply to his work and should notify the Architect immediately, in writing, should conditions exist which prevent satisfactory results in installation of system.
- B. Should Contractor start work without such notification, he shall remove and replace, at his own expense, any work under this division of the Specifications required due to such conditions.

**1.10 CUTTING, PATCHING, AND EXCAVATION**

- A. Cutting and patching of walls, partitions, floors, concrete, pits, and chases in wood and masonry shall be done by Contractor as provided on the drawings or as directed by the Architect. Cutting of steel, wood, concrete slabs, or other main structural members must be approved by the Architect prior to cutting.
- B. Contractor shall do all necessary excavation and backfilling incidental to work and is to be as specified in Excavation and Backfill Division of Specifications.
- C. Contractor shall be responsible for sealing all conduit penetrations made through fire rated walls, ceilings, slabs, etc. Penetration seals shall be per U.L. assembly standard.

**1.11 CLEANING AND ADJUSTMENTS**

- A. Upon completion of work, Contractor shall clean all lighting fixtures, device plates, equipment enclosures, trim flanges, etc. furnished under this section of specifications. Operable equipment and enclosures will be adjusted and made ready for testing.

**1.12 REMOVAL OF RUBBISH**

- A. Contractor shall, at all times, keep premises free from accumulations of waste materials or rubbish caused by his employees or work. At completion of work, all tools, scaffolding, materials, and rubbish shall be removed from building site. Premises shall be left in a clean and orderly condition acceptable to the Architect.



1.13 ACCEPTANCE

- A. Seven (7) days prior to date of requested Final Inspection, Contractor shall:
1. Complete work under his contract.
  2. Furnish to the Architect certificates of inspection issued by authorities.
  3. Acceptance will be by Architect on the basis of tests and inspection of the job.  
Contractor shall furnish necessary equipment and assist with Final Inspection.

1.14 GUARANTEE AND SERVICE

- A. In addition to guarantee of equipment by manufacturer, Contractor shall also guarantee such equipment which will include tests, adjustments and/or replacements of defective equipment, materials, and workmanship for a period of one (1) year from final acceptance of building by Architect.
- B. Contractor shall furnish three (3) complete sets of operation instructions applying to each piece of equipment installed, including parts lists and maintenance brochures.

2. PRODUCTS

2.1 RACEWAYS

- A. For each electrical raceway system required, provide a complete assembly of conduit, tubing or duct, with fittings including, but not necessarily limited to, connectors, nipples, couplings, elbows, outlet box covers, expansion fittings and other components and accessories as required for a complete system.
- B. Rigid steel conduit shall be galvanized and produced to Federal Specifications WW-C-581.
- C. PVC conduit shall be Schedule 40.
- D. Each length of conduit or tubing shall bear the Underwriters' Laboratories seal of inspection.
- E. Conduit installation shall follow layout shown on drawings. However, layout is diagrammatic only, and where changes are necessary due to structural conditions, interferences with other apparatus or other causes, such changes shall be made without additional cost to the Owner. Offsets in conduits are not indicated but shall be installed as required by the conditions.
- F. Empty raceways shall have pull lines installed, Jet Line No. 232 Polyolefin pull line, or approved equal.
- G. Verify exact stub-up location and termination requirements for items and equipment being served, for all necessary power and control circuits.
- H. Provide four 3/4 inch spare conduits from top of each flush- mounted lighting power panel,

telephone cabinet, and miscellaneous system cabinets. Stub into ceiling space (where applicable).

## 2.2 BOXES AND FITTINGS

- A. Boxes, fittings, clamps, hangers, etc. shall be galvanized steel or rust resistant malleable iron alloy compatible with raceway system and manufactured by Appleton, Steel City, or Thomas & Betts.
- B. Outlet boxes for fixtures and miscellaneous devices shall be one-piece, hot dipped galvanized stamped steel. Depth of boxes varies with construction materials. Galvanized steel plaster covers or extension rings shall be provided where required.
- C. Junction boxes shall be galvanized code gauge steel with screw covers. All exposed surfaces shall be finished with rust resistant enamel to match adjacent surfaces.
- D. Outlet boxes for exterior application shall be case alloy with gasketed cast alloy cover and threaded watertight conduit hubs.
- E. Outlet boxes shall be provided with fixture stubs where applicable.
- F. EMT connectors, couplings and miscellaneous fittings shall be steel set-screw type. Pot metal type and "sock-on" type fittings shall not be used.
- G. Switch and receptacle outlet boxes shall not be less than 4 inches square by 1 1/2 inches deep with standard device covers. Boxes in exposed masonry to be square corner type. Thru-wall boxes shall not be installed in any location.

