



Rolesville, North Carolina  
**PUBLIC WORKS FACILITY**

---

PROJECT MANUAL

JULY 1, 2022



**IBI GROUP**  
421 Fayetteville St–Suite 1609  
Raleigh NC 27601 USA  
tel 919 851 4211  
[ibigroup.com](http://ibigroup.com)

THIS PAGE INTENTIONALLY LEFT BLANK

PUBLIC WORKS FACILITY  
ROLESVILLE, NORTH CAROLINA

PROFESSIONAL SEALS



ARCHITECT



DATE: 07/01/2022  
STRUCTURAL



07-01-2022

PLUMBING



07-01-2022

FIRE PROTECTION



07-01-2022

MECHANICAL



ELECTRICAL



CIVIL

THIS PAGE INTENTIONALLY LEFT BLANK



## TABLE OF CONTENTS

### Cover

Design Certifications

### DIVISION 00 – BIDDING AND CONTRACT REQUIREMENTS

Advertisement for Bids

Instructions to Bidders

Form of Proposal

Bid Bond Form

General Conditions

Contract for Construction

### APPENDICES

Appendix A – Guidelines for Minority Business Participation

Appendix B – Reporting Sales Tax

Appendix C – Bond Forms

Appendix D – Change Order Form

Appendix E – Qualifications of Bidders

Appendix F – Certification of Financial Condition

Appendix G – Index of Drawings

### DIVISION 01 – GENERAL REQUIREMENTS

Section 01 11 00	Summary of Work
Section 01 21 00	Allowances
Section 01 22 00	Unit Prices
Section 01 23 10	Alternates
Section 01 34 00	Submittals
Section 01 50 00	Temporary Facilities and Controls
Section 01 60 00	Product Requirements
Section 01 78 00	Closeout Procedures
Section 01 78 23	O-M Documentation General

### DIVISION 03 - CONCRETE

Section 03 30 00	Cast-In-Place Concrete
------------------	------------------------

### DIVISION 05 – METALS

Section 05 12 00	Structural Steel Framing
Section 05 31 00	Steel Decking
Section 05 50 00	Metal Fabrications
Section 05 51 13	Metal Pan Stairs
Section 05 52 00	Metal Railings

## **DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES**

Section 06 10 00	Rough Carpentry
Section 06 20 20	Interior Finish Carpentry

## **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

Section 07 21 00	Thermal Insulation
Section 07 62 00	Sheet Metal Flashing and Trim
Section 07 92 00	Joint Sealers

## **DIVISION 08 – OPENINGS**

Section 08 11 14	Metal Doors and Frames
Section 08 36 12	Sectional Metal Overhead Doors
Section 08 41 13	Aluminum-Framed Entrances and Storefronts
Section 08 63 00	Prismatic Unit Skylights
Section 08 71 00	Door Hardware
Section 08 80 00	Glazing
Section 08 91 00	Louvers and Blank-Off Panels

## **DIVISION 09 – FINISHES**

Section 09 05 61	Moisture Vapor Emission Control
Section 09 06 00	Schedule for Finishes
Section 09 22 16	Gypsum Board Assemblies
Section 09 51 00	Acoustical Ceilings
Section 09 65 19	Resilient Flooring
Section 09 67 23	Resinous Flooring ( <b>Bid Alternate</b> )
Section 09 90 00	Paints and Coatings

## **DIVISION 10 – SPECIALITIES**

Section 10 14 00	Plastic Signs
Section 10 21 13	Toilet and Shower Compartments
Section 10 22 15	Chain Link Mesh Partitions
Section 10 28 13	Toilet Accessories
Section 10 44 00	Fire Protection Specialties
Section 10 51 13	Lockers and Benches
Section 10 73 16	Aluminum Awnings

## **DIVISION 11 – EQUIPMENT**

Section 11 31 16      Appliances

## **DIVISION 12 – FURNISHINGS**

Section 12 21 13      Horizontal Louver Blinds

## **DIVISION 13 – SPECIAL CONSTRUCTION**

Section 13 34 19      Metal Building Systems

## **DIVISION 21 – FIRE SUPPRESSION**

Section 21 13 13      Wet Pipe Sprinkler Systems

## **DIVISION 22 – PLUMBING**

Section 22 05 53      Identification for Plumbing Piping-Equipment  
Section 22 07 19      Plumbing Piping Insulation  
Section 22 11 16      Domestic Water Piping  
Section 22 11 19      Domestic Water Piping Specialties  
Section 22 13 16      Sanitary Waste-Vent Piping  
Section 22 13 19      Sanitary Waste Piping Specialties  
Section 22 13 23      Oil Water Separator  
Section 22 15 00      General Service Compressed-Air Systems  
Section 22 33 00      Electric Domestic Water Heater  
Section 22 40 00      Plumbing Fixtures  
Section 22 42 23      Commercial Showers

## **DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)**

Section 23 01 00      Common work Requirements for Mechanical  
Section 23 01 30.51      HVAC – Air Distribution System Cleaning  
Section 23 07 00      HVAC Insulation  
Section 23 09 23.16      Gas Instruments  
Section 23 09 23.23      Pressure Instruments  
Section 23 09 23.27      Temperature Instruments  
Section 23 31 00      Ductwork and HVAC Casings  
Section 23 33 00      Air Duct Accessories  
Section 23 34 00      HVAC Fans  
Section 23 35 00      Special Exhaust Systems  
Section 23 36 00      VAV Unit  
Section 23 37 13      Diffuser, Registers and Grilles  
Section 23 51 00      Breechings, Chimneys and Stacks

Section 23 55 00	Fuel-Fired Heaters
Section 23 81 26	Split-System Air-Conditioners

## **DIVISION 26 – ELECTRICAL**

Section 26 00 10	General Requirements for Electrical Systems
Section 26 02 24	Conduit
Section 26 05 19	Building Wire and Cable
Section 26 05 26	Grounding and Bonding for Electrical Systems
Section 26 05 33	Raceways-Boxes for Electrical Systems
Section 26 05 37	Boxes
Section 26 05 53	Identification for Electrical Systems
Section 26 05 59	Hangers-Supports for Electrical Systems
Section 26 05 74	Overcurrent Protective Device Coordination and Arc-Flash Study
Section 26 09 23	Lighting Control Devices
Section 26 24 16	Panelboards
Section 26 27 13	Electricity Metering
Section 26 27 26	Wiring Devices
Section 26 28 13	Fuses
Section 26 28 16	Enclosed Switches and Circuit Breakers
Section 26 29 13	Enclosed Controllers
Section 26 29 23	Variable Frequency Drives
Section 26 32 13	Engine Generator
Section 26 36 00	Transfer Switches
Section 26 51 00	Interior Lighting
Section 26 56 19	LED Exterior Lighting

## **DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

Section 28 31 00	Fire Alarm Systems
------------------	--------------------

## **DIVISION 31 – EARTHWORK**

Section 31 10 00	Site Clearing
Section 31 22 13	Rough Grading
Section 31 23 16.13	Trenching
Section 31 23 23	Fill

## **DIVISION 32 – EXTERIOR IMPROVEMENTS**

Section 32 11 23	Aggregate Base Courses
Section 32 12 16	Asphalt Paving
Section 32 13 13	Concrete Paving
Section 32 31 13	Chain Link Fences and Gates
Section 32 92 19	Seeding

## **DIVISION 33 – UTILITIES**

Section 33 05 61	Concrete Manholes
Section 33 42 00	Stormwater Conveyance

## **DIVISION 34 – TRANSPORTATION**

Section 34 71 13	Plastic Bollard Covers
------------------	------------------------

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## ADVERTISEMENT FOR BIDS

Sealed proposals will be received until **3:00 pm on October 25, 2022** at the Rolesville Town Hall, 502 Southtown Circle, Rolesville, NC 27571, for the construction of renovations to the existing Town Hall at which time and place bids will be opened and read.

Complete plans and specifications for this project can be obtained from Eric L. Marsh, Assistant Town Manager, Town of Rolesville, 502 Southtown Circle, Rolesville, NC 27571 or via email at [eric.marsh@rolesville.nc.gov](mailto:eric.marsh@rolesville.nc.gov) or by calling (919) 556-3506 during normal office hours.

A Pre-Bid meeting will be held at the Town Hall meeting room, 502 Southtown Circle, Rolesville NC 27571 on October 12, 2022 at 11:00 am. Attendance at the pre-bid meeting is strongly encouraged, but not mandatory. For those unable to attend in person, a link to the simultaneous videoconference will be available to registered plan holders as of the day before the meeting.

Work included in the project is listed below:

*A new, single-story, pre-engineered metal building with a storage/equipment mezzanine and related site work. The new facility will house the Town of Rolesville Public Works operations. The building contains office areas plus warehouse storage, workshop, and service bays. The site work includes earthwork, paving, landscaping and utilities. The building work includes plumbing, fire protection, HVAC and electrical work. The project also includes the delegated design of pre-engineered metal building system and a fire protection sprinkler system.*

The State Department of Administration requires participation by minority or women-owned businesses according to General Statute 143-128.1(a). The Town of Rolesville has set a participation goal at 15%

The Bid Documents may be obtained by following instructions posted at the following location:

<https://www.rolesvillenc.gov/finance/bid-opportunities>

Bidders are responsible for monitoring this site for addenda and other pertinent documents

Town of Rolesville as owner reserves the right to reject any and all bids for any reason.

IBI Group  
Tasha Hicks - Administrator  
421 Fayetteville Street, Suite 1609  
Raleigh NC 27601 United States  
(919) 851 4211 ext. 51518  
[tasha.hicks@ibigroup.com](mailto:tasha.hicks@ibigroup.com)

Town of Rolesville  
Eric L. Marsh, Assistant Town Manager  
502 Southtown Circle  
PO Box 250  
Rolesville, NC 27571  
(919) 556-3506  
[eric.marsh@rolesville.nc.gov](mailto:eric.marsh@rolesville.nc.gov)

THIS PAGE INTENTIONALLY LEFT BLANK



## **INSTRUCTIONS TO BIDDERS**

### **Quality Monitoring**

Work must be completed to the satisfaction of IBI Group AND to the Town of Rolesville.

### **Payment Methods and Approvals**

Payment applications will be processed monthly based on work completed. Retainage of 5% of contract amount will be withheld until completion of any and all punch list items.

IBI Group will review all pay applications within 5 days of submittal and forward with recommendation to the Town of Rolesville.

### **Scheduling**

The time of completion is expressed as the number of calendar days from receipt of the Notice to Proceed until the date of Substantial Completion. It is hereby understood and mutually agreed, by and between the Contractor and the Town, that the date of beginning, rate of progress and the time for completion of the Work are essential conditions of this Contract. Work should occur between the hours of 7am and 5pm on weekdays. Additional hours or weekend work may be possible in limited circumstances.

The Contract Time is **310** consecutive calendar days

### **Notice to Proceed**

After contractor receives written notice to proceed by way of signed contract with owner, a construction schedule is to be submitted to IBI Group within 14 days.

### **Liquidated Damages**

Contractor will not be held responsible for delays outside of their control, such as unusual weather. Contractor is responsible for notifying IBI Group in writing as to any anticipated delays and the reasons for same. Contractor will be assessed liquidated damages in amount of \$500.00 per day after the Substantial Completion date established in the construction contract

### **Licensing Reminder**

All contractors must have licenses under State laws for respective trades.

### **Bonds Requirements**

Bid bonds equal to not less than 5% of bid amount will be required. Performance bonds and Payment bonds will be required for the full amount of the contract and for the duration of the project only. Please NOTE again; payments WILL NOT BE MADE until work is completed and accepted by owner and architect.

### **Owner's Right to Reject Bids**

Owner reserves the right to reject any or all bids and to waive informalities.

THIS PAGE INTENTIONALLY LEFT BLANK

# BID PROPOSAL

Project: Public Works Facility Bidder: \_\_\_\_\_

Owner: Town of Rolesville, North Carolina Date: \_\_\_\_\_

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this proposal is accepted to contract with the Town of Rolesville, North Carolina, in the form of the included contract, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the contract for:

## SINGLE PRIME CONTRACT:

### Base Bid:

\_\_\_\_\_ Dollars (\$)\_\_\_\_\_

General Subcontractor:

\_\_\_\_\_ Lic \_\_\_\_\_

Plumbing Subcontractor:

\_\_\_\_\_ Lic \_\_\_\_\_

Mechanical Subcontractor:

\_\_\_\_\_ Lic \_\_\_\_\_

Electrical Subcontractor:

\_\_\_\_\_ Lic \_\_\_\_\_

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

## ALTERNATES:

Should any of the alternates, as more fully described in the contract documents, be accepted, the amount written below shall be the amount to be "added to" or "deducted from" the base bid. (Strike out "Add" or "Deduct" as appropriate.)

Alternate No. 1 Add Interior Chain Link Mesh Partitions:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

Alternate No. 2 Use Resinous Flooring in lieu of vinyl flooring:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

Alternate No. 3 Add Prismatic Skylights and Curbs:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

Alternate No. 4 Add Trench Drains and increase OWS Tank size:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

Alternate No. 5 Add Standby Generator, Tank with Fuel, ATS and cabling:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

Alternate No. 6 Add Lightning Protection:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

Alternate No. 7 Add Tap Box for Owner's mobile generator:

(Add) (Deduct) \_\_\_\_\_ Dollars(\$)

#### **UNIT PRICES**

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents. Unit prices may be used for either additive or deductive changes and are further described in the the specifications.

No.1	Excavate Unsuitables and Spread	per Cu. Yd.	<u>Unit Price (\$)</u>
No.3	Rip Rock and Spread	per Cu. Yd.	<u>Unit Price (\$)</u>
No.4	Blast Rock and Spread	per Cu. Yd.	<u>Unit Price (\$)</u>
No.5	Turn and Dry Soil	per Cu. Yd.	<u>Unit Price (\$)</u>
No.6	Import & Compact Fill Material	per Cu. Yd.	<u>Unit Price (\$)</u>
No.7	Import & Compact #57 Washed Stone	per Cu. Yd.	<u>Unit Price (\$)</u>

No.8	Import & Compact ABC Stone	per Cu. Yd.	<u>Unit Price (\$)</u> _____
No.9	Asphalt Paving	per Ton.	<u>Unit Price (\$)</u> _____
No.10	Geotextile, Mirafi 500X or equal:	Per Sq. Ft.	<u>Unit Price (\$)</u> _____
No.11	Haul Rock Off-Site	per Cu. Yd.	<u>Unit Price (\$)</u> _____
No.12	Moisture Vapor Emission Control	per Sq. Ft.	<u>Unit Price (\$)</u> _____

## Proposal Signature Page

The undersigned further agrees to execute the said contract and the bonds within seven (7) consecutive calendar days after written notice being given of the award of contract.

Respectfully submitted this day of \_\_\_\_\_

\_\_\_\_\_  
(Name of firm or corporation making bid)

WITNESS:

\_\_\_\_\_  
(Proprietorship or Partnership)

By:

Title \_\_\_\_\_

\_\_\_\_\_  
(Owner/Partner/Pres./V.Pres)

Address \_\_\_\_\_

License No. \_\_\_\_\_

Federal I.D. No. \_\_\_\_\_

ATTEST:

By: \_\_\_\_\_

Title: \_\_\_\_\_

(Corp. Sec. or Asst. Sec. only)

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 \_\_\_\_\_ Addendum No. 3 \_\_\_\_\_ Addendum No. 5 \_\_\_\_\_ Addendum No. 6 \_\_\_\_\_

Addendum No. 2 \_\_\_\_\_ Addendum No. 4 \_\_\_\_\_ Addendum No. 6 \_\_\_\_\_ Addendum No. 7 \_\_\_\_\_

END OF PROPOSAL FORM

## FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT \_\_\_\_\_

\_\_\_\_\_ as  
principal, and \_\_\_\_\_, as surety, who is  
duly licensed to act as surety in North Carolina, are held and firmly bound unto the State of  
North Carolina\* through \_\_\_\_\_ as  
obligee, in the penal sum of \_\_\_\_\_ DOLLARS, lawful money of  
the United States of America, for the payment of which, well and truly to be made, we bind  
ourselves, our heirs, executors, administrators, successors and assigns, jointly and  
severally, firmly by these presents.

Signed, sealed and dated this \_\_\_\_ day of \_\_\_\_ 20\_\_

WHEREAS, the said principal is herewith submitting proposal for  
and the principal desires to file this bid bond in lieu of making  
the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that  
if the principal shall be awarded the contract for which the bid is submitted and shall  
execute the contract and give bond for the faithful performance thereof within ten days after  
the award of same to the principal, then this obligation shall be null and void; but if the  
principal fails to so execute such contract and give performance bond as required by G.S.  
143-129, the surety shall, upon demand, forthwith pay to the obligee the amount set forth in  
the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by  
G.S. 143-129.1

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

THIS PAGE INTENTIONALLY LEFT BLANK



## CONSTRUCTION CONTRACT for the TOWN OF ROLESVILLE

This Construction Contract for the Town of Rolesville (the "Agreement") is made and entered into this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by and between the **TOWN OF ROLESVILLE, NORTH CAROLINA**, a municipal corporation of the State of North Carolina ("Owner") and \_\_\_\_\_ (the "Contractor"). Owner and Contractor are, collectively, the "Parties" and individually, a "Party."

The Project:  
Name and Location:

The Designer is:

1. **CONTRACT DOCUMENTS.** The "Contract Documents" consist of this Agreement, General Conditions of the Contract for Construction ("General Conditions"); Specifications; Drawings; Addenda issued prior to execution of the Agreement; other documents listed in Paragraph 19 of the Agreement (if any); and Modifications executed by the Parties after execution of the Agreement; and, for public Projects, the Owner's Advertisements to Bid or Invitations to Bid, the Owner's Instructions to Bidders, the Contractor's Bid or Proposal, Performance and Payment Bonds, and Certificates of Insurance (together, the "Contract"). The Contract Documents form the Contract and are fully a part of the Contract as if attached to the Agreement or repeated herein. In the event of conflicts among the Contract Documents, the Specifications shall take precedence over the Drawings, and the Supplementary Conditions shall take precedence over the General Conditions. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Owner and a Subcontractor or Sub-subcontractor.