## 2.3 CONDUCTORS

- A. Provide 98% Conductivity copper, solid for #10 AWG and smaller and IPCEA standard stranding for #8 AWG and larger. Unless otherwise noted, conductor sizes #6 AWG and smaller shall have a moisture resistant thermoplastic insulation, type THWN (75 degree C wet or dry). Conductor sizes #4 AWG and larger shall have moisture and heat resistant thermoplastic insulation, type THWN (75 degree C wet or dry).
- B. Type MC (Metal Clad) cable may be used if accepted by local AHJ and owner.

## 2.4 WIRING DEVICES

- A. All general purpose switches and receptacles shall be the product of a single manufacturer. Catalog numbers listed are Leviton. However, comparable devices by Pass and Seymour, Bryant, or Arrow Hart will be accepted. Color selected by architect.
  - 1. Switches: Single Pole - Leviton #CSB1-201
  - Switches: Three-Way - Leviton #CSB3-201
  - Dimmers: Single Pole Leviton
  - (All other required switches shall match in color and style.)

2. Receptacles: Duplex Outlet - Leviton #BR20-I  
(All other receptacles shall match in color and style.)
3. Cover Plates: Smooth Nylon (80700 Series) and Stainless Steel, where applicable. Plates shall be provided for all wiring devices, data, and telephone outlet boxes. Plates shall be of suitable configuration for the number and type of device for which it is the cover. Telephone and data wall plates shall be provided as required for systems installed. Plates shall be one-piece type.
4. Telephone and data outlet cover plates shall match those specified for adjacent wiring devices, including those with special finishes.
5. Provide corrosion-resistant device cover plates for all locations marked weatherproof (WP).

## 2.5 PANELBOARDS

- A. All panelboards shall be the product of a single manufacturer. Catalog numbers and descriptive data on plans and contained herein are those of Square 'D'. However, comparable equipment by Siemens, General Electric or Cutler-Hammer only will be accepted.
- B. See Branch Circuit Schedules on plans for panelboard type, location, mounting, bussing, and branch circuit arrangement. Note that dimensions may be critical; do not exceed dimensions of the specified manufacturer without prior approval.
- C. All panelboards shall be circuit breaker type with dead front trim, lock type hinged door, distributed phase bussing and are to have medium grey enamel finish.
- D. Branch circuit breakers shall be ambient compensating thermal magnetic type. Two and three pole breakers shall have common trip handle. Tandem circuit breakers shall not be used.

## 2.6 DISCONNECT SWITCHES

- A. Furnish general duty disconnect switches rated in accordance with NEMA Standard KS-1-1990, unless specified otherwise on drawings. Switches shall be a product of the same manufacturer as panelboards, using a quick-make, quick-break mechanism.
- B. Exterior units shall have NEMA 3R or 4 (raintight or watertight) enclosures as indicated. Other types of enclosures than NEMA 1 for interior locations shall be provided to suit installation conditions.

## 2.7 FUSES

- A. All fuses for safety switches shall be dual element, cartridge type. Fuses shall be those manufactured by either Bussman or Littlefuse. The Contractor shall furnish and install fuses specified and shall also furnish to the Owner one spare fuse for each size and type of fuse installed. Fuses 600 Amps or less shall be Class "T" or "J", typical unless otherwise noted. Fuses over 600 Amps shall be Class L.

## 2.8 LIGHTING FIXTURES

- A. Lighting fixtures shall be provided in accordance with the schedules. The fixtures shall be complete with all accessories necessary for a complete and proper installation. Catalog numbers indicated in schedules do not necessarily include plaster frame special mounting and other fittings which may be required for proper installation, but these devices shall be provided where applicable.
- B. All fluorescent light fixtures shall have lamps and ballasts as follows:
  - 1. Lamps to be energy saving C.W. as follows:
    - a. Trimline by G.E.
    - b. Octron by Sylvania
    - c. TL 70 by Phillips
  - 2. Ballasts to be compatible to above lamps as follows:
    - a. Sylvania Quicktronic Ballast
    - b. Triad by G.E.
    - c. Mark III by Advance
- C. All incandescent lamps shall be 130 volt general service type by either General Electric, Philips or Sylvania.