The Owner and Contractor agree that should the Contractor utilize the services of a Subcontractor for any Work under this Contract, the Subcontractor shall be required to comply with all terms and conditions of this Contract and any and all Contract Documents entered into between the Owner and Contractor and any of its Subcontractors shall require the same of their Subcontractors.

2. **WORK.** The Contractor shall fully execute the Work described in the Contract Documents or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.
3. **RELATIONSHIP OF THE PARTIES.** The Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Designer and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve information required by the Contractor and to make payments to the Contractor, both in accordance with the requirements of the Contract Documents.
4. **DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION.** The Work required by the Contract shall be commenced by the Contractor not later than | 7 | calendar days after the Owner's notice to the Contractor to proceed and the entire work shall be completed not later than | 310 | calendar days after the date of notice to proceed.

The Contractor acknowledges and recognizes that the Owner is entitled to full and beneficial occupancy and use of the completed Work following expiration of the Contract Time as defined

above, and that the Owner has entered into, or will enter into, binding agreements with third parties based upon the Contractor's achieving Substantial Completion of the Work within the Contract Time. The Contractor further acknowledges and agrees that if the Contractor fails to complete substantially or fails to cause the Substantial Completion of any portion of the Work within the Contract Time, the Owner will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be difficult to ascertain. Therefore, the Owner and Contractor agree that the Owner shall be entitled to liquidated damages for the Contractor's failure to complete substantially or failure to cause Substantial Completion of any portion of the Work within the Contract Time as set forth below.

If the Contractor fails to complete substantially or fails to cause the Substantial Completion of any Work within the Contract Time, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the following per diem amounts commencing on the upon the first day following expiration of the Contract Time and continuing until the date that the Contractor achieves Substantial Completion of the entire Work. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed completion of the Work: | \$500 | per day.

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Contract. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable by the Contractor to the Owner at the demand of the Owner, together with interest from the date of the demand at a rate equal to the prime interest rate as published by the Wall Street Journal.

Notwithstanding anything to the contrary in the Contract, if the Owner is unable to recover any portion of liquidated damages in accordance with the terms and conditions above because any portion thereof is found to be unenforceable or invalid as a penalty or otherwise, then the Owner shall be entitled to recover from the Contractor all of the Owner's actual damages in connection with any failure by the Contractor to complete substantially to achieve Substantial Completion of the Work within the Contract Time, including without limitation, consequential damages.

## 5. CONTRACT SUM AND PAYMENT

5.1 Owner agrees to pay for services, satisfactorily performed, in accordance with the Contract Documents. Unless otherwise specified, Contractor shall submit an Application for Payment in the manner described in Article 9 of the General Conditions. Payment will be processed promptly upon receipt and upon approval of the Application by Owner.

5.2 Contractor shall receive from Owner a sum not to exceed \$ | |, as full compensation for the provision of construction services provided under this Contract, subject to additions and deductions as provided in the Contract Documents.

5.3 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

| |

5.4 Unit prices, if any, are as follows:  
| May reference bid form |

## 6. PROGRESS PAYMENTS. Based upon Applications for Payment submitted to the Designer by the

Active\106014219.v2-1/16/20

Contractor and Certificates for Payment issued by the Designer pursuant to Sections 9.5 and 9.6 of the General Conditions, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in Sections 9.3, 9.4, and 9.7 of the General Conditions.

7. **FINAL PAYMENT.** Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when (1) the Contract has been fully performed by the Contractor and all requirements expressed in Sections 9.3 and 9.11 of the General Conditions have been satisfied except for those requirements set forth in Sections 11.2 and 11.3 of the General Conditions and any other requirements which necessarily survive final payment; and (2) a final Certificate for Payment has been issued by the Designer; such final payment shall be made by the Owner not more than 30 days after the issuance of the Designer's final Certificate for Payment.
8. **INDEMNIFICATION.** The Contractor's indemnification obligations connected with the Contract are set forth in Paragraph 3.17 of the General Conditions.
9. **NOTICES.** All notices which may be required by this Contract or any rule of law shall be effective when received by the following individuals through personal delivery or by certified mail at the following addresses:

FOR: **TOWN OF ROLESVILLE**

|  
|  
|

FOR: **CONTRACTOR**

|  
|  
|

10. **NON-DISCRIMINATION.** Contractor shall not discriminate against any employee or applicant for employment because of age, sex, race, creed, national origin, or disability. Contractor shall take affirmative action to ensure that applicants are employed and that employees are treated fairly and legally during employment with regard to their age, sex, race, creed, national origin, or disability. In the event Contractor is determined by the final order of an appropriate agency or court to be in violation of any non-discrimination provision of federal, state, or local law, or this provision, this Contract may be canceled, terminated or suspended in whole or in part by Owner, and Contractor may be declared ineligible for further Owner contracts.
11. **HEALTH AND SAFETY.** Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs required by OSHA and all other regulatory agencies while providing services under this Contract.
12. **NON-ASSIGNMENT.** This Contract is not assignable by either Party, by operation of law or otherwise, except as provided in Section 12.2 of the General Conditions.
13. **MODIFICATION.** This Contract may be modified only by a written agreement executed by both Parties.
14. **TERMINATION OR SUSPENSION.** This Contract may be terminated by the Owner or the Contractor as provided in Article 13 of the General Conditions. The Work may be suspended by the Owner as provided in Section 13.4 of the General Conditions.

15. E-VERIFY. As a condition of payment for services rendered under this Contract, Contractor shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes. Further, if Contractor provides Work utilizing a Subcontractor, Contractor shall require the Subcontractor to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes as well. Contractor shall verify by affidavit compliance of the terms of this section upon request by the Owner.
- ~~16. IRAN DIVESTMENT ACT. Contractor attest that it is not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4. Individuals or companies on the Final Divestment List are ineligible to contract or subcontract with Local Government Units. (See N.C.G.S. 143C-6A-6(a).) It is Contractor's responsibility to monitor its compliance with this restriction. Contracts valued at less than \$1,000 are exempt from this restriction.~~
17. DIVESTMENT FROM COMPANIES THAT BOYCOTT ISRAEL. Contractor certifies that it has not been designated by the North Carolina State Treasurer pursuant to N.C.G.S. 147-86.81 as a company engaged in the boycott of Israel. It is Contractor's responsibility to monitor compliance with this restriction. Contracts valued at less than \$1,000 are exempt from this restriction.
18. INSURANCE AND BONDS
- 18.1 CONTRACTOR'S INSURANCE. Contractor agrees to purchase at its own expense insurance coverages to satisfy the following minimum requirements and to secure the required insurance prior to performing Work. A certificate reflecting the following minimum coverages shall accompany this Agreement:
- Workers' Compensation Insurance - Limits of no less than \$1,000,000 for each accident and each employee. Waivers of Indemnity are not recognized by the North Carolina Department of Insurance and will not be accepted by the Town of Rolesville.
  - Commercial General Liability - Combined single limits of no less than \$1,000,000 each occurrence, and \$2,000,000 in the aggregate. This insurance shall include Comprehensive Broad Form Coverage including contractual liability. It shall provide coverage for claims including (1) damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person; (2) personal injury and advertising injury; (3) damages because of physical damage to or destruction of tangible property, including the loss of use of such property; (4) bodily injury or property damage arising out of completed operations; and (5) the Contractor's indemnity obligations under Section 3.17 of the General Conditions. The following language must be endorsed onto the policies and listed on Certificate of Insurance: "Town of Rolesville is named additional insured as its interests may appear."
  - Commercial Automobile Liability - Automobile Liability covering vehicles owned and non-owned vehicles used by the Contractor, with policy limits of no less than \$1,000,000 per accident for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage. Evidence of commercial automobile coverage is only necessary if vehicles are used in the provision of services under this Agreement and/or are brought on an Owner site. The following language must be endorsed onto the policies and listed on Certificate of Insurance: "Town of Rolesville is named additional insured as its interests may appear."

All insurance companies used by the Contractor must be licensed in North Carolina. Contractor shall disclose to the Owner any deductible or self-insured retentions applicable

to any insurance required to be provided by the Contractor and shall provide the Owner no less than thirty (30) days' notice of cancellation, or any material change, to any insurance coverage required by this Contract.

18.2 PERFORMANCE BOND AND PAYMENT BOND. The Contractor has furnished and attached hereto a Performance Bond in the penal sum of \$| |, and a Payment Bond in the penal sum of \$| | covering the faithful performance of this Contract and the payment of all obligations arising hereunder, in such form and content as the Owner may prescribe and with surety approved by the Owner. Should any surety upon the bond for the performance of this Contract become unacceptable to the Owner, the Contractor must promptly furnish additional security as may be required from time to time by the Owner to protect the interests of the Owner and of persons, firms and corporations supplying labor or materials in the performance of the work contemplated by the Contract.

19. INCORPORATION OF CONTRACT DOCUMENTS. The Contract Documents, except for Modifications issued after execution of this Contract, are enumerated as indicated:

- ( ) Agreement
- ( ) General Conditions of the Contract for Construction
- ( ) Supplemental and Other Conditions
- ( ) Job Specifications

Title

- ( ) Project Drawings

Title

- ( ) Addenda

Number / Date

- ( ) Advertisement to Bid
- ( ) Instructions to Bidders
- ( ) Contractor's Proposal
- ( ) Performance Bond (w/Power-of-Attorney)
- ( ) Payment Bond (w/Power-of-Attorney)
- ( ) Certificate of Insurance
- ( ) Other (Describe)

20. The Agreement and the other Contract Documents described herein represent the entire and integrated agreement between the Owner and Contractor and supersede any and all prior negotiations, representations or agreements concerning the Project between the Parties, whether written or oral.

21. OTHER PROVISIONS.

- 21.1 If a court finds any provision of the Contract invalid or unenforceable, in whole or in part, the finding shall not affect the validity or enforceability of any other provision of the Contract or the remainder of the provision in question.
- 21.2 No act or failure to act by the Owner or Contractor constitutes a waiver of any right, remedy, obligation or duty afforded them under the Contract or Law, or approval of, or acquiescence in, any breach of contract or negligence of the other party, except as stated in the Contract or otherwise agreed in writing.
- 21.3 The Parties may sign this Agreement in counterparts. Together the counterparts shall constitute a complete document. Signatures transmitted electronically shall have the same effect as physical delivery of the paper bearing the original signatures.

SIGNATURE PAGE FOLLOWS

**TOWN OF ROLESVILLE**

This instrument has been pre-audited  
in the manner required by the Local  
Government Budget and Fiscal Control Act.

By: \_\_\_\_\_

Date: \_\_\_\_\_

\_\_\_\_\_  
Finance Officer

**CONTRACTOR**

ATTEST:

By: \_\_\_\_\_

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

STATE OF NORTH CAROLINA  
COUNTY OF \_\_\_\_\_

I, a Notary Public in and for the aforesaid County and State, do hereby certify that \_\_\_\_\_  
personally appeared before me this day and acknowledged that he is \_\_\_\_\_ of  
\_\_\_\_\_, a North Carolina corporation, and that by authority duly given and as the act of  
the corporation, the foregoing instrument was signed in its name by its \_\_\_\_\_, sealed with its  
corporate seal and attested by \_\_\_\_\_ as its \_\_\_\_\_.

Witness my hand and notarial seal this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_

THIS PAGE INTENTIONALLY LEFT BLANK



## GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

### 1 ARTICLE 1 GENERAL PROVISIONS

#### 1.1 **BASIC DEFINITIONS**

- 1.1.1 Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the Parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Designer or the Designer's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Designer or the Designer's consultants, or (4) between any persons or entities other than the Owner and the Contractor.
- 1.1.2 Contract Documents. The Contract Documents are enumerated in the Construction Contract for the Town of Rolesville (hereinafter, the Agreement).
- 1.1.3 Contractor. The Contractor is the person or entity identified as such in the Agreement, and is referred to throughout the Contract Documents as if singular in number. Unless otherwise stated, the term "Contractor" shall mean the General Contractor or the General Contractor's authorized representative(s).
- 1.1.4 Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.
- 1.1.5 Designer. The Designer is the Architect or Engineer registered in accordance with the provisions of Chapter 89C of the North Carolina General Statutes, is identified as such in the Agreement, and is referred to throughout the Contract Documents as if singular in number. Unless otherwise stated, the term "Designer" shall mean the Designer or the Designer's authorized representative(s).
- 1.1.6 Modification. A Modification is (1) a written amendment to the Agreement or to other Contract Documents signed by both Parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Designer.
- 1.1.7 Owner. The Owner is the Town of Rolesville. The term "Owner" shall mean the Owner or the Owner's authorized representative(s).
- 1.1.8 Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner or by separate contractors.
- 1.1.9 Project Manual. The Project Manual is the volume usually assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract, and Specifications.
- 1.1.10 Separate Contractor. The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements.
- 1.1.11 Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services.
- 1.1.12 Work. The term "Work" means the construction and services required by the Contract

Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

## **1.2 EXECUTION, CORRELATION, AND INTENT**

- 1.2.1 The Contract Documents shall be signed by the Owner and Contractor as provided in the Contract.
- 1.2.2 Execution of the Contract by the Contractor is a representation that the Contractor has visited the worksite, is familiar with local conditions under which the Work is to be performed, has correlated personal observations with requirements of the Contract Documents, has checked and verified all worksite conditions.
- 1.2.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all.
- 1.2.4 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any Subcontractor.
- 1.2.5 Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

## **1.3 OWNERSHIP AND USE OF DESIGNER'S DRAWINGS, SPECIFICATIONS AND OTHER**

**DOCUMENTS:** The Drawings, Specifications, and other documents prepared by the Designer are instruments of the Designer's service, which describe the Work to be executed by the Contractor. The Contractor may retain one contract record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Designer. The Owner will retain all common law, statutory, and other reserved rights, in addition to the copyright of the Drawings, Specifications, and other documents prepared by the Designer. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Designer, on request, upon completion of the Work. The Drawings, Specifications, and other documents prepared by the Designer, and copies thereof furnished to the Contractor, are for use solely with respect to this Project; they are not to be used by the Contractor or any Subcontractor, Sub-subcontractor, or material or equipment supplier on other projects without the specific written consent of the Owner and Designer. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by the Designer appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications, and other documents prepared by the Designer. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Owner's copyright or other reserved rights.

- 1.4 **CAPITALIZATION:** Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Articles, Sections, Paragraphs, Subparagraphs, and Clauses in the document or (3) the titles of other

documents.

- 1.5 INTERPRETATION:** In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

## **2 ARTICLE 2 OWNER**

### **2.1 INFORMATION AND SERVICES REQUIRED OF THE OWNER**

- 2.1.1 The Owner shall furnish plan and profile of existing Town utilities. The Contractor is responsible for locating all existing utilities prior to Work.
- 2.1.2 Except for permits and fees which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments, and charges required for construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.
- 2.1.3 Information or services under the Owner’s control shall be furnished by the Owner with reasonable promptness to avoid delay in orderly progress of the Work.
- 2.1.4 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.

- 2.2 OWNER’S RIGHT TO STOP THE WORK:** If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

- 2.3 OWNER’S RIGHT TO CARRY OUT THE WORK:** If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after such seven-day period, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Designer’s additional services and expenses made necessary by such default, neglect, or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior review and confirmation by the Designer. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

## **3 ARTICLE 3 CONTRACTOR**

### **3.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

- 3.1.1 The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Owner pursuant to Section 2.1, and shall at once report to the Designer any errors, inconsistencies, or omissions discovered. If the Contractor performs any construction activity when it knew or should have known that such work involves any

errors, inconsistencies, or omissions in the Contract Documents without providing notice to the Designer, the Contractor shall assume full responsibility for such performance and shall bear the full costs for any required correction.

- 3.1.2 The Contractor shall take field measurements, verify field conditions, and shall carefully compare such field measurements, conditions, and other information known to the Contractor with the Contract Documents before commencing and construction activity. If the Contractor discovers errors, inconsistencies, or omissions it shall promptly report such conditions to the Designer.
- 3.1.3 The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to Section 3.11.

### **3.2 SUPERVISION AND CONSTRUCTION PROCEDURES**

- 3.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures. The Contractor shall be solely responsible for coordinating all portions of the Work under the Contract, unless Contract Documents give other specific instructions concerning these matters.
- 3.2.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of the Contractor or any of its Subcontractors.
- 3.2.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Designer in the Designer's administration of the Contract, or by tests, inspections, or approvals required or performed by persons other than the Contractor.
- 3.2.4 The Contractor shall be responsible for inspection of portions of Work already performed under this Contract (if any) to determine that such portions are in proper condition to receive subsequent Work.

### **3.3 LABOR AND MATERIALS**

- 3.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.
- 3.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- 3.3.3 Materials, equipment, or items required for a complete job that are shown on the Drawings but not mentioned in the Specifications; or materials, equipment, or items required by the Specifications but not shown on the Drawings, shall be furnished and installed the same as if they were both shown on the Drawings and required by the Specifications.

### **3.4 WARRANTY**

- 3.4.1 The Contractor warrants to the Owner and Designer that materials and equipment furnished

under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents; that the Work will be free from defects not inherent in the quality required or permitted; and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Designer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.4.2 Except as otherwise specifically stated below, the Contractor shall guarantee his materials and workmanship against defect due to faulty materials or faulty workmanship or negligence for a period of twelve (12) months following Substantial Completion of the Work. Where the manufacturer's warranty on equipment or parts thereof exceeds twelve (12) months, the guarantee period on such equipment or parts thereof shall be extended to include the full warranty of the manufacturer. The Contractor shall repair or replace such defective materials, equipment, or workmanship to the full satisfaction of the Owner within the stipulated guarantee period without cost to the Owner.

3.4.3 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**3.5 TAXES:** The Contractor shall pay sales, consumer, use, and similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

### **3.6 PERMITS, FEES AND NOTICES**

3.6.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract for Construction and which are legally required when bids are received or negotiations concluded.

3.6.2 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work.

3.6.3 It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Designer and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.

3.6.4 If the Contractor performs Work the Contractor knows or should have known it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Designer and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs.

### **3.7 ALLOWANCES**

3.7.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to

employ persons or entities against which the Contractor makes reasonable objection.

**3.7.2 Unless otherwise provided in the Contract Documents:**

- 1 materials and equipment under an allowance shall be selected promptly by the Owner to avoid delay in the Work;
- 2 allowances shall cover the cost to the Contractor of materials and equipment delivered to the site and all required taxes, less applicable trade discounts;
- 3 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the allowances;
- 4 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by a Change Order. The amount of the Change Order shall reflect (a) the difference between actual costs and the allowances under Clause 3.7.2(2) and (b) changes in Contractor's costs under Clause 3.7.2(3). To the extent that any allowance is not fully used, then the unused amount of each allowance shall be credited to the Owner by a Change Order.

**3.8 SUPERINTENDENT:** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing upon request.

**3.9 CONTRACTOR'S CONSTRUCTION SCHEDULES**

**3.9.1** Promptly after being awarded the Contract, the Contractor shall prepare and submit for the Designer's review and comment a construction schedule for the Work. The schedule shall not exceed time limits provided in the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. If separate prime contracts are awarded by the Owner in connection with this Project, the Contractor shall additionally submit a Contractor's construction schedule for the Work to the General Contractor in order for the General Contractor to carry out its duties under Article 6.

**3.9.2** The Contractor shall prepare and keep current, for the Designer's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Designer reasonable time to review submittals.

**3.9.3** The Contractor shall perform Work in general accordance with the most recent schedules.

**3.10 DOCUMENTS AND SAMPLES AT THE SITE**

The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, addenda, Change Orders, and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be available to the Designer and shall be delivered to the Designer for submittal to the Owner upon completion of the Work.

**3.11 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**

- 3.11.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.
- 3.11.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- 3.11.3 Samples are physical examples, which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
- 3.11.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Designer is subject to the limitations of Paragraph 4.1.6.
- 3.11.5 The Contractor shall review, approve, and submit to the Designer Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Submittals made by the Contractor which are not required by the Contract Documents may be returned without action.
- 3.11.6 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples, or similar submittals until the respective submittal has been reviewed and approved or other appropriate action taken by the Designer. Such Work shall be in accordance with approved submittals.
- 3.11.7 By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements, and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- 3.11.8 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Designer's review and approval of Shop Drawings, Product Data, Samples, or similar submittals unless the Contractor has specifically informed the Designer in writing of such deviation at the time of submittal and the Designer has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by the Designer's approval thereof.
- 3.11.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Designer on previous submittals.
- 3.11.10 Informational submittals upon which the Designer is not expected to take responsive action may be so identified in the Contract Documents.
- 3.11.11 When professional certification of performance criteria of materials, systems, or equipment is required by the Contract Documents, the Designer shall be entitled to rely upon the accuracy and completeness of such calculations and certificates.
- 3.12 USE OF SITE:** The Contractor shall confine operations at the site to areas permitted by law,

ordinances, permits, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **3.13 CUTTING AND PATCHING**

- 3.13.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.
- 3.13.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a Separate Contractor except with written consent of the Owner and of such Separate Contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a Separate Contractor the Contractor's consent to cutting or otherwise altering the Work.

### **3.14 CLEANING UP**

- 3.14.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials.
- 3.14.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

**3.15 ACCESS TO WORK:** The Contractor shall provide the Owner and Designer access to the Work in preparation and progress wherever located.

**3.16 ROYALTIES AND PATENTS:** The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of patent rights and shall hold the Owner and Designer harmless from loss unless a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Designer.

### **3.17 INDEMNIFICATION**

- 3.17.1 To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, the Owner's elected officials, officers, directors, managers, agents, employees, and affiliated entities of any of them; the Designer, the Designer's consultants, agents, employees, and affiliated entities of any of them; and any parties which the Contract Documents require the Contractor to defend, indemnify, or hold harmless (altogether, the "Indemnified Parties") from and against any and all claims, losses, damages, demands, injuries, judgments, causes of action, suits, and liability of every kind including without limitation attorneys' fees and other litigation expenses incurred by an Indemnified Party (collectively, the "Indemnified Claims") for the following:

- 1 For bodily injury to or the death of any person, or damage to or destruction of tangible property (including the loss of its use) arising from the negligence of the Contractor or the Contractor's derivative parties (as "derivative parties" are defined by N.C. Gen. Stat. § 22B-1); provided, however, that the Contractor shall not be required to indemnify or hold harmless an Indemnified Party against any damages arising out of



bodily injury to persons or damage to personal property proximately caused by or resulting from the negligence, in whole or in part, of such Indemnified Party.

2 For all Indemnified Claims not included in Subparagraph 1 above, in which the fault of the Contractor or its derivative parties (as "fault" and "derivative parties" are defined by N.C. Gen. Stat. § 22B-1) is a proximate cause of the loss, damage, or expense indemnified.

3 For all Indemnified Claims against the Indemnified Party arising from or relating to liens asserted under Chapter 44A of the General Statutes of North Carolina.

3.17.2 In any and all Indemnified Claims against the Indemnified Parties by an employee of the Contractor, to the fullest extent permitted by law, any indemnification obligation shall not be limited by amount or type of damages, compensation, or benefits payable by or for the Contractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

3.17.3 The obligations of the Contractor under this Section 3.17, shall not extend to the liability of the Designer, the Designer's consultants, and agents and employees of any of them arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or specifications, or (b) the giving of or the failure to give directions or instructions by the Designer, the Designer's consultants, and agents and employees of any of them provided such giving or failure to give is the primary cause of the injury or damage.

3.17.4 If any indemnity obligation of the Contractor under this Section 3.17 or elsewhere in the Contract, is held to be unenforceable, Contractor shall indemnify and hold harmless the Indemnified Parties to the full extent permitted by Law. Further, the Contractor's liability resulting from its defense and indemnity obligations under the Contract is not limited or affected in any way by insurance coverage or lack thereof.

#### **4 ARTICLE 4 ADMINISTRATION OF THE CONTRACT**

##### **4.1 DESIGNER'S ADMINISTRATION OF THE CONTRACT**

4.1.1 The Designer will provide administration of the Contract as described in the Contract Documents, and will be the Owner's representative during construction through final payment, and with the Owner's concurrence, from time to time during the correction period described in Section 11.2. The Designer will advise and consult with the Owner. The Designer will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument in accordance with other provisions of the Contract.

4.1.2 The Designer will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in Section 3.2. The Designer will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Designer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

4.1.3 Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate through

the Designer. Communications by and with the Designer's consultants shall be through the Designer. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Designer.

- 4.1.4 Based on the Designer's inspections, observations, and evaluations of the Contractor's Applications for Payment, the Designer will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.
- 4.1.5 The Designer will have authority to reject Work which does not conform to the Contract Documents. Whenever the Designer considers it necessary or advisable for implementation of the intent of the Contract Documents, the Designer will have authority to require additional inspection or testing of the Work in accordance with Paragraphs 12.7.2 and 12.7.3, whether or not such Work is fabricated, installed, or completed. However, neither this authority of the Designer nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Designer to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.
- 4.1.6 The Designer will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data, and Samples but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Designer's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or Separate Contractors, while allowing sufficient time in the Designer's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Designer's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Article 3. The Designer's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Designer, of any construction means, methods, techniques, sequences, or procedures. The Designer's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- 4.1.7 The Designer will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4.
- 4.1.8 The Designer will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will receive and forward to the Owner for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.
- 4.1.9 The Designer will interpret and decide matters concerning performance under and requirements of the Contract documents on written request of either the Owner or Contractor. The Designer's response to such requests will be made with reasonable promptness and within any time limits agreed upon. If no agreement is made concerning the time within which interpretations required of the Designer shall be furnished in compliance with this Paragraph 4.1.9, then delay shall not be recognized on account of failure by the Designer to furnish such interpretations until 15 days after written request is made for them.

- 4.1.10 Interpretations and decisions of the Designer will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Designer will endeavor to secure faithful performance by both Owner and Contractor, and will not show partiality to either.
- 4.1.11 The Designer's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.
- 4.1.12 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Section 11.2 or persistently fails to carry out Work in accordance with the Contract Documents, the Designer may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Designer to stop the Work shall not give rise to a duty on the part of the Designer to exercise this right for the benefit of the Contractor or any other person or entity.

## **4.2 CLAIMS AND DISPUTES**

- 4.2.1 A Claim is a demand or assertion by one of the Parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract. Claims include other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be made pursuant to the Dispute Resolution Procedure set forth in Section 4.4. The responsibility to substantiate Claims shall rest with the party making the Claim.
- 4.2.2 Decision of Designer. Claims, including those alleging an error or omission by the Designer, shall be referred initially to the Designer for action as provided in Section 4.4. A decision by the Designer shall be required as a condition precedent to mediation and litigation of a Claim between any Party involved in this construction Project as to all such matters arising prior to the date final payment is due, regardless of whether such matters relate to execution and progress of the Work or the extent to which the Work has been completed. The decision by the Designer in response to a Claim shall not be a condition precedent to litigation in the event (1) the position of Designer is vacant, (2) the Designer has not received evidence or has failed to render a decision within agreed time limits, or (3) forty-five (45) days have passed after the Claim has been referred to the Designer.
- 4.2.3 Time Limits on Claims. Claims by the Contractor must be made within ten (10) days after occurrence of the event giving rise to such Claim or within ten (10) days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been implemented by Change Order will not be considered.
- 4.2.4 Continuing Contract Performance. Pending final resolution of a Claim, unless otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.
- 4.2.5 Waiver of Claims: Final Payment. The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:
- 1 unsettled claims arising out of the Contract; or
  - 2 failure of the Work to comply with the requirements of the Contract Documents; or
  - 3 terms of special warranties required by the Contract Documents

Acceptance of final payment by the Contractor waives all Claims by the Contractor against the Owner except those previously asserted and remaining unsettled.

- 4.2.6 Claims for Concealed Or Unknown Conditions. If conditions are encountered at the site which are (a) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (b) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing Party shall be given to the other Party promptly before conditions are disturbed and in no event later than ten (10) days after first observance of the conditions. The Designer will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Designer determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified the Designer shall so notify the Owner and Contractor in writing stating the reasons, Claims by either party in opposition to such determination must be made within twenty-one (21) days after the Designer has given notice of the decision. If the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Designer for initial determination, subject to further proceedings pursuant to Section 4.4.
- 4.2.7 Claims for Additional Cost. If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.3. If the Contractor believes additional cost is involved for reasons including but not limited to (a) a written interpretation from the Designer, (b) a written order for a minor change in the Work issued by the Designer, (c) termination of the Contract by the Owner, Claim shall be filed in accordance with the procedure established herein. This Article, and Article 7, shall be the exclusive means by which the Contractor may claim additional cost or damages from the Owner, and the Contractor hereby waives any and all right to claim additional cost or damages by any other remedy including, without limitation, quantum meruit, subrogation, or implied contract.
- 4.2.8 Claims for Additional Time. If the Contractor wishes to make Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary. Adverse weather conditions shall not be a basis for a Claim for additional costs.
- 4.2.9 Waiver of Claims for Consequential Damages. The Contractor waives Claims against the Owner for consequential damages arising out of or relating to this Contract except to the extent that such damages are covered and paid under a policy of insurance maintained by the Owner. This waiver includes damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work. This waiver is applicable, without limitation, to all consequential damages due to the Owner's termination in accordance with Article 13. Nothing contained in this Paragraph 4.2.9 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

**4.3 INJURY OR DAMAGE TO PERSON OR PROPERTY:** If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other Party, of any of the other Party's employees or agents, or of others for whose acts such Party is legally liable, written notice as such injury or damage, whether or not insured, shall be given to the other Party within a reasonable time not exceeding ten (10) days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in Paragraphs 4.2.7 or 4.2.8.

**4.4 DISPUTE RESOLUTION PROCEDURE**

- 4.4.1 To prevent all disputes and litigation, it is agreed by the Parties that any Claim, question, difficulty, or dispute arising from this Contract or the construction process shall be first submitted to the Designer to address the issue. Upon review of the Claim, the Designer shall take one or more of the following preliminary actions within ten (10) days of receipt of a Claim: (1) request additional supporting data from the claimant, (2) submit a schedule to the Parties indicating when the Designer expects to take action, (3) reject the Claim in whole or in part stating reasons for rejection, (4) recommend approval of the Claim by the other Party, or (5) suggest a compromise. The Designer may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.
- 4.4.2 If a Claim has been resolved, the Designer will prepare or obtain appropriate documentation.
- 4.4.3 If a Claim has not been resolved, the Party making the Claim shall, within ten (10) days after the Designer's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested by the Designer, (2) modify the initial Claim and resubmit it to the Designer, or (3) notify the Designer that the initial Claim stands and submit the Claim for mediation pursuant to Paragraph 4.4.4, below.
- 4.4.4 A mediator shall address any properly submitted Claim, question, difficulty, or dispute arising from this Contract or the construction process, which has not been satisfactorily resolved by the Designer or Owner. The mediator's orders, decisions, and decrees shall be non-binding. Mediation, pursuant to this Paragraph, shall be a pre-condition to initiating litigation concerning the dispute. During the pendency of any dispute and after a determination thereof, the Parties to the dispute shall act in good faith to mitigate any potential damages including utilization of construction schedule changes and alternate means of construction. The mediator shall be agreed upon by the Parties and the Designer.
- 4.4.5 The mediation session shall be private. Prior to commencement of mediation, if requested by either Party or the mediator, the Parties and the mediator shall execute a written confidentiality agreement in accordance with the provisions of North Carolina law. All such mediation sessions shall be held in Wake County, North Carolina.
- 4.4.6 If, as a result of mediation, a voluntary settlement is reached the agreement shall be reduced to writing, and it shall be enforceable in the General Court of Justice in the Wake County, North Carolina, which shall be the exclusive venue and jurisdiction for disputes arising thereunder.
- 4.4.7 If the disputed issue cannot be resolved in mediation or either party disagrees with the results of the mediation, the parties may seek resolution in the General Court of Justice in the County of Wake and the State of North Carolina.
- 4.4.8 The dispute resolution procedure set forth in this Paragraph shall be made available to any party involved in this construction project including Owner, Contractor, Designer,

Subcontractors, as well as Sub-subcontractors and is a precondition to initiation of litigation concerning the dispute.

- 4.4.9 The Parties shall share the mediator's fee and any filing fees equally.

## **5 ARTICLE 5 SUBCONTRACTORS**

### **5.1 DEFINITIONS**

- 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or subcontractors of a Separate Contractor.

- 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### **5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**

- 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Designer the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work, including (1) Heating, ventilating, and air conditioning, (2) Plumbing, (3) Electrical, and (4) General. The Designer will promptly reply to the Contractor in writing stating whether or not the Owner or the Designer, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Designer to reply promptly shall constitute notice of no reasonable objection.

- 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

- 5.3 The Contractor shall NOT substitute any person or company listed in the Contractor's original Bid Proposal, except (1) when one of the listed Subcontractor's bid is later determined by the Contractor to be non-responsible or non-responsive or the listed Subcontractor refuses to enter into a contract for the complete performance of the Work, or (2) with the approval of the Owner for good cause shown by the Contractor.

- 5.4 **SUBCONTRACTUAL RELATIONS:** By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms and conditions of the Contract Documents and Contract for Construction, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these documents, assumes toward the Owner and Designer. Each subcontract agreement shall preserve and protect the rights of the Owner and Designer under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the

Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement which may be at variance with the Contract Documents. Subcontractors shall similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

## **6 ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS**

- 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site.
- 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Contract.
- 6.1.3 The General Contractor shall provide for coordination of the activities of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the General Contractor (and the Owner and Designer as needed) in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor and Separate Contractors until subsequently revised.
- 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10 and 11.
- 6.1.5 The General Contractor shall be responsible for scheduling the work of all contractors; the maintenance of the progress schedule for all prime contractors for this Project; and for the notification of the Designer of any changes in the progress schedule.

### **6.2 MUTUAL RESPONSIBILITY**

- 6.2.1 The Contractor shall afford the Owner and Separate Contractors (if any) reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Designer apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or the Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

- 6.2.3 Costs caused by delays, by improperly timed activities, defective construction, or any other damages shall be borne by the party responsible therefor. The Owner shall not be liable nor responsible for any delays or damages to the Contractor caused by Separate Contractors or the Designer.
- 6.2.4 The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or Separate Contractors as provided in Paragraph 10.2.5.
- 6.2.5 Claims and other disputes and matters in question between the Contractor and a Separate Contractor shall be subject to the provisions of Sections 4.2 and 4.4, provided the Separate Contractor has reciprocal obligations.
- 6.2.6 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.13.
- 6.3 OWNER'S RIGHT TO CLEAN UP:** If a dispute arises among the Contractor, Separate Contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in Section 3.14, the Owner may clean up and allocate the cost among those responsible as the Designer determines to be just.

## **7 ARTICLE 7 CHANGES IN THE WORK**

### **7.1 CHANGES**

- 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without in validating the Contract, by Change Order, Construction Change Directive, or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.
- 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Designer; a Construction Change Directive requires agreement by the Owner and Designer and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Designer alone pursuant to Section 7.4.
- 7.1.3 Changes in the Work shall be performed under applicable Provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.
- 7.1.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.
- 7.1.5 Overhead and profit shall not exceed 15% of the value of labor and material for work performed by any contractor or Subcontractor. If the work is performed by a Subcontractor, the prime contractor's overhead and profit shall not exceed 5%.