## 3. EXECUTION

### 3.1 PLANS AND SPECIFICATIONS

- A. Plans, in general, are diagrammatic and Contractor shall coordinate his work, in advance, with that of the other trades to prevent installation conflict. Electrical Drawings shall not be scaled. Architect will be notified immediately of impending conflict, and work in question is not to be installed until Architect has resolved conflict.

### 3.2 INSTALLATION

- A. All fasteners, channels, angles and other members required for support of finished installation of electrical work shall be furnished and installed under this section of the specifications.
- B. All metallic, non-current carrying components of the electrical systems, including boxes, enclosures, raceways, etc., shall be securely bonded to an approved ground as per N.E.C.

#### B.1 HVAC WIRING

The electrical disconnect switches, conduit and wire shown on plans are sized as per the manufacturer and model number listed on the mechanical plans. If there is an equal, or complete substitution of A/C manufacturer provided, the mechanical/general contractor shall bear any additional cost incurred, if the electrical specifications are not equal.

## C. Raceways

1. Raceways shall be concealed in floor slabs, walls, or above finished ceilings except where specifically noted on plans.
2. Conduit sizes shall be in strict accordance with National Electrical Code allowances on percentage fill unless specifically noted on plans.
3. Electric Metallic Tubing (EMT) shall not be installed in slab or below grade, or in locations else where specified as requiring rigid steel conduit materials. EMT shall not be installed for wiring to "vaportight" or explosion-proof equipment or within concrete light standard bases. EMT shall be allowed in concealed walls and above finished ceiling.
4. Rigid steel or Schedule 40 PVC conduit shall be installed below finished grade and in or below concrete slabs. Where rigid steel is used, it shall be completely coated with an alkali and rust-resistant bitumastic paint, Sherwin Williams "Tar Guard", and threads shall be coated with zinc chromate. Rigid steel shall also be used when conduit is exposed to exterior environment such as exterior of building or where it is subject to damage.
5. Rigid steel conduit installed below grade shall be completely coated with an alkali and rust resistant bitumastic paint, Sherwin Williams "Tar Guard."
6. All PVC conduit larger than two inches (2") shall have rigid galvanized steel elbows.
7. Raceways shall be labeled with a permanent marker indicating circuits of system wiring they contain.
8. In general, raceways shall be run in straight lines with a minimum number of bends and offsets between junction outlet boxes. Exposed conduit, where permitted, shall be neatly installed in straight lines parallel with partitions and vertical construction features. All conduits shall be secured in accordance with N.E.C. requirements.
9. Terminations of all conduit runs shall be capped during construction to prevent intrusion of construction debris.

## D. Outlet Boxes

1. Individual outlet boxes shall be selected for compatibility with construction materials involved. In general, depth of box shall be sufficient to accept conduit entry without additional chipping or cutting of construction material.
2. Flush boxes shall be rigidly installed and plumb so that finished face of the box and device cover is flush with adjacent wall surface.
3. Mounting height, to center line of outlet boxes, shall be:
  - a. Light Switches - 48" above floor
  - b. Convenience Outlets - 18" above floor
  - c. Receptacle Over Counters - 8" above work surface
  - d. Fixed Appliance Outlets - 18" above floor
  - e. Telephone/Data Outlets - 18" above floor

*(ALL HEIGHTS SHALL BE VERIFIED WITH ARCHITECT AND/OR OWNER PRIOR TO ROUGH-IN)*
4. In masonry walls, mounting heights listed above shall be adjusted so that top or bottom of box is aligned with nearest masonry joint when possible. Mounting heights listed above are handicap accessibility standards.
5. For exterior locations and areas subject to moisture or water, provide corrosion-resistant

cast metal waterproof boxes as applicable. Boxes shall be of types, shapes and sizes required. They shall be gasketed and have threaded hubs and conduit. Box accessory materials shall match the box for the specific application.

6. Outlet boxes shall be labeled with a permanent marker indicating circuits or system wiring they contain.
7. Outlet boxes on opposite sides of a wall shall be mounted a minimum of 24 inches apart to centerline of boxes.