### **7.2 CHANGE ORDERS**

- 7.2.1 A Change Order is a written instrument prepared by the Designer and signed by the Owner, Contractor, and Designer, stating their agreement upon all of the following:
  - 1 a change in the Work;



- 2 the amount of the adjustment in the Contract Sum, if any; and
- 3 the extent of the adjustment in the Contract Time, if any.

7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Paragraph 7.3.3.

### **7.3 CONSTRUCTION CHANGE DIRECTIVES**

7.3.1 A Construction Change Directive is a written order prepared by the Designer and signed by the Owner and Designer, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- 1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- 2 unit prices stated in the Contract Documents or subsequently agreed upon;
- 3 cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- 4 as provided in Paragraph 7.3.6.

7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Designer of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.5 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Designer on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Clause 7.3.3(3), the Contractor shall keep and present, in such form as the Designer may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Paragraph 7.3.6 shall be limited to the following:

- 1 costs of labor, including social security, old age, and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- 2 costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

- 3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
  - 4 costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes related to the Work; and
  - 5 additional costs of supervision and field office personnel directly attributable to the change.
- 7.3.7 Pending final determination of cost to the Owner, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Designer. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.
- 7.3.8 If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Designer for determination.
- 7.3.9 When the Owner and Contractor agree with the determination made by the Designer concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.
- 7.4 MINOR CHANGES IN THE WORK:** The Designer will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Designer and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Designer's order for a minor change without prior notice to the Designer that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time. The Contractor shall carry out such written orders promptly.

## **8 ARTICLE 8 TIME**

### **8.1 DEFINITIONS**

- 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.
- 8.1.2 The date of commencement of the Work is the date established in the Contract. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.
- 8.1.3 The date of Substantial Completion is the date certified by the Designer in accordance with Section 9.9.
- 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

### **8.2 PROGRESS AND COMPLETION**

- 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing

the Contract, the Contractor confirms that the Contract Time is a reasonable period for performing the Work. The Contractor and the Contractor's surety shall be liable for and shall pay the Owner such sums as shall be set forth in the Contract between Owner and Contractor as liquidated damages each calendar day of delay until the Work is substantially complete.

- 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by the Contract for Construction to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by a notice to proceed given by the Designer, the Contractor shall notify the Owner and Designer in writing not less than five days before commencing the Work.
- 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

### **8.3 DELAYS AND EXTENSIONS OF TIME**

- 8.3.1 If the Contractor is delayed at any time in progress of the Work by an act or neglect of the Owner or Designer, or of an employee of either, or of a Separate Contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidably casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending litigation, or by other causes which the Designer determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Designer may determine.
- 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.2.8.
- 8.3.3 Should the Work be interrupted or hindered by the Owner or Designer, the Contractor shall be entitled to an extension of time pursuant to Section 4.2 in an amount equal to such interruption or hindrance, but the Contractor hereby waives any claim for damages resulting from such interruption or hindrance.
- 8.3.4 Should the Work be delayed in whole by any act or acts of the Contractor, the Contractor shall not be entitled to an extension of time pursuant to Section 4.2, nor shall such delay constitute a claim either for damages or for loss of anticipated profits by the Contractor. Should the Work be delayed in part by any act or acts of the Contractor and in part by any act or acts of the Owner or Designer, the Contractor shall be entitled to an extension of time pursuant to Section 4.2 in an amount equal to that portion of the delay for which the Contractor is not responsible, but such delay shall not constitute a claim either for damages or for loss of anticipated profits by the Contractor.
- 8.3.5 Should the Work be delayed, interrupted or hindered, in whole or in part, by any act or acts of any separate prime contractors, the Contractor shall be entitled to an extension of time pursuant to Paragraph 4.2.8 in an amount equal to such delay, interruption or hindrance but such delay, interruption or hindrance shall not constitute a claim for damages nor for loss of anticipated profits by the Contractor.

## **9 ARTICLE 9 PAYMENTS AND COMPLETION**

- 9.1 **CONTRACT SUM:** The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of

the Work under the Contract Documents.

- 9.2 SCHEDULE OF VALUES:** Before the first Application for Payment, the Contractor shall submit to the Designer a Schedule of Values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Designer may require. This Schedule of Values, unless objected to by the Designer, shall be used as a basis for reviewing the Contractor's Applications for Payment.

**9.3 APPLICATIONS FOR PAYMENT**

- 9.3.1 At least twenty (20) days before the date established for each progress payment, the Contractor shall submit to the Designer an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, supported by such data substantiating the Contractor's right to payment as the Owner or Designer may require, such as copies of requisitions from Subcontractors and material suppliers and reflecting retainage if provided for elsewhere in the Contract Documents.
- 9.3.2 Such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives but not yet included in Change Orders.
- 9.3.3 Such applications may not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.
- 9.3.4 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.
- 9.3.5 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work.
- 9.3.6 Provided an Application for Payment is received by the Designer not later than the tenth (10th) day of a month, the Owner shall make payment to the Contractor pursuant to a Certificate of Payment within thirty (30) days.

**9.4 RETAINAGE**

To ensure proper performance of this Contract, Owner shall retain five percent (5%) of the amount of each approved Application for Payment until the project Work is 50% complete provided that the Contractor continues to perform satisfactorily and any non-conforming Work identified in writing prior to submission of the application has been corrected by the

Contractor and accepted by the Owner. The project shall be deemed fifty percent (50%) complete when the Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the value of the contract, except the value of materials stored on-site shall not exceed twenty percent (20%) of the Contractor's gross project invoices for the purpose of determining whether the project is fifty percent (50%) complete.

After the Work is 50% complete, if the Owner determines the Contractor's performance is unsatisfactory and/or it has failed to correct non-conforming Work, the Owner may reinstate the retainage amount of 5% for each subsequent periodic Application for Payment until the Contractor's performance becomes satisfactory.

Notwithstanding the above, after the Work is 50% complete, the Owner may also withhold additional retainage from any subsequent periodic payment, not to exceed 5%, in order to allow the Owner to retain 2.5% total retainage through the completion of the Project.

Within sixty (60) days after the submission of a final pay application, the Owner with written consent of the Surety shall release to the Contractor all retainage on payments held by the Owner if (1) the Owner receives a certificate of Substantial Completion from the Designer or the Contractor, or (2) the Owner receives beneficial occupancy or use of the Project. However, the Owner may retain sufficient funds to secure completion of the Project or corrections to any Work. If the Owner retains funds, the amount retained shall not exceed two and one half times the estimated cost of the Work to be completed or corrected. Any reduction in the amount of retainage on payments shall be with the consent of the Contractor's Surety. Retainer provisions contained in Contractor's subcontracts may not exceed the terms and conditions for retainage provided herein. Contractor is further required to satisfy the retainage provisions of N.C.Gen. Stat. §143-134.1(b2) with regard to subcontracts for early finishing trades (structural steel, piling, caisson, and demolition) and to coordinate the release of retainage for such trades from the retainage held by Owner from the Contractor pursuant to statute.

Nothing herein shall prevent the Owner from withholding payment to the Contractor in addition to the amounts identified herein for unsatisfactory job progress, defective construction not remedied, non-conforming Work, disputed Work, and/or third party claims filed against the Owner or reasonable evidence that a third party claim will be filed.

## **9.5 CERTIFICATES FOR PAYMENT**

9.5.1 The Designer will, within seven (7) days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Designer determines is properly due, or notify the Contractor and Owner in writing of the Designer's reasons for withholding certification in whole or in part as provided in Paragraph 9.6.1.

9.5.2 The Designer's certification for payment shall constitute a representation to the Owner, based on the Designer's inspections at the site and on the data comprising the Contractor's Application for Payment, that the Work has progressed to the point indicated and that the inspections of the construction, repairs, or installations have been conducted with the degree of care and professional skill and judgment ordinarily exercised by a member of his profession; and that to the best of his knowledge and in the professional opinion of the Designer, the Contractor has fulfilled the obligations of such plans, specifications, and contract. The Designer's certification for payment shall be signed and sealed by the Designer and presented to the Owner. The foregoing representations are subject to an evaluation of the Work for

conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion, and to specific qualifications expressed by the Designer. The issuance of a Certificate for Payment shall further constitute a representation by the Designer, that the Contractor is entitled to payment in the amount certified.

## **9.6 DECISIONS TO WITHHOLD CERTIFICATION**

9.6.1 The Designer may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Designer's opinion, the representations to the Owner required by Paragraph 9.5.2 cannot be made. If the Designer is unable to certify payment in the amount of the Application, the Designer will notify the Contractor and Owner as provided in Paragraph 9.5.1. If the Contractor and Designer cannot agree on a revised amount, the Designer will promptly issue a Certificate for Payment for the amount for which the Designer is able to make such representations to the Owner. The Designer may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Designer's opinion to protect the Owner from loss due to:

- 1 defective Work not remedied;
- 2 third party claims filed or reasonable evidence indicating probable filing of such claims;
- 3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- 4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- 5 damage to the Owner or another contractor;
- 6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- 7 persistent failure to carry out the Work in accordance with the Contract Documents.

9.6.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

## **9.7 PROGRESS PAYMENTS**

9.7.1 After the Designer has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Designer.

9.7.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in similar manner.

9.7.3 The Designer will furnish to a Subcontractor, upon request and if practicable, information

regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Designer and Owner on account of portions of the Work done by such Subcontractor.

9.7.4 Neither the Owner nor Designer shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

9.7.5 Payment to material suppliers shall be treated in a manner similar to that provided in Paragraphs 9.7.2, 9.7.3, and 9.7.4.

9.7.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

**9.8 FAILURE OF PAYMENT:** The Contractor shall not stop the Work for the failure of the Designer to issue a Certificate of Payment, or the Owner to make timely payment.

#### **9.9 SUBSTANTIAL COMPLETION**

9.9.1 Substantial Completion is the stage in the progress of the Project when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents, so the Owner can occupy or utilize the Work for its intended use.

9.9.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Designer a comprehensive list of items to be completed or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility for the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the Contractor's list, the Designer will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Designer's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Designer. The Contractor shall then submit a request for another inspection by the Designer to determine Substantial Completion.

9.9.3 When the Work or designated portion thereof is substantially complete, the Designer will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

9.9.4 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Designer, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents.

#### **9.10 PARTIAL OCCUPANCY OR USE**

- 9.10.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Designer as provided under Paragraph 9.9.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Designer.
- 9.10.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Designer shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.
- 9.10.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

#### **9.11 FINAL COMPLETION AND FINAL PAYMENT**

- 9.11.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Designer will promptly make such inspections and, when the Designer finds the Work acceptable under the Contract Documents and the Contract fully performed, the Designer will promptly issue a Final Certificate for Payment stating that to the best of the Designer's knowledge, information and belief, and on the basis of the Designer's observations and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in said Final Certificate is due and payable. The Designer's Final Certificate for Payment will constitute a further representation that the conditions listed in Paragraph 9.11.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.
- 9.11.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Designer (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract for Construction to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5) if required by the Owner, other or additional data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains



unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

- 9.11.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Designer so confirms, the Owner shall, upon application by the Contractor and certification by the Designer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed and accepted is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Designer prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
- 9.11.4 Acceptance of final payment by the Contractor, Subcontractor, or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## **10 ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **10.1 SAFETY PRECAUTIONS AND PROGRAMS**

- 10.1.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract and construction of the Project.
- 10.1.2 In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (hereinafter "APCB") which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Designer by phone and in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or PCB and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or PCB, or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Designer.
- 10.1.3 The Contractor shall not be required to perform without consent of Owner and Designer any Work relating to asbestos or PCB.

### **10.2 SAFETY OF PERSONS AND PROPERTY**

- 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to:
- 1 employees working on the Project and other persons who may be affected thereby;
  - 2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
  - 3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation,

or replacement in the course of construction.

- 10.2.2 The Contractor shall comply with and give notices required by applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.
- 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including erecting necessary barricades or other temporary walls and structures as required during the period of construction, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.
- 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.
- 10.2.5 The Contractor shall promptly remedy damage and loss to property referred to in Clauses 10.2.1(2) and (3), caused in whole or in part by the Contractor, Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Clauses 10.2.1(2) and (3), except damage or loss attributable to acts or omissions of the Owner or Designer and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Article 3. All costs to repair any damage and loss to property referred to in Clauses 10.2.1(2) and (3), shall be the sole responsibility of the Contractor and such repair or replacement shall be performed expeditiously without cost to the Owner.
- 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's Superintendent, required under Section 3.8, unless otherwise designated by the Contractor in writing to the Owner and Designer.
- 10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
- 10.2.8 Existing utilities have been identified and described in the Contract Documents insofar as information is reasonably available, however, it is the Contractor's responsibility to verify such information and to preserve all existing utilities whether shown in the Contract Documents or not. If utility conflicts are encountered by the Contractor during construction, Contractor shall file sufficient notice to the owners of the utilities so that they may make the necessary adjustments, as well as the Designer.

### **10.3 EMERGENCIES**

In an emergency affecting the safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Paragraphs 4.2.7, 4.2.8 and Article 7.

## **11 ARTICLE 11 UNCOVERING AND CORRECTION OF WORK**

### **11.1 UNCOVERING OF WORK**

- 11.1.1 If a portion of the Work is covered contrary to the Designer's request or to requirements

specifically expressed in the Contract Documents, it must, if required in writing by the Designer, be uncovered for the Designer's observation and be replaced at the Contractor's sole expense without change in the Contract Time.

- 11.1.2 If a portion of the Work has been covered which the Designer has not specifically requested to observe prior to its being covered, the Designer may request to see such Work and it shall be uncovered by the Contractor. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate contractor in which event the Owner or separate contractor shall be responsible for payment of such costs. If such Work is in accordance with the Contract Documents, the Owner, by appropriate Change Order, shall be charged with the cost of uncovering and replacement.

## **11.2 CORRECTION OF WORK**

- 11.2.1 The Contractor shall promptly correct Work rejected by the Designer or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. The Contractor shall bear any and all costs of correcting such rejected Work, including additional testing and inspections and compensation for the Designer's services and expenses made necessary thereby.
- 11.2.2 If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Paragraph 9.10.1 or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found not to be in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation under this Paragraph 11.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.
- 11.2.3 The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.
- 11.2.4 If the Contractor fails to correct non-conforming Work within a reasonable time, the Owner may correct it in accordance with Section 2.2. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Designer, the Owner may remove it and store the salvageable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within ten days after written notice, the Owner may upon ten additional days written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Designer's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.
- 11.2.5 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the

Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

- 11.2.6 Nothing contained in this Section 11.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in Paragraph 11.2.2, relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

### **11.3 ACCEPTANCE OF NON-CONFORMING WORK**

If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

## **12 ARTICLE 12 MISCELLANEOUS PROVISIONS**

- 12.1 **GOVERNING LAW:** This Contract for Construction shall be governed by and in accordance with the laws of the State of North Carolina. All actions relating in any way to this Contract, shall be brought in the General Court of Justice in the County of Wake and the State of North Carolina, after exhausting the dispute resolution procedure set forth in Section 4.4, herein.
- 12.2 **SUCCESSORS AND ASSIGNS:** The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives if any to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither Party to the Contract shall assign the Contract as a whole without written consent of the other. If either Party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.
- 12.3 **WRITTEN NOTICE:** Where Contract Documents require one Party to notify or give notice to the other Party, such notice shall be provided in writing to the representative of the other Party designated in Paragraph 9 of the Agreement in the manners designated in the agreement.
- 12.4 **RIGHTS AND REMEDIES:** Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.
- 12.5 **WAIVER OF A RIGHTS:** No action or failure to act by the Owner or Designer shall constitute an obligation or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.
- 12.6 **COMPLIANCE WITH LAWS:** Contractor represents that it is in compliance with all Federal, State, and local laws, regulations or orders, as amended or supplemented. The implementation of this contract will be carried out in strict compliance with all Federal, State, or local laws regarding discrimination in employment.
- 12.7 **TESTS AND INSPECTIONS**

- 12.7.1 Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and the Owner shall bear the costs of tests, inspections, and approvals. Should any retest be necessary due to the failure of the Work to pass the first test or for any other reason whatsoever, the Contractor shall bear all related costs of retests, inspections or re-inspections, and approvals. The Contractor shall give the Designer timely notice of when and where tests and inspections are to be made so the Designer may observe such procedures.
- 12.7.2 If the Designer, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Paragraph 12.7.1, the Designer will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Designer of when and where tests and inspections are to be made so the Designer may observe such procedures.
- 12.7.3 If such procedures for testing, inspection, or approval under Paragraphs 12.7.1 and 12.7.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Designer's services and expenses.
- 12.7.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Designer.
- 12.7.5 If the Designer is required by the Contract Documents to observe tests, inspections, or approvals, the Designer will do so promptly and, where practicable, at the normal place of testing.
- 12.7.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

### **13 ARTICLE 13 TERMINATION OR SUSPENSION OF THE CONTRACT**

#### **13.1 TERMINATION BY THE CONTRACTOR**

- 13.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 180 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work under contract with the Contractor, for any of the following reasons:
- 1 issuance of an order of a court or other public authority having jurisdiction;
  - 2 an act of government, such as a declaration of national emergency, making material unavailable;
  - 3 because the Designer has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.6.
- 13.1.2 If one of the above reasons exists, the Contractor may, upon seven (7) additional days' written notice to the Owner and Designer, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools,

and construction equipment and machinery, not including overhead, profit, or damages.

### **13.2 TERMINATION BY THE OWNER FOR CAUSE**

13.2.1 The Owner may terminate the Contract if the Contractor:

- 1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- 2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- 3 persistently disregards laws, ordinances, or rules or regulations or orders of a public authority having jurisdiction;
- 4 fails to abide by the Non-Discrimination requirements of Paragraph 10 of the Agreement; or,
- 5 is otherwise in substantial breach of a provision of the Contract Documents.

13.2.2 When any of the above reasons exist, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven (7) days' written notice, terminate employment of the Contractor and may, subject to any prior rights of surety:

- 1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor; and
- 2 finish the Work by whatever reasonable method the Owner may deem expedient.

13.2.3 When the Owner terminates the Contract for one of the reasons stated in Paragraph 13.2.1, the Contractor shall not be entitled to receive further payment.

13.2.4 If the unpaid balance of the Contract Sum does not cover the cost of finishing the Work, the Contractor shall pay the difference to the Owner. The amount to be paid to the Owner shall be certified by the Designer, upon application, and this obligation for payment shall survive termination of the Contract.

### **13.3 TERMINATION BY THE OWNER FOR CONVENIENCE**

13.3.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

13.3.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall: (1) cease operations as directed by the Owner in the notice; (2) take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and (3) except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

13.3.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts, but not for overhead or profit on the Work not executed.

### **13.4 SUSPENSION BY THE OWNER FOR CONVENIENCE**

The Owner may, without cause, order the Contractor in writing to suspend, delay, or interrupt

the Work in whole or in part for such period of time as the Owner may determine.

**13.5 BANKRUPTCY**

- 13.5.1 The bankruptcy of the Contractor shall not terminate this Contract until such time that it is specifically rejected by the Trustee or Contractor in bankruptcy. During the election period the Contractor has to assume or reject this Contract, the Contractor shall continue to perform its Work under the Contract.
- 13.5.2 In the event the Contractor in Bankruptcy assumes the Contract, the Contractor shall apply progress payments to all of its unpaid obligations on this project before using any of these monies for either administrative expenses of the bankruptcy or as general assets of the estate.

**14 ARTICLE 14 SECURITY OF NON-PUBLIC RECORDS**

- 14.1 SECURITY OF NON-PUBLIC RECORDS:** Pursuant to N.C. Gen. Stat. § 132-1.7 entitled, "Sensitive Public Security Information", public records, as defined in N.C. Gen. Stat. § 132-1, shall not include information containing specific details of public security plans and arrangements or the detailed plans and drawings of public buildings and infrastructure facilities. Therefore, all information provided, received, gathered, or obtained by Contractor containing specific details of public security plans and arrangements or the detailed plans and drawings of public buildings and infrastructure facilities shall be held confidential and shall be used by the Contractor only for the purpose of fulfilling the terms of this Contract. All plans and drawings shall be returned to the Owner, or otherwise destroyed at the direction of the Owner, upon termination or expiration of this Contract. Any breach of this Paragraph 14.1 by Contractor shall result in the immediate termination of this Contract.

THIS PAGE INTENTIONALLY LEFT BLANK



## APPENDIX A

### GUIDELINES FOR MINORITY BUSINESS PARTICIPATION

THIS PAGE INTENTIONALLY LEFT BLANK

do hereby certify that on this project, we will use the following minority business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**The total value of minority business contracting will be (\$)**\_\_\_\_\_.

THIS PAGE INTENTIONALLY LEFT BLANK

# State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of \_\_\_\_\_

(Name of Bidder)

Affidavit of \_\_\_\_\_

I have made a good faith effort to comply under the following areas checked:

**Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive.** (1 NC Administrative Code 30 I.0101)

- ☐ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ☐ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ☐ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ☐ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ☐ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ☐ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ☐ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ☐ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ☐ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ☐ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

THIS PAGE INTENTIONALLY LEFT BLANK

**State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract  
with Own Workforce.**

County of \_\_\_\_\_

Affidavit of \_\_\_\_\_  
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the \_\_\_\_\_  
\_\_\_\_\_ contract.  
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

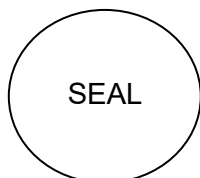
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

THIS PAGE INTENTIONALLY LEFT BLANK



# State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by Minority Firms

County of \_\_\_\_\_

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(g) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of \_\_\_\_\_ I do hereby certify that on the \_\_\_\_\_  
(Name of Bidder)

Project ID# \_\_\_\_\_ (Project Name) Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

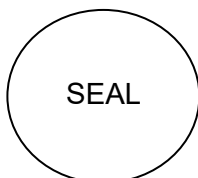
Name and Phone Number	*Minority Category	Work description	Dollar Value

\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_



Signature: \_\_\_\_\_

Title: \_\_\_\_\_

State of North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

THIS PAGE INTENTIONALLY LEFT BLANK

# State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of \_\_\_\_\_

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

(Name of Bidder)

Affidavit of: \_\_\_\_\_

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work description	Dollar Value

\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions.

Examples of documentation include, but are not limited to, the following evidence:

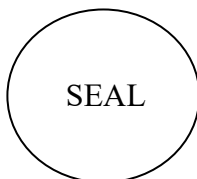
- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster.
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX E

### MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: \_\_\_\_\_

Address & Phone: \_\_\_\_\_

Project Name: \_\_\_\_\_

Pay Application #: \_\_\_\_\_ Period: \_\_\_\_\_

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* INDICATE TYPE OF MBE	AMOUNT TO BE PAID	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

\*Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Social and Economically Disadvantage (D)

Date: \_\_\_\_\_ Approved/Certified By: \_\_\_\_\_

Name

Title

Signature

**SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT**

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B  
REPORTING SALES TAX

THIS PAGE INTENTIONALLY LEFT BLANK



## **PROCEDURE FOR REPORTING NORTH CAROLINA SALES TAX EXPENDITURES ON TOWN OF ROLESVILLE CONTRACTS**

The following procedure in handling the North Carolina sales tax is applicable to this project. Contractors shall comply fully with the requirements outlined hereinafter, in order that the owner may recover the amount of the tax permitted under the law.

1. It shall be the general contractor's responsibility to furnish the owner documentary evidence showing the materials used and sales tax paid by the general contractor and each of his subcontractors. Any county sales tax included in the Contractor's statements must be shown separately from the state sales tax. If more than one county is shown, each county shall be listed separately.
2. The documentary evidence shall consist of a certified statement, by the general contractor and each of his subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes by each county paid each vendor. The certified statement must show the invoice number(s) covered and inclusive dates of such invoices. State sales tax shall be listed separately from county sales tax. If more than one county is shown, each county shall be listed separately.
3. Materials used from general contractor's or subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
4. The general contractor shall not be required to certify the subcontractor's statements.
5. The documentary evidence to be furnished to owners eligible for sales or use tax refunds covers sales and/or use taxes paid on building materials used by contractors and subcontractors in the performance of contracts with churches, orphanages, hospitals not operated for profit, educational institutions not operated for profit, and other charitable or religious institutions or organization not operated for profit, and incorporated cities, towns, and counties in this State. The documentary evidence is to be submitted to the above-named institutions, organizations, and governmental units to be included in claims for refunds to be prepared and submitted by them to obtain refunds provided by G.S> 105-164.14 and is to include the purchases of building materials, supplies, fixtures, and equipment which become a part of or annexed to buildings or structures being erected, altered, or repaired under contract with such institutions, organizations, or governmental units.

The Contractor or contractors to whom an award is made on this project will be required to follow the procedure outlined above.

The Contractor is advised that all requests for payment, partial or final, for work completed under this contract must include a sales tax report submitted in accordance with the procedures outlined above.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C  
BOND FORMS

THIS PAGE INTENTIONALLY LEFT BLANK

## FORM OF PERFORMANCE BOND

Date of Contract: \_\_\_\_\_

Date of Execution: \_\_\_\_\_

Name of Principal  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_

Name of Contracting  
Body: \_\_\_\_\_

Amount of Bond: \_\_\_\_\_

Project \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind, ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body, identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the contracting body, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in \_\_\_\_\_ counterparts.

Witness:

\_\_\_\_\_  
(Proprietorship or Partnership)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec. only)

(Corporate Seal)

Witness:

\_\_\_\_\_

Countersigned:

\_\_\_\_\_

\_\_\_\_\_  
(N.C. Licensed Resident Agent)

\_\_\_\_\_

\_\_\_\_\_  
Name and Address-Surety Agency

\_\_\_\_\_

\_\_\_\_\_  
Surety Company Name and N.C.  
Regional or Branch Office Address

\_\_\_\_\_  
Contractor: (Trade or Corporate Name)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Owner, Partner, or Corp. Pres. or Vice  
Pres. only)

\_\_\_\_\_  
(Surety Company)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Attorney in Fact)

(Surety Corporate Seal)

## FORM OF PAYMENT BOND

Date of Contract: \_\_\_\_\_

Date of Execution: \_\_\_\_\_

Name of Principal  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_

Name of Contracting  
Body: \_\_\_\_\_

Amount of Bond: \_\_\_\_\_

Project \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall promptly make payment to all persons supplying labor/material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in \_\_\_\_\_ counterparts.

Witness:

\_\_\_\_\_  
(Proprietorship or Partnership)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

Witness:

\_\_\_\_\_

Countersigned:

\_\_\_\_\_

\_\_\_\_\_  
(N.C. Licensed Resident Agent)

\_\_\_\_\_

\_\_\_\_\_  
Name and Address-Surety Agency

\_\_\_\_\_

\_\_\_\_\_  
Surety Company Name and N.C.  
Regional or Branch Office Address

\_\_\_\_\_  
Contractor: (Trade or Corporate Name)

By: \_\_\_\_\_

Title \_\_\_\_\_  
(Owner, Partner, or Corp. Pres. or Vice  
Pres. only)

\_\_\_\_\_  
(Surety Company)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Attorney in Fact)

(Surety Corporate Seal)



## APPENDIX D

### CHANGE ORDER FORM

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX D - Quotation Form for Cost Change Proposals

Project:

Brief Description of Change:

- |    |   |          |   |
|----|---|----------|---|
| 1. | Materials / Products (itemized breakdown / quotes attached)<br>Attach additional sheets as required.                    | \$ _____ | 1 |
| 2. | Owned Equipment (list each item separately)*  | \$ _____ |   |
|    | Rental of Equipment (list each item separately)*  | \$ _____ |   |
|    | Subtotal  | \$ _____ | 2 |
|    | TOTAL of 1 + 2  | \$ _____ | A |
| 3. | Labor (itemized breakdown)  | \$ _____ | 3 |
| 4. | Insurance (Worker's Compensation, Social Security, or as<br>otherwise required or specified): % [Capped at <u>30%</u> ] | \$ _____ | 4 |
|    | TOTAL (A) + 3 + 4   | \$ _____ | B |
| 5. | Overhead and Profit { <u>15%</u> of Total (B)}**  | \$ _____ | 5 |
|    | TOTAL (B) + 5   | \$ _____ | C |
| 6. | Sales Taxes on Total (A)  | \$ _____ | 6 |
|    | TOTAL of (C) + 6  | \$ _____ | D |
| 7. | Subcontracted Work (if applicable in a similar breakdown<br>(through total (D). Profit and overhead allowance is 15%))  | \$ _____ | 7 |
| 8. | Prime Contractor's overhead and profit on item 7 sub-<br>contractors' bids (5%)***                                      | \$ _____ | 8 |
|    | TOTAL of 7 + 8  | \$ _____ | E |
|    | TOTAL of (D) + (E)  | \$ _____ | F |
| 9. | Performance/Payment Bonds on total (F)  | \$ _____ | 9 |

Extension of time requested: \_\_\_\_\_ calendar days

(Time extension request must be provided with detailed schedule information noting the activities on the critical path that are affected by the change)

Notes:

\*- Include current schedules with each request if equipment is involved.

\*\* - In case of deductible changes, this figure will be ten percent (10%).

\*\*\* - In case of deductible changes, this figure will be zero percent (0%).

Where the extra Work involved is covered by unit prices quoted in the proposal, or subsequently agreed to by the Contractor, Designer, and the Town the value of the change shall be computed by application of unit prices based on quantities, estimate or actual as agreed of the items involved, except in such cases where a quantity exceeds the estimated quantity allowance in the contract by more than 15%. In such cases, either party may elect to negotiate a new unit price, based on actual costs, or apply the unit prices in the original bid/proposal.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

QUALIFICATIONS OF BIDDERS

THIS PAGE INTENTIONALLY LEFT BLANK

TO BE SUBMITTED AFTER THE BID BY THE APPARENT LOW BIDDER

## APPENDIX E - QUALIFICATIONS OF BIDDERS

In order to assist the Owner in determining whether the Bidder is qualified to perform the Work, as set forth in the Contract Documents, the Bidder shall furnish the following information as an attachment to the Bid Form to assist the owner in evaluating the Bidder's qualifications.

Years Bidder has been in business providing similar services to that as outlined in these Bid Documents under the same business name and legal entity: \_\_\_\_\_

List **three (3)** Project References who are qualified to judge as to the Bidder's financial responsibility and his experience in providing similar equipment and performing work within the last five (5) years of a similar nature to that as outlined in these Bid Documents.

### PROJECT REFERENCE

A. Project Name:

\_\_\_\_\_

B. Owner Name and Contact Information:

\_\_\_\_\_

C. Project Description:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

D. Bidder's Role in Project:

\_\_\_\_\_

E. Contract Date Started (approximate):

\_\_\_\_\_

F. Date Project was Substantially Complete (approximate):

\_\_\_\_\_

G. Dollar Value of Construction (approximate):

\_\_\_\_\_

Bidder shall attach additional pages, if necessary, in order to complete the required information.

THIS PAGE INTENTIONALLY LEFT BLANK



APPENDIX F

CERTIFICATION OF FINANCIAL CONDITION

THIS PAGE INTENTIONALLY LEFT BLANK

## APPENDIX F: CERTIFICATION OF FINANCIAL CONDITION

---

Name of Vendor: \_\_\_\_\_

The undersigned hereby certifies that: [check all applicable boxes]

- ☐ The Vendor is in sound financial condition and, if applicable, has received an unqualified audit opinion for the latest audit of its financial statements.

Date of latest audit: \_\_\_\_\_

- ☐ The Vendor has no outstanding liabilities, including tax and judgment liens, to the Internal Revenue Service or any other government entity.

- ☐ The Vendor is current in all amounts due for payments of federal and state taxes and required employment- related contributions and withholdings.

- ☐ The Vendor is not the subject of any current litigation or findings of noncompliance under federal or state law.

- ☐ The Vendor has not been the subject of any past or current litigation, findings in any past litigation, or findings of noncompliance under federal or state law that may impact in any way its ability to fulfill the requirements of this Contract.

- ☐ He or she is authorized to make the foregoing statements on behalf of the Vendor.

**Note:** This shall constitute a continuing certification and Vendor shall notify the Contract Lead within 15 days of any material change to any of the representations made herein.

**If any one or more of the foregoing boxes is NOT checked, Vendor shall explain the reason in the space below:**

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX G  
INDEX OF DRAWINGS

THIS PAGE INTENTIONALLY LEFT BLANK

## **APPENDIX G INDEX OF DRAWINGS**

G000	COVER SHEET
G001	CODE SUMMARY
G002	LIFE SAFETY PLAN
C0.00	COVER
C0.01	GENERAL NOTES
C0.02	GENERAL NOTES AND LEGEND
C0.03	SIGNED SURVEY
C0.04	RECORDED PLAT
C1.00	EXISTING CONDITIONS & DEMOLITION PLAN
C2.00	SITE PLAN
C3.00	UTILITY PLAN
C3.01	PUMP STATION DETAIL
C4.00	STORM DRAINAGE & GRADING PLAN
C5.00	EROSION CONTROL – STAGE 1
C5.01	EROSION CONTROL – STAGE 2
C5.02	BASIN DRAINAGE AREA MAP
C5.03	EROSION CONTROL DETAILS
C5.04	EROSION CONTROL DETAILS
C5.05	EROSION CONTROL DETAILS
C5.06	NCG01 DETAILS
C6.00	SS & STORM PLAN & PROFILES
C7.00	SITE DETAILS
C7.01	SANITARY SEWER DETAILS
C7.02	WATER DETAILS
C7.03	STORM DRAINAGE DETAILS
L1.00	LANDSCAPE PLAN
L1.01	LANDSCAPE DETAILS
SL1.00	LIGHTING PLAN AND DETAIL
A101	FLOOR PLANS AND PARTITION TYPES
A102	RCP, INTERIOR ELEVATIONS, STAIR DETAILS, ROOF PLAN & FINISH NOTES

A201	ELEVATIONS
A301	WALL SECTIONS AND DETAILS
A302	WALL SECTIONS
A401	ENLARGED TOILET PLANS AND DETAILS
A601	DOOR SCHEDULE, TYPES AND NOTES
S001	ABBREVIATIONS AND SYMBOLS
S002	GENERAL NOTES
S003	GENERAL NOTES
S004	DESIGN CRITERIA
S101	STRUCTURAL FOUNDATION PLAN
S102	STRUCTURAL FRAMING PLAN
S-300	FOUNDATION SECTIONS
S-301	STEEL SECTIONS
S-501	TYPICAL CONCRETE DETAILS
S-502	TYPICAL STEEL DETAILS
S-503	TYPICAL STEEL DETAILS
FP100	FIRE PROTECTION PLAN, NOTES, DETAILS, AND SCHEDULES
P000	PLUMBING TITLE SHEET
P001	PIPING GENERAL NOTES AND SYMBOLS
P100	UNDERGROUND PLUMBING PLANS
P101	FIRST AND MEZZANINE FLOOR PLUMBING PLAN
P401	ENLARGED PLUMBING PIPING PLANS
P501	PIPING DETAILS
P502	PIPING DETAILS
P503	PIPING DETAILS
P601	PLUMBING SCHEDULE
M000	MECHANICAL GENERAL NOTES
M001	HVAC ABBREVIATIONS AND SYMBOLS
M100	FIRST AND MEZZANINE FLOOR HVAC PLAN
M101	ROOF PLAN - HVAC
M401	ENLARGED PLANS - HVAC
M501	HVAC DETAILS
M601	HVAC SCHEDULE
E000	LEGEND AND NOTES



E001	ONE-LINE DIAGRAM & PANEL SCHEDULE
E100	ELECTRICAL POWER PLANS
E101	ELECTRICAL LIGHTING PLANS
E102	ROOF AND SYSTEMS PLAN
E103	ELECTRICAL GROUND PLAN
E104	SITE PLAN
E300	ELECTRICAL DETAILS
E301	ELECTRICAL DETAILS

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 – GENERAL

##### 1.01 PROJECT DESCRIPTION

- A. The Project is for a new, single-story, pre-engineered metal building with a storage/equipment mezzanine and related site work. The new facility will house the Town of Rolesville Public Works operations. The building contains office areas plus warehouse storage, workshop, and service bays for minor vehicle & equipment maintenance such as changing fluids, and lawn mower repairs. The site work includes earthwork, paving, landscaping and utilities. The building work includes plumbing, fire protection, HVAC and electrical work. The project also includes the delegated design of pre-engineered metal building system, suspended awnings and a fire protection sprinkler system.
- B. The Project Owner is the Town of Rolesville, North Carolina.