#### E. Wire and Cable

1. Conductors shall not be installed in a conduit run until that conduit run is complete and properly terminated with bushed connector.
2. Switch and receptacle conductors shall be terminated with at least 8" free conductor at outlet box for device connection. Home runs shall be terminated in panelboard enclosure with sufficient free conductor length to reach related branch circuit protective device without splicing.
3. Pulling lubricants shall be approved for use with particular type of insulation on conductors being installed.
4. Solderless, insulated, spring type pressure connectors (SCOTCHLOK) shall be used for all general wiring size #8 and smaller. Compression type connectors shall be used for wiring size #6 and larger. Special connectors, where required, shall be solderless type, properly sized for conductors joined, and be completely covered with self vulcanizing electrical tape.
5. Furnish code approved wiring in ceiling cavities forming air plenums.
6. Conductors shall be color coded as follows:

<u>208V SYSTEM</u>	<u>480V SYSTEM</u>	<u>PHASE SEQUENCE</u>
Neutral - White	Neutral - White	ABC, top to bottom,
Phase A - Black	Phase A - Brown	left to right, front to
Phase B - Red	Phase B - Orange	back
Phase C - Blue	Phase C - Yellow	
Grd.Con - Green	Grd.Con - Green	

#### F. Wiring Devices

1. Wiring devices shall be securely fastened in place, properly aligned and plumb.
2. Wiring devices installed prior to application of interior finishes, shall be covered with plastic paint guard or masking tape throughout the application process.
3. All standard receptacles shall be grounded by means of ground wire. Strap alone will not constitute an acceptable ground.
4. All electrical raceways shall be equipped with a ground conductor sized as required by N.E.C.
5. Device plates shall not be installed until all interior wall finishes are completed. Device plates shall be installed with all four edges of plate in continuous contact with adjacent wall surface.

#### G. Panelboards

1. Panelboards shall be mounted with their center lines approximately 5 feet, 6 inches above the finished floor, except that the highest breaker shall in no case be more than 6 feet, 6 inches above the finished floor.
2. Typewritten circuit index shall be affixed to inside surface of each panelboard door, clearly indicating area and type of load served by each branch circuit protective device, including spares.
3. Engraved, laminated plastic identification plates shall be furnished and installed in all panels. Plates shall indicate panel name, voltage and amperage. Plates shall be affixed to front of panels with sheet metal screws.

#### H. Lighting Fixtures

1. All lighting fixtures shall be installed, wired, adjusted, aligned and lamped under this section of specifications.
2. In areas where the reflected ceiling plan is shown, all work shall be in conformance with this plan. If the ceiling grid is installed other than shown on the electrical plan, it shall be the responsibility of the installer of the lighting fixtures to call this fact immediately to the attention of the Architect and Contractor, and work shall not proceed until the Architect's decision in the matter is obtained.
3. Lighting in equipment rooms and electric closets is diagrammatic, indicating type, quantity and general circuiting of fixtures. Modify locations and mounting to suit conditions, allowing clearances for equipment, piping and ductwork.
4. Plaster frames shall be provided for all recessed fixtures including those located in lath and plaster, gypsum board, and similar materials.
5. Provide fixture support bars spanning structural T-bar ceiling channels for surface mounting type fixtures. Support bars and fixtures shall allow vertical and horizontal positioning of the fixture.
6. Provide a proper ceiling grid hanger for fixtures that are ceiling mounted or suspended from exposed "T-Grid" ceilings. The grid hanger shall secure to the main support channels of the ceiling and have provisions for locking in place. Grid hangers shall accept stem canopy or surface fixtures.
7. Fixtures shall not be supported by outlet box cover screws alone. Provide additional structural support as required.
8. Contractor shall review architectural plans for light fixture placement in ceilings and ceiling tiles, and review HVAC plans for coordination with ceiling mounted diffusers.

### 3.3 GROUNDING

- A. Service and equipment ground conductors shall be copper with Type THWN insulation and installed in strict accordance with N.E.C. regulations. Bonding fittings used are to be U.L. listed and be compatible with metals used in system.
- B. A separate, green Type THWN copper ground conductor shall be run from ground lug of each grounded receptacle to an approved connection inside the enclosing steel outlet box. Device mounting screws shall not be considered an approved ground.
- C. A separate ground conductor shall be installed in every conduit and raceway and securely bonded in an approved grounding terminal at both ends of the run. The grounding

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conductor shall be sized in accordance with Table 250-95 of the N.E.C. Contractor shall size conduit to accommodate additional conductor.

END OF SECTION