##### 1.03 WORK BY OWNER TO BE COORDINATED BY CONTRACTOR

- A. During construction, the Owner will provide and install telecommunication / IT equipment, cabling, faceplates, wireless access points and terminations within the Project. Contractor is to include time for these Owner activities within its Project Schedule, and endeavor to coordinate the Work with these activities.
- B. During Construction, the Owner will directly hire a security vendor to install door access controls and surveillance camera system. Contractor is to include time for these Owner activities within its Project Schedule, and endeavor to coordinate the Work with these activities.
- C. During construction, the Owner's utility company, Duke Energy, will provide and install all exterior site lighting pole fixtures, including cabling and utility hook-up. Contractor would be responsible for providing and installing underground conduits to serve poles. Contractor is to include time for these Owner/Utility activities within its Project Schedule, and endeavor to coordinate the Work with these activities.
- D. After Substantial Completion, the Owner will be responsible for providing and installing furnishings, kitchen and break room appliances and audio-visual equipment.

##### 1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. All exterior material storage, temporary facilities and parking are limited to within the site boundaries, unless otherwise authorized in writing by the Owner.

##### 1.05 BUILDING PERMITS

- A. The Building permit has been applied for by the Owner.
- B. The Contractor shall pick up all permits associated with the construction.
- C. The Contractor shall pay for the Building permit and inspections associated with the Work.

#### 1.06 CONSTRUCTION MATERIAL TESTING

- A. Construction material testing includes both Field Testing and Laboratory Testing and is required for concrete, structural steel welds and bolt torque, earthwork compaction and concrete/asphalt pavement.
- B. The Owner has arranged for a third-party, independent testing agent (ITA) and shall pay for the initial indicated construction material testing. Re-testing and re-inspection that are necessitated by testing failures shall be at the Contractor's sole expense. The Contractor shall be responsible for coordinating the scheduling all testing and inspections.
- C. Requirements for construction material testing are indicated in individual technical specification sections.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01 21 00

### ALLOWANCES

#### PART 1 – GENERAL

##### 1.01 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
- B. Drawings and general provisions of the Contract and other Division 01 Specification Sections apply to this Section.
- C. Allowances:
  - 1. **All Allowances shall be included in the Contractor's lump sum bid.**
  - 2. The Contractor shall be reimbursed for materials and equipment furnished under allowances on a monthly basis by including said allowances in the monthly applications for partial payment. Supporting invoices shall be attached to each application that includes such request for reimbursement. Payment will be based on contract Unit Prices.
  - 3. Adjustments to allowances may be made by change order.
  - 4. Allowances shall be identified as separate line items on the Schedule of Values within each Application for Payment.
- D. The Contractor shall be reimbursed from the allowance for purchase of materials and equipment based on the invoice cost of said materials and equipment. All labor, equipment, and incidental materials required to produce shop drawings, purchase, deliver, handle, store, install, service, and place materials and equipment purchased under an allowance into continuous reliable service, shall be included in the Contractors' Bid Proposal.
- E. Types of allowances include the following:
  - 1. Quantity Allowances.
  - 2. Contingency Allowance.

##### 1.02 SUBMITTALS (NOT APPLICABLE)

##### 1.03 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products, installation labor and equipment and shall include taxes, freight, and delivery to Project site as well as general conditions, labor burden, bonds, overhead and profit.
- B. See Section 09 05 61 Moisture Vapor Emission Control.
- C. See Schedule at end of this section.

#### 1.04 CONTINGENCY ALLOWANCES

- A. Allowance shall include an amount that may be used by Owner for unforeseen conditions and changes in the Work at the Owner's discretion.
- B. Use of Allowance funds must be authorized in advance by Owner in writing.
- C. See Schedule at end of this section.

#### PART 2 – PRODUCTS (NOT APPLICABLE)

#### PART 3 – EXECUTION

##### 3.01 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

##### 3.02 PREPARATION

- B. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

##### 3.03 SCHEDULE OF ALLOWANCES

- A. Quantity Allowances shall be established for each item as follows:
  - 1. **Moisture Vapor Emission Control: 2,000 square feet of floor coverage.**
- B. Contingency Allowance shall be established as follows:
  - 1. **Construction Contingency: \$200,000.00.**
  - 2. Contingency may be omitted from scope prior to contract execution at Owner's discretion.

END OF SECTION

## SECTION 01 22 00

### UNIT PRICES

#### PART 1 – GENERAL

##### 1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for unit prices.
  - 1. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the Work required by the Contract Documents are increased or decreased.
  - 2. Unit prices include all necessary equipment, labor, material, overhead, profit and applicable taxes.
  - 3. Unit prices shall remain valid for the duration of the Project Schedule through Substantial Completion.
- B. Schedule: A "Unit Price Schedule" is included at the end of this Section.
  - 1. Any work performed without prior authorization by the Owner's representative specifically designated for this role shall be classified as incidental work and shall not be included in the measurement of quantities for payment.
  - 2. Work-in-place that involves use of established unit prices shall be measured by an independent surveyor or other agent, acceptable to the Contractor, selected by and paid by the Owner.

#### PART 2 – PRODUCTS (NOT USED)

#### PART 3 – EXECUTION

##### 3.01 UNIT PRICE SCHEDULE

- A. Unit Prices shall be established as follows:
  - 1. Excavate Unsuitable Soils and Spread on Owner's contiguous property: Per Cubic Yard.
  - 2. Excavate Rock (Rippable) and Spread on Owner's contiguous property: Per Cubic Yard.
  - 3. Excavate Rock (Blasting) and Spread on Owner's contiguous property: Per Cubic Yard
  - 5. Turn and Dry Out wet soils on site: Per Cubic Yard.
  - 6. Import Suitable Fill Material, Place and Compact: Per Cubic Yard.

7. Import #57 Washed Stone, Place and Compact: Per Cubic Yard.
8. Import ABC Stone, Place and Compact: Per Cubic Yard.
9. Provide and install asphalt paving. Per Ton.
10. Geotextile, Mirafi 500X or approved equal: Per square foot installed.
11. Haul Rock and Legally Dispose Off-Site. Per Cubic Yard.
12. Moisture Vapor Emission Control, suitable for floor finish manufacturers' warranties when finish is placed over slabs whose Calcium Chloride tests result in readings exceeding 8 lbs of moisture per 1,000 sf per 24 hours and/or whose ASTM F2170 Relative Humidity tests result in readings exceeding 80% and/or whose Alkali test results exceeds pH 10. Per square foot.

### 3.02 UNIT PRICE MEASUREMENT AND PAYMENT

A. Unit Prices shall be measured as the basis for payment as follows:

1. Owner's Independent testing Agency (ITA) shall be responsible for measurements.
2. Rock (Cubic Yard) - Measurement - Shall be measured from the trench width plus 1-foot on either side and 0.5-foot below the pipe.
3. For unit price items quoted in per square foot or square yard, measurements shall be along the surface of the completed accepted work.
4. Prices and payment shall be considered full compensation for furnishing all materials, labor, tools, and equipment needed to install the unit price items.

END OF SECTION



## SECTION 01 23 10

### ALTERNATES

#### PART 1 – GENERAL

##### 1.01 SECTION INCLUDES

- A. Alternate bid submission procedures.
- B. Owner's Preferred Brand Bid Alternates.
- C. Documentation of alternates to Contract Sum and Contract Time.

##### 1.02 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. No priority order should be assumed by the bidder.
- B. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- C. Coordinate related work and modify surrounding work to integrate the Work of each alternative.

##### 1.03 ALTERNATE TYPES

- A. All Bid Alternates are intended to be "Additive" or at "No Cost" to the base bid. Indicate Add or Deduct on Bid Proposal Form.
- B. Drawings typically illustrate the Bid Alternate as if this work were in the base bid Project Scope. Refer to narratives in this Section and Drawing notes for base bid conditions.
- C. Owner's Preferred Brand items are identified as bid alternates to specified items and equivalents.

##### 1.03 SCHEDULE OF ALTERNATES

- A. Alternates shall be established as follows:
  - 1. Add interior Chain Link Wire Mesh Partitions and sliding, lockable gates.
  - 2. Use Resinous Flooring throughout office areas in lieu of vinyl flooring.
  - 3. Add Prismatic Skylights and curbs to roof.
  - 4. Add Trench Drains and piping at additional overhead doors and increase the size of the oil-water separator tank.
  - 5. Add Standby Generator, tank and fuel, ATS and associated cabling.
  - 6. Add Lightning Protection to building.
  - 7. Add Tap Box to exterior building wall to accept connection from Owner's mobile generator.
- C. Identify Bid Alternate cost on Bid Proposal Form.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

## SECTION 01 34 00

### SUBMITTALS

#### PART 1 – GENERAL

##### 1.01 SUBMITTALS

- A. The Contractor is responsible for the minimum submittals identified below, which are in addition to submittal requirement found elsewhere in the contract documents. Include full documentation, product data, samples where appropriate, detailed performance comparisons and evaluation, testing laboratory reports where applicable, coordination information for effect on other work and time schedule, cost information for proposed change order, Contractor's general certification of recommended substitution, location of the intended installation of each item, and similar information germane to circumstance.
1. Contractor's review and certification of submittals and shop drawings on the submittal schedule shall follow the below format.
  2. The Contractor shall provide the name and qualifications of the individual designated to review and approve submittals and shop drawings prior to forwarding for Designer review. Prior to submittal of any item to the Designer for review, all submittal items are to be reviewed for contract compliance and approved by the Contractor. Each item is to be certified by the Contractor and stamped with the following, or other acceptable stamp, to note compliance review. The Contractor is responsible for ensuring that all submittal items meet the contract requirements. Items which do not bear evidence of Contractor review will be returned without comment:

#### SUBMITTAL / SHOP DRAWING REVIEW AND CERTIFICATION

Contractor: \_\_\_\_\_

Project: \_\_\_\_\_

\_\_\_\_\_ No exceptions noted

\_\_\_\_\_ Approved with minor corrections as noted on the submittal data or attachments

\_\_\_\_\_ Other - See Comments / Remarks

Signed: \_\_\_\_\_  
Contractor Project Manager

Date: \_\_\_\_\_

B. Submittals During Contract Award and Mobilization Period:

1. List of Subcontractors: Within 7 days of Contract Award.
2. Executed Agreement and supporting documents prior to Notice to Proceed with work.
3. Certificates of Insurance prior to Notice to Proceed with work.
4. Construction Schedule: Within 30 days after Notice to Proceed and prior to first application for payment.
5. Schedule of Values: Within 30 days of execution of the Agreement and prior to first application for payment. Identify each major work activity, contract allowance, and trade on separate line items. Do not combine work of more than one subcontractor on a single line. For the work of the major trades of Plumbing, Mechanical and Electrical, separate values for labor from materials.
6. List of Submittals: Within 30 days of Contract Award and prior to submittal of any shop drawings for review.

C. Submittals During the Construction Period and Prior to Substantial Completion:

1. Shop Drawings, Cut Sheets, Data and Manufacturer Certifications, Warranty Samples:
  - a. General: Prior to fabrication, shipment to the job site, or installation.
  - b. Schedule submittals based on length of lead time. Materials with the longest lead time should be submitted first.
  - c. Prior to fabrication, the Contractor shall submit for review complete assembly drawings that show and dimension each major component of equipment and identify all materials of construction, sizes of principal members, location of electrical motor and controller connections for conduit layout.
  - d. Prior to fabrication of electrical power distribution centers or motor control centers that are to be installed in existing or proposed enclosed rooms, sufficient layout drawings shall be submitted to ensure that equipment provided can be installed in space provided.
  - e. The Contractor shall verify by written statement on the cover sheet of each submittal that the proposed product or equipment complies with the contract documents. Clearly list any exception on the shop drawings.
  - f. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
  - g. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
  - h. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
    - 1) For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

- i. Submittals for items specified as a package, group, or system shall be made as a single bound submittal. Otherwise, submittals shall be for individual items or systems.
  - j. Contractor's schedule shall allow 14 calendar days for each review for each submittal.
- 2. Applications for Partial Payment: Submit monthly if work is performed.
- 3. Certified Payroll Forms: Submit monthly with Application for Payment.
- 4. Sales Tax Forms: Submit monthly with Applications for Payment.
- 5. Insurance Renewal Certificates: Submit prior to expiration of previous certificate.
- 6. Documentation related to change orders as required.
- 7. Monthly Progress Report:
  - a. Meeting minutes from previous monthly progress meeting.
  - b. List of Work progress during the past month.
  - c. List of Work scheduled for following month.
  - d. List of RFI's and status.
  - e. List of Submittals and status.
  - f. List of Supplemental Instructions received
  - g. Summary of construction contract value, Change Order requests and Change Orders approved.
  - h. One (1) day prior to the monthly progress meeting, submit report electronically to the Designer and Owner in PDF format.
  - i. Deliver hardcopies to the Owner and Architect at the monthly progress meeting.

D. Submittals Prior to Project Closeout:

- 1. See requirements found elsewhere in Division 1.

PART 3 – PRODUCTS (NOT APPLICABLE)

PART 4 – EXECUTION (NOT APPLICABLE)

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION OF REQUIREMENTS

- A. Contractor shall provide temporary services and facilities for use by all construction personnel as well as the Designer and Owner's field representatives, except as otherwise herein specified. Do not remove temporary facilities until authorized use of permanent facilities.

##### 1.02 USE CHARGES

- A. Usage charges for temporary facilities and utilities shall be paid by the Contractor.

##### 1.03 REGULATIONS AND LIMITATIONS

- A. Comply with requirements of the City, local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.
- B. The Contractor shall be limited to work within the property limits of the site and shall be responsible for and take necessary precautions to avoid damage to all adjacent property.

##### 1.04 TEMPORARY UTILITY INSTALLATION

- A. Engage the local utility company to install temporary services. As early as possible change to use of permanent service, to enable removal of the temporary utility and eliminate possible interference with completion of the work.
- B. Electrical Power Service: Provide weathertight, grounded temporary electrical service-entrance and distribution system, with ground-fault circuit interrupters and ground-fault interrupter features of proper types, sizes, electrical ratings and characteristics to fulfill project requirements. Comply with applicable requirements of NEMA, NECA and UL standards and governing regulations. Install temporary lighting of adequate illumination levels to perform the work specified. Temporary electric service for construction purposes shall be for use by all prime contractors.
- C. Temporary Heat: Provide temporary heat where needed for performance of work, for curing or drying of recently installed work or for protection of work in place from adverse effects of low temperatures or high humidity. Provide UL or FM tested and labeled heating units known to be safe and without adverse effect upon work in place or being installed. Maintain a minimum temperature of 45 degrees F (7 degrees C) in permanently enclosed portions of the building and areas where finished work has been installed.

1. Except where use of the permanent heating system is available and authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control for temporary heat. Do not use open burning or salamander type heating units.

#### 1.04 FIELD OFFICES

- A. General Contractor's Field Office: Provide standard prefabricated or mobile unit to accommodate the Contractor's personnel at the site. As a minimum, the Contractor's office shall be equipped with the following services throughout the entire period of construction.
  1. Air Conditioning, heating and lighting.
  2. Meeting space with table and seating to accommodate 10 people.
  3. Copies of drawings, specifications, addenda, change orders, submittals and shop drawings.
- C. Field Offices for Subcontractors: Subcontractors may each furnish their own field office at their own discretion. The General Contractor is to allocate site area for each subcontractor desiring to have an office and shall provide and maintain all drives and parking facilities for all field offices.

#### 1.06 STAGING PLAN

- A. Prior to the start of work, Contractor is to create and submit a Staging Plan for the Project site. Contractor shall obtain approval of the Owner for implementation of the Staging Plan.
- B. The Staging Plan is to indicate the locations and dimensions of temporary facilities (including layouts, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area. Show locations of safety and construction fences, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

#### 1.05 SANITARY FACILITIES

- A. Sanitary facilities include temporary toilets for construction personnel of all prime contractors.
  1. Supply toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility. Provide appropriate covered waste containers for used material.
  2. Toilets: Install single occupant self-contained toilet units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with glass fiber reinforced polyester shell.
  - 3.
- B. Drinking Water: Provide tap-dispenser bottled-water type drinking water units for personnel of Contractors and all Subcontractors.



#### 1.10 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Maintain site in a safe, lawful and publicly acceptable manner. Contractor and each subcontractor shall be responsible for security of their own office and storage facilities.

#### 1.11 BARRICADES, WARNING SIGNS AND LIGHTS

- A. Comply with recognized standards and code requirements for erection of substantial, barricades where needed to prevent accidents. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the public, of the hazard being protected against. Provide lighting where needed, including flashing red lights where appropriate.
- B. Erect and maintain temporary barricades to limit non-construction personnel access to hazardous areas. Barricades will be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

#### 1.12 TEMPORARY FENCING

- A. Provide temporary fencing around any all open excavations, tunnels and exterior staging areas to control access by unauthorized people.
- B. Provide gates and warning signs to protect the public from construction activities
- C. The fencing shall be a minimum of 72-inches high, supported and tightly secured to steel posts located on minimum 10 foot centers. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.
- D. Remove the fence from the work site upon completion of the construction phase.

#### 1.13 EMPLOYEE PARKING

- A. Contractor employees will park privately owned vehicles within a designated staging area on site. If this area does not afford sufficient space, then the Contractor shall provide a means for transporting his workers to the construction site that is acceptable to the Owner

#### 1.14 MAINTENANCE OF TRAFFIC

- A. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on highways except with written permission of the Owner at least 15 calendar days prior to the proposed modification date.
- B. Provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.

- C. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Owner prior to starting any activity that will obstruct traffic.
- D. Provide, erect, and maintain, at Contractor's expense, lights, barriers, signals, passageways, detours, and other items that may be required by the authority having jurisdiction.
- E. Maintain and protect traffic on all affected roads during the construction period. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit.
- F. Contractor is responsible for the repair of any damage to roads caused by construction operations.

#### 1.15 DUST CONTROL

- A. Dust control methods and procedures must be used so as to not interfere with the ongoing building occupancy and adjoining facilities and grounds. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

#### 1.16 WATER CONTROL

- A. Grade Site to drain.
- B. Maintain excavations free of water.
- C. Provide, operate, and maintain dewatering equipment as required.
- D. Protect Site from puddles or channelized water.

#### 1.17 MAINTENANCE

- A. Operate and maintain temporary services and facilities in good operating condition and in a safe and efficient manner until removal is authorized. Do not overload services or facilities. Protect from damage by freezing temperatures and similar elements. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

#### 1.18 TERMINATION AND REMOVAL

- A. Remove each temporary service and facility promptly when need has ended, or when replaced by use of a permanent facility, but no later than Substantial Completion.
- B. Complete, or, if necessary, restore permanent work delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces and replace work which cannot be repaired.
- C. At Substantial Completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

#### 1.19 SAFETY MEASURES

- A. In addition to complying with safety requirements set forth in the General Conditions, the Contractor shall:
  - 1. Inform himself of and fully comply with all applicable requirements of the Williams-Steiger Occupational Safety and Health Act of 1970 in the performance of work required under this contract.
  - 2. The Contractor shall adhere to the rules, regulations, and interpretations of the Secretary of the Department of Labor relating to safety and health for construction which are hereby incorporated into these requirements.
  - 3. Follow all rules set out in the regulations and recommendations published by the Associated General Contractors and the North Carolina Department of Labor, and the Contractor shall use every effort to safeguard life and property throughout his operations.

#### 1.20 CONSTRUCTION SIGNAGE

- A. Erect one sign, approximately 48 inches x 96 inches, identifying the names of the Project, Owner, Architect, Civil Engineer, Contractor, and major Subcontractors as room permits.
- B. Directional signs for material deliveries are allowed within the construction area, if required, and shall be 4' wide x 2' high maximum, black and white only. The Owner shall approve the design of the sign and the sign text prior to fabrication.
- C. All signage shall be professionally crafted.
- D. Signage shall be properly erected to resist wind-loads and is to be maintained in good condition throughout the work.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 01 60 00

### PRODUCT REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

##### 1.02 RELATED REQUIREMENTS

- A. Instructions to Bidders.

##### 1.03 REFERENCE STANDARDS

- A. 16 CFR 260 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; current edition.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### PART 2 - PRODUCTS

##### 2.01 NEW PRODUCTS

- A. General:
  - 1. Manufacture parts to U.S.A. standard sizes and gauges.
  - 2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
  - 3. When equipment is expected to generate or be subjected to movement, ensure that parts are fabricated to withstand anticipated shock and vibratory loads.
  - 4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
  - 5. Modify standard products as necessary to meet performance specifications.
- B. Provide new products unless specifically required or permitted by the Contract Documents.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.

- D. Do not use products having any of the following characteristics:
  - 1. Made using or containing CFC's or HCFC's.
  - 2. Made of wood from newly cut, old-growth timber.
- E. Where all other criteria are met, Contractor shall give preference to products that:
  - 1. Are extracted, harvested, and/or manufactured closer to the location of the Project.
  - 2. Have longer documented life span under normal use.
  - 3. Result in less construction waste.
  - 4. Are more readily serviceable at the location of the Project.

## 2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. See PART 3 – EXECUTION for Substitution Procedures.

## 2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, and software of types and in quantities specified in individual specification sections.
- B. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to the following:
  - 1. Adequate oil and grease.
  - 2. Integral light bulbs.
  - 3. Fuses.
  - 4. Hydrant wrenches.
  - 5. Valve keys.
  - 6. Handwheels.
  - 7. Chain operators.
  - 8. Special tools.
  - 9. Other parts as required for initial operation.
- C. Deliver and place in location as directed; obtain receipt prior to final payment.

## 2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer/Owner, notify Engineer/Owner not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).

- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

## PART 3 - EXECUTION

### 3.01 SUBSTITUTION PROCEDURES

- A. Architect/Engineer will not consider requests for substitutions made later than 10 days prior to the bid date.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. Include side by side comparison of both specified product and proposed substitution.
- D. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision to the Contract Documents.
- G. Substitution Submittal Procedure:
  - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed product substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. The Architect/Engineer will document approved product substitutions in written form. Product substitutions that are not approved will not result in any action on the part of the Architect/Engineer.
- F. The term “Or Equal” shall have the following meaning: To possess same performance qualities and characteristics, and fulfill the utilitarian function without any decrease in quality, durability, or longevity. No inference that items must be identical in all respects, if above conditions are met.

### 3.02 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

### 3.03 FIELD FINISHING

- A. In accordance with Division 9 and individual Specification sections.

### 3.04 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

### 3.05 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

### 3.06 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule, and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- J. Hazardous Materials:
  - 1. The Contractor is to maintain a 3-ring binder containing a regularly updated index of chemicals and Material Safety Data Sheets (MSDS) at the Site. Include MSDS sheets for all chemicals being used on the project. Update MSDS's for new chemicals as each new chemical arrives.
  - 2. Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

END OF SECTION



## SECTION 01 78 00

### CLOSEOUT PROCEDURES

#### PART 1 – GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- 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. Other closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 46.

##### 1.03 PRELIMINARY SUBMISSIONS

- A. Submit the following for approval prior to submission of Application for Payment that equates to a Total Completed and Stored to date amount equaling 90% of the Contract Sum to Date and prior to requesting a final review for certification of Substantial Completion.
  - 1. Operating and Maintenance Preliminary Submission: Reference Section 01 78 23 O-M Documentation General
  - 2. Shop Drawings copies for Owner: Submit a complete set of legible Contractor approved, Architect reviewed, shop drawings folded up in cardboard file storage boxes. Organize using expandable file folder pouches. Index pouch tabs with each specification section's submission numerically, beginning with Division 1. Include typed listing of all Shop Drawings in transmittal boxes.

##### 1.04 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion and before submitting an Application for Payment that equates to a Total Completed and Stored to date amount equaling 95% of the Contract Sum to Date,

complete the following.

1. Project Observation Reports: Contractor will maintain a 3-ring binder of Architect's field reports at the site. Final review for Substantial Completion will not be scheduled until all reported items are in compliance or are scheduled for completion.
  2. Contractor's Final Inspection: Contractor shall fully inspect the work with Contractor's project manager, superintendent and subcontractor's managers to verify that the work is ready for Architect's final inspection.
  3. Contractor will inspect the Work and issue typewritten pre-final punchlist. Contractor must correct each non-complying item. Contractor will document correction of each item by initialing approval, dating, and sending Architect copy of initialed items. It is the Contractor's responsibility to manage the proper structural and technical installation of all exposed finishes. The Contractor must also assure the quality of the workmanship of all finishes. Do not wait, for or attempt to, use Architect's final inspection to identify unacceptable quality workmanship.
- B. 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.
1. 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.
  2. Advise Owner of pending insurance change-over requirements.
  3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
  4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
  5. Submit final project photographs, damage or settlement survey, property survey, and similar final record information.
  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. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
  9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

10. Complete equipment and operating and maintenance instruction and training of Owner's staff in accordance with Division 1 requirements. Demonstrate: Emergency instructions, spare parts list, copies of warranties, wiring diagrams, recommended turn around" cycles, inspection procedures, shop drawings and product data, fixture lamping schedule, maintenance manuals, record documents, spare materials, tools, lubricants, fuels, identification systems, control sequences, hazards, cleaning, warranties and bonds, maintenance agreements and similar commitments, start-up, shut-down, emergency operations, noise and vibration adjustments, safety procedures, economy and efficiency adjustments and effective energy utilization. Document training occurrence for the Owner's records.
  11. Submit Operating and Maintenance Documentation in accordance with Section 01 78 23.
- C. Final Inspection Procedures: For each portion of the Work to be deemed as Substantially Complete the Architect will perform one continuous pre-final inspection. The Architect's pre-final inspection shall occur only after the Contractor has completed the Work, conducted their own pre-final inspection, have created their own pre-final punch list, and have requested a pre-final inspection. On receipt of a request for pre-final inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of Work that must be completed or corrected before the certificate will be issued. Results of the Architect's pre-final review will form the initial punchlist.
1. Incomplete work by the Contractor or work that is not of quality, in the opinion of the Architect, will delay the final inspection until that work is completed or corrected throughout. The Architect performing routine field reviews will be the sole judge of readiness for the final inspection. Routine field reviews by the Architect and/or a pre-final inspection of a pre-arranged sample building area will identify incomplete or non-complying items, all of which must be corrected throughout entire contract area prior to requesting a final inspection.
  2. The final inspection will be a single continuous effort for each portion of the Work put forth by the Contractor as Substantially Complete. Contractor shall have all finishes complete, building clean, roof complete, windows in place and all plumbing, fire protection, mechanical and electrical systems completely operational. Contractor shall provide ladders, scaffolds, keys, drop cord lights, swing stages or other equipment and manpower necessary to complete the final inspection in a timely manner. Contractor's project manager and superintendent will accompany the Architect at all times during the final inspection. Contractor will identify each room by contract document number on temporary tape on door hinges. Tape will remain until every item on punchlist is corrected and then be removed by Contractor. Contractor will bring bound field reports, specifications, addenda, construction change directives, change orders and record prints along on final inspection.
  3. Correct or complete all non-complying items.

4. Submit copies of the final punchlist of itemized work to be completed or corrected. Contractor's project manager or superintendent must inspect, approve and initial completion or correction of each punchlist item.
5. Punchlist Inspection: The review of the punchlist will also be a single continuous effort for each portion of the Work put forth by the Contractor as Substantially Complete.

#### 1.05 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
  1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
  2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
  3. Submit consent of surety to final payment.
  4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  5. Submit As-Built documents to Architect.
  6. Submit lien waivers in a format acceptable to the Owner.
  7. Deliver attic maintenance stocks and overruns of materials at one time to location(s) designated by the Owner. Submit inventory lists and obtain written acceptance from the Owner.
  8. Submit to Architect a Final Project Tally Sheet in both PDF and MS Word or RichText file format indicating original Contract Price and Time, all changes to Price and time made by Change Order, and final Contract Price and Time.

#### 1.06 AS-BUILT DOCUMENT SUBMITTALS

- A. General: Do not use as-built documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.
- B. As-built Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
  1. Mark as-built sets with a distinguishable color.

2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
  3. Organize as-built drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
  4. Record Product Data: Where applicable, mark Product Data submittal to show significant variations in actual Work performed in comparison with information submitted. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation.
- C. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work.

## PART 2 – PRODUCTS (NOT APPLICABLE)

## PART 3 – EXECUTION

### 3.01 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".
- 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 manufacturer's 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, broken or scratched 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. 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.
    - d. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither

paved nor planted, to a smooth even-textured surface. Clean all sidewalks thoroughly.

- C. Pest Control: Make a final inspection and take appropriate action to rid the building interiors of rodents, insects and other pests.
- D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for 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 in a lawful manner.
  - 1. 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

## SECTION 01 78 23

### OPERATIONS AND MAINTENANCE DOCUMENTATION GENERAL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. The contractor shall provide Owner with Documentation for the safe and effective Operation and Maintenance (O&M) of the systems and equipment listed. O&M Documentation requirements included in other Sections of this Specification are in addition to, and do not replace, those required in this Section.

##### 1.02 SUBMITTALS

- A. Preliminary Submittal: Two (2) copies of the draft manuals shall be submitted in electronic PDF; one copy to each of Owner and Architect for review within two (2) weeks of Substantial Completion. One copy will be returned to the Contractor within two (2) weeks after submittal and, if required, shall be revised and resubmitted by the Contractor within two (2) weeks.
- B. Final Submittal: Two (2) complete sets of manuals and electronic copies shall be furnished to Owner prior to the anticipated date of Final Completion.

#### PART 2 - GENERAL

##### 2.01 PURPOSE

- A. The Operation and Maintenance manuals are for the training of, and use by, Owner's employees in the operation and maintenance of the systems and equipment as specified below. The manuals shall consist of instruction on systems and equipment. A separate manual or set of manuals shall be prepared for each class of components, equipment or systems as specified.

##### 2.02 FORMAT

- A. Bind manuals in durable, locking, 3-ring binders. Binders shall be white view-type binders with clear plastic overlays to allow insertion of title pages for binder identification.
- B. Use 8-1/2" x 11" sheets, except that larger sheets up to 11" x 17" may be used when double folded to this size and used as a pull-out. Documents which are larger than 11" x 17" shall be reduced to 11" x 17" for inclusion in the manuals except where this compromises legibility (for drawings that are to scale, add a graphic scale prior to reduction). Documents that cannot be reduced will be folded and inserted in plastic envelopes inserted in the binders so that the folded documents are securely bound into the binders. Loosely inserted documents or documents inserted into pockets in the inside covers of the binders shall not be acceptable.

- C. Each binder shall be labeled on both cover and spine to indicate project name and Owner's project number, submitting contractor, date, general contents, volume number and total number of volumes in set.
- D. At the front of each binder include the following information:
  - 1. Master Table of Contents (TOC), identifying chapter headings and numbers, for all O&M Manual volumes provided by the submitting contractor
  - 2. Detailed TOC for the current volume listing, in order, the sections and subsections within each chapter of that specific manual
  - 3. Contact sheet for the submitting contractor listing appropriate contact names, addresses, phone numbers, and email addresses
  - 4. Introduction: including a brief description of project and purpose of the manual.
- E. Manuals shall be divided into chapters based on specification sections. Chapters shall be identified using both the specification section number and name (i.e. 23 21 23 Hydronic Pumps). Manual chapters shall be further subdivided into sections and sub-sections as appropriate for clarity of organization and to facilitate use by Owner.
  - 1. Chapters shall be separated by index tabs labeled with the covered specification name and number. Chapter division tabs shall be identical to each other in style and appearance, but different than the section division tabs.
  - 2. Major sections within a chapter shall be separated by index tabs, which indicate the equipment or material covered. Section division tabs shall be identical to each other in style and appearance, but different than the chapter division tabs.
  - 3. Provide a complete bill of materials in matrix format.
- F. In addition to the hard copy O&M manuals, provide two (2) full set of electronic O&M manuals for each set of hard copies, in searchable PDF format. Provide Bookmarks for each section within each PDF.

## 2.03 CONTENT

- A. Each chapter shall contain the following, information in addition to the requirements specified elsewhere in these specifications.
  - 1. Contact list identifying vendors providing equipment and systems covered in the current chapter. This information shall include vendor name, address, name of contact person(s), phone numbers (including 24 hour service numbers where appropriate), fax numbers, and email addresses.
  - 2. Equipment/material schedule(s) for all covered equipment and systems showing equipment identification (tag) number, manufacturer, model number, serial number, quantities, area/system served, equipment location, etc.
  - 3. Safety Precautions. This subsection shall comprise a listing of safety precautions and instructions to be followed during operation and before, during, and after repairs or adjustments are made.



- B. Each chapter shall describe the procedures necessary for Owner's personnel to operate and maintain the systems and equipment covered in that chapter.
- C. References shall be made, as appropriate, to drawings, schematics, sequences of operation and other information included as part of the construction contract drawings and specifications that show distribution system layout, equipment arrangements and items of control.
- D. All information included in the final O&M Manuals, including equipment schedules, manufacturer's literature, drawings, etc. shall represent the "as-built" condition.
- E. Manufacturer's literature and other information provided in the O&M Manuals shall be for the actual equipment installed under contract for the particular facility. Where literature (standard product catalogs, cut-sheets, etc.) contains data pertaining to parts, equipment or options other than those specifically provided for this project, the contractor shall clearly indicate the specific products, model numbers, and options provided. Mark-ups made by the contractor for this purpose shall be made in a manner that will clearly photocopy (no highlighters).
- F. A brief description of each type of required information follows:
  - 1. Warranty information
    - a. Provide copies of all warranty certificates from equipment manufacturers
    - b. If not included on warranty certificate, provide the start/end dates of warranty period, descriptions of what is and isn't covered and contact information for warranty claims (if different from contact list described above).
    - c. Provide information of an operations or maintenance nature covering warranty items that have not been discussed elsewhere.
  - 2. Product Information
    - a. Provide manufacturers' standard, published product literature describing covered materials, equipment and devices including illustrations, exploded views, dimensions, weights, application data, etc.
    - d. Where manufacturer's product information (catalog cut-sheets, etc.) contain data pertaining to parts, equipment or options other than those specifically provided for this project, the contractor shall clearly indicate the specific products, model numbers, and options provided. Mark-ups made by the contractor for this purpose shall be made in a manner that will clearly photocopy (no highlighters).
    - e. Provide manufacturer's standard, published Installation, Operation & Maintenance bulletins pertaining to the specific equipment installed.
    - f. Provide performance curves and rating data, specific to the equipment installed on the project such as fan and pump curves, chiller selection sheets, sound data, etc.

- g. Provide a copy of all approved shop drawings covering approval of equipment for the project with the product information. Include all data concerning changes made during construction.

### 3. Preventive Maintenance Procedures & Schedules

- a. Provide written preventive maintenance procedures describing each required PM task. Procedures shall include lists of tools and parts required and all safety precautions to be taken.
- b. State, preferably in tabular form, the recommended frequency for each preventive maintenance task: (cleaning, inspection, lubrication, scheduled overhauls, etc.). Task schedules shall be grouped and sorted by frequency (daily, weekly, quarterly, annually, etc.)
- c. Procedures for lubrication of equipment shall indicate both the type and quantity of lubricant to be used.
- d. If periodic inspection of equipment is required for operation, cleaning, or other reasons indicate the items to be inspected and give the inspection criteria. Examples of equipment requiring inspections include, but are not limited to, the following:
  - 1) Motors
  - 2) Controls
  - 3) Filters
  - 4) Heat exchangers
  - 5) Emergency Generator and associated fuel system
  - 6) ATS and associated systems
  - 7) TVSS and associated systems
- e. Provide instruction for the proper handling, disposal and/or removal of hazardous or otherwise special materials such as used filters, refrigerant, oils, chemicals, etc.
- f. Provide instruction for minor repairs or adjustments required for preventive maintenance routines. Minor repair and adjustment shall be limited to repairs and adjustments that may be performed without special tools or test equipment and that require no special training or skills. Identify test points and give values for each.

### 4. Corrective Maintenance Procedures

- a. Corrective Maintenance: Corrective maintenance instructions shall be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime. Instructions and data shall appear in the normal sequence of corrective

maintenance, for example, troubleshooting first, repair and replacement of parts second, and then the parts list.

- b. Troubleshooting: This information shall describe the general procedure for locating malfunctions and shall give, in detail, any specific remedial procedures or techniques. The data shown are intended to isolate only the most common equipment deficiencies. Troubleshooting tables, charts, or diagrams may be used to present specific procedures. A guide to this type shall be a three-column chart. The columns shall be entitled Malfunction, Probable Cause, and Recommended Action. The information shall be alphabetically arranged by component, and each component shall, in turn, list deficiencies that may be expected. Each deficiency shall contain one or more problems with a recommended correction.
- c. Repair and Replacement: Indicate the repair and replacement procedures most likely to be required in the maintenance of the systems and equipment. Information included here shall consist of step-by-step instructions for repair and replacement of defective items. Include all information required to accomplish repair or replacement, including information such as torque values. Identify all tools, special equipment, and materials that may be required. Identify uses for maintenance equipment. The paragraphs shall contain headings to identify the topics covered.

5. Spare Parts Lists.

- a. Provide a list of all spare parts for the covered equipment. The parts list shall include a tabulation of descriptive data for each part including part number and manufacturer. Where available, provide an exploded diagram of the equipment identifying parts listed in the spare parts list.
- b. Provide a list of recommended spare parts to be kept in inventory by the Owner's maintenance staff for performance of preventive maintenance and typical corrective maintenance tasks.

6. System Descriptions:

- a. Provide a narrative, (both typewritten and electronic format), describing, in general terms, the covered equipment / system. Topics to be covered in this narrative shall include theory of operation, overall system layout, description of major components, interconnections with utilities and other systems, description of control system layout and operation, identification of unusual features or functions, and major safety precautions. This information should correlate with information provided in the manufacturers' standard published literature.
- b. Provide the following data (if not already being provided under the other requirements in this specification):

- 1) Detailed illustrations and schematic diagrams of each system showing major components, piping, valves, controls, utility connections, and other components, where applicable.
  - 2) Wiring and control diagrams with data to explain detailed operation and control of each component.
  - 3) Control sequences describing start-up, all modes of operation, and shut down.
  - 4) Corrected shop drawings.
  - 5) Copies of approved certifications and laboratory test reports (where applicable).
7. Operating Instructions:
  - a. Provide, (both typewritten and electronic format), condensed instructions for operation of the covered system / equipment. Where more than one (1) common unit is installed, one set of instructions is adequate. The instructions shall provide procedures for:
    - 1) Starting up the equipment/system
    - 2) Shutting down the equipment/system
    - 3) Normal operating procedures
    - 4) Procedures for operating the equipment / system in emergency or unusual conditions
    - 5) Safety precautions
    - 6) Procedures for both short-term and long-term equipment lay-up
    - 7) Other pertinent data applicable to the operation of particular systems or equipment
    - 8) The instructions shall be suitable for posting adjacent to the equipment concerned.
8. Factory Test Reports
  - a. Provide copies of factory test reports specified in the covered section of the specifications.
  - b. Test reports should include a brief description of the test procedures used, test date, names of personnel performing test, names of personnel witnessing test (if any), test results and comparison of test results with specified acceptance criteria.
9. Field Test Reports
  - a. Provide copies of field test reports specified in the covered section of the specifications. Samples of field testing include, but are not limited to,

HVAC test and balance, leak testing of piping and ductwork and megger testing of electrical distribution systems.

- b. Test reports shall clearly indicate the type of test performed, test procedures used, system being tested, section or area of equipment being tested, date of test, signatures of personnel performing and witnessing the test, test results and comparison of test results with specified acceptance criteria.

10. Posted Operating Instructions and Diagrams:

- a. Operating Instructions: (Provide both, typewritten and electronic format)
  - 1) Where specified, copies of operating instructions shall be posted in the near vicinity of each piece of applicable equipment. The instructions shall be mounted neatly in frames under Plexiglas, where they can be easily read by operating personnel. Instructions mounted outdoors shall be suitably protected from weather.
  - 2) Coordinate with Owner regarding size and location of posted operating instructions.
- b. Systems Diagrams: (Provide both, typewritten and electronic format)
  - 1) Simplified one (1) line diagrams of HVAC heating, cooling, and airflow systems shall be developed and posted neatly under Plexiglas in the main or most appropriate equipment room for easy reference by operating and maintenance personnel.
  - 2) These drawings shall be done in a professional manner, which is acceptable to the Owner's Facility Management staff. The diagrams shall show each component including all valves installed in the system, with name and identifying number. If space does not permit valve numbers on the diagrams, valve charts shall be provided. Explanatory notes, where needed, shall be provided.
  - 3) Coordinate with owner regarding locations of posted operating instructions.
  - 4) These diagrams shall be suitable for reduction in size and use in the operating manual system descriptions previously covered.
- c. Valve Chart: (Provide both, typewritten and electronic format)
  - 1) Valve name and number charts shall be developed and posted neatly under Plexiglas in the main or most appropriate equipment room for easy reference by operating and maintenance personnel.
- d. Service contacts: (Provide both, typewritten and electronic format)

- 1) Service and supplier contacts shall be developed for all provided equipment and systems for easy reference by operating and maintenance personnel.

END OF SECTION

## SECTION 03 30 00

### CAST IN PLACE CONCRETE

#### 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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Spread Footings.
  - 2. Grade Beams.
  - 3. Pits and Trenches.
  - 4. Slab-on-Grade.
  - 5. Bollard footings.
  - 6. Metal Pan Stairs
  - 7. Concrete on Metal Decking.
  - 8. Dumpster Enclosure hinge post footings
- B. Related Sections:
  - 1. Section 05 31 00 Steel Decking
  - 2. Section 05 51 13 Metal Stairs
  - 3. Section 13 34 19 Metal Building Systems

##### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- B. Contract Documents: Documents including Project Drawings and Project Specifications covering required Work.
- C. High Early Strength Concrete: Concrete that uses ASTM C 150 Type III cement or admixtures and is capable of attaining specified strength at earlier ages than normal concrete.
- D. Mass Concrete: Any volume of concrete with dimensions large enough to require that measures be taken to cope with generation of heat from hydration of cement and attendant volume change

to minimize cracking. Concrete 3 feet or more in thickness shall be classified as mass concrete unless otherwise shown in Contract Documents.

- E. Normal Weight Concrete: Concrete having densities of roughly 150 pounds per cubic foot made with gravel or crushed stone aggregates.
- F. Strength Tests: Compressive strength average of two cylinders made from one sample of concrete and tested at 28 days or at test age designated for determination of specified compressive strength.
- G. Structural Lightweight Concrete: Structural concrete made with lightweight aggregate; density usually between 90 to 115 pounds per cubic foot.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: Submit product data or manufacturer's specifications and installation instructions for following to show compliance with the specifications:
  - 1. Cement including type, class, manufacturer, and plant locations.
  - 2. Supplementary cementitious materials.
  - 3. Coarse and Fine Aggregates including type, pit or quarry location, producer, gradation, specific gravity, and material test reports.
  - 4. Admixtures.
  - 5. Column isolation joint forms.
  - 6. Expansion Joint Fillers and semi rigid joint fillers.
  - 7. Curing materials and methods.
  - 8. Bonding Agents.
  - 9. Waterstops.
  - 10. Vapor Retarder.
  - 11. Floor and slab treatments.
  - 12. Fiber reinforcement.
  - 13. Joint shear transfer devices.
- B. Concrete Mix Designs: Submit concrete mix design information for each proposed concrete mix. Submit information on standard mix design submittal forms printed at end of this Section. Information can be submitted on concrete supplier formatted sheets if required information is provided. The submitted mix designs shall include the following:
  - 1. Proportions for all ingredients - cement, coarse aggregates, fine aggregates, admixtures, and water supply.
  - 2. Chemical admixtures containing manufacture's name, brand, proposed use, and chloride content.
  - 3. Selection of concrete mix proportions based in either trial laboratory data or historical field test records used to establish required average strength in accordance with ACI 301. Historical test data shall not be more than 12 months old.
  - 4. Coarse and Fine Aggregate gradations including producers name, pit and quarry locations, and specific gravities. Include dated information that shows that information is not more than ninety (90) days old.



5. Slab on grade design mix to include a combined aggregate distribution analysis and coarseness factor chart derived from the current certified reports of gradations of the individual aggregates as outline in ACI 302.1R-04.
  6. Water/cement ratio; slump (ASTM C 143); air content (ASTM C 231).
- C. Concrete Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout Shop Drawing: Indicate proposed construction joints required to construct the structure.
1. Location of construction joints is subject to approval of the Architect-Engineer.
- E. Saw-cut Control Joints Layout Shop Drawing: Indicate proposed saw-cut control joints for all concrete slabs subject to approval of the Architect-Engineer.
- F. Cold-Weather and Hot-Weather Concrete Placing Procedures. The submittal shall include but is not limited to the following:
1. Procedures for protecting subgrade from frost and accumulation of ice or snow on reinforcement or forms before concrete placement. Include methods for removing frost, ice, or snow in event they accumulate before precautions are implemented or precautions proves to be inadequate.
  2. Methods of temperature protection during placement.
  3. Types of covering, insulation, housing, heating, or cooling to be provided.
  4. Curing methods to be used during and following protection period.
  5. Use of retarding or accelerating admixtures.
  6. Methods for verification of in-place strength other than those instances noted as being provided by Owner.
  7. Procedures for measuring and recording concrete temperatures after placement.
  8. Procedures for preventing excessive evaporation during hot, dry, or windy conditions.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer Qualifications; Manufacturer Qualifications; and Testing Agency Qualifications.
- B. Welding certificates.
- C. Material Certificates: Submit product data or manufacturer specifications and installation instructions for the following materials to show compliance with specifications.
1. Form materials and form-release agents.
  2. Steel reinforcement and accessories.
  3. Adhesives.
  4. Joint-filler strips.
  5. Repair materials.

- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

## 1.7 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

### 2.2 REINFORCEMENT ACCESSORIES

- A. Joint Shear Transfer Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), shall be round plain-steel bars, cut true to length with ends square and free of burrs.

- B. Joint Shear Transfer Dowel Bars: ASTM A 36, shall be square plain steel bars, cut true to length with ends square and free of burrs.
- C. Joint Shear Transfer Devices: ASTM A 36, shall be square steel diamond plates of size and length as shown on Drawings.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I, Type II, Type III gray
    - a. Use Type I for standard (28 day) strength concrete. Use Type II (moderate heat) for Mass Concrete. Use Type III for high early (7 day concrete).
  - 2. Supplementary Cementitious Materials:
    - a. Fly Ash: ASTM C 618, Type C or F may be used up to a maximum of 25% of the total cementitious content.
    - b. Ground Granulated Blast Furnace Slag: ASTM C 989, Grade 100 or 120 may be used up to a maximum of 40% of the total cementitious content.
- B. Normal-Weight Aggregates: ASTM C 33, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.
  - 1. Maximum Coarse Aggregate for normal weight concrete shall be crushed stone, crushed gravel or washed gravel conforming to ASTM C 33. The maximum size of coarse aggregate shall be:
    - a. Maximum size coarse aggregate for slab on grade shall be nominal 1.5 inch nor more than 1/3 depth of the slab or topping thickness.
    - b. Maximum aggregate size for mass concrete shall be nominal 2 inches. Furnish in two separate component sizes until mixing in concrete.
    - c. Maximum aggregate size shall be 3/8 inch for concrete steel stair pan fill; pipe posts and column fill.
    - d. Maximum nominal aggregate size shall not exceed three-fourths of the minimum clear spacing between reinforcing bars or one-fifth of the narrowest dimension between sides of forms.
  - 2. Fine Aggregate Natural sand conforming to ASTM C 33 and free of materials with deleterious reactivity to alkali in cement.

3. Normal weight aggregates for slab on ground shall meet the Combined Aggregate Gradation as described in ACI 302.1R-04 Chapter 5.4.3 and the meet the Coarseness Factor Chart Zone II described in ACI 302.1R-04 Chapter 6.
- C. Lightweight Aggregate: Fine and Coarse light weight aggregates used for lightweight concrete shall conform to ASTM C 330.
- D. Water: ASTM C 94/C 94M and potable.

## 2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  3. Accelerating Admixture: ASTM C 494/C 494M, Type C.
  4. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  5. Mid-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  6. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  7. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  8. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Chemical Admixtures: Subject to compliance with requirements products from manufacturers incorporated into work are limited to the following:
  1. Euclid Chemical Company.
  2. Grace Construction Company.
  3. BASF.
  4. Sika Corporation.
  5. Axim Italcementi Group.
  6. Or approved equivalent

## 2.5 FIBER REINFORCEMENT

- A. Carbon-Steel Fiber: ASTM A 820/A 820M, deformed, minimum of 2 inches (50 mm) long, and aspect ratio of 45 to 50.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Fiber: Type 1, Cold-Drawn Wire: Fibers shall be round shafts with hooked ends with a minimum yield strength equivalent to 120 kips per square inch.
      - 1) Bekaert; Dramix.
      - 2) Propex Concrete Systems Corp.; Novocon 1050.
      - 3) Maccaferri; Wirand FF3.

- 4) BASF: MasterFiberFF3.
- 5) Or approved equivalent

B. Minimum Fiber Dosage: Provide a minimum dosage of fibers (pounds per cubic yard) to insure a minimum post crack equivalent flexural strength of 200 psi in accordance with ASTM C 1609 unless otherwise noted on drawings. The minimum dosage shall be based on the project's concrete design mix and not the manufacturer's standard test mix.

1. Minimum fiber dosage shall be based on laboratory testing conducted with concrete beam tests utilizing 6 inch x 6 inch molded samples performed in accordance with ASTM C 1609 and ASTM C 172.
2. Submit for approval laboratory test results and data validating proposed minimum fiber dosage to Architect-Engineer. Submit at the same time the proposed concrete mix designs are submitted to Architect-Engineer for approval.

## 2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Fortifiber Building Systems Group; Moistop Ultra 15.
  - b. Meadows, W. R., Inc.; Perminator 15 mil.
  - c. Raven Industries Inc.; Vapor Block 15.
  - d. Reef Industries, Inc.; Griffolyn 15 mil Green.
  - e. Stego Industries, LLC; Stego Wrap 15 mil Class A.
  - f. Or approved equivalent

## 2.7 FLOOR SLAB TREATMENTS

A. Non Oxidizing Metallic Dry Shake: The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected portland cement and necessary plasticizing agents.

1. Products: Subject to compliance with requirements provide one of the following:
  - a. BASF "MasterTop 210COR"
  - b. Euclid Chemical Company "Diamond Plate"
  - c. Or approved equivalent.

B. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing 3/8-inch (9.5-mm) sieve.

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Anti-Hydro International, Inc.; Emery.

- b. Dayton Superior Corporation; Emery Tuff Non-Slip.
- c. Lambert Corporation; EMAG-20.
- d. L&M Construction Chemicals, Inc.; Grip It.
- e. Metalcrete Industries; Metco Anti-Skid Aggregate.

## 2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. BASF Construction Chemicals - Building Systems; Confilm.
    - b. Conspec by Dayton Superior; Aquafilm.
    - c. Dayton Superior Corporation; Sure Film (J-74).
    - d. Euclid Chemical Company (The), an RPM company; Eucobar.
    - e. L&M Construction Chemicals, Inc.; E-CON.
    - f. Or approved equivalent
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet with moisture loss of no more than .055 grams per square centimeter( 1.8 ounces per square foot) when tested in accordance with ASTM C 156.
- D. Moisture-Retaining Cover: ASTM C171; A naturally colored, non woven polypropylene fabric with a 4 mil non perforated reflective (white) polyethylene coating containing stabilizers to resist degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture retention.
  - 1. Products: Subject to compliance with requirements provide one of the following:
    - a. Hydracure S-16 by PNA Construction Technologies, Inc., Matthews, NC.
    - b. Transguard 4000 by Reef Industries (Armorlon Division), Incorporated, Houston TX.
    - c. Or approved equal.
  - 2. Cure with slabs on ground and bonded concrete floor toppings that receive Trap Rock Dry Shakes; Quartz Dry Shakes; Emery Dry Shakes.
- E. Water: Potable.
- F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A, 25% solids content minimum, non yellowing. Moisture loss shall be not more than 0.40Kg per square meter when applied at 300 sq.ft./gal. Manufacturer certification is required.
  - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. BASF Construction Chemicals - Building Systems; Kure 1315.
- b. ChemMasters; Polyseal WB.
- c. Conspec by Dayton Superior; Sealcure 1315 WB.
- d. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
- e. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
- f. Meadows, W. R., Inc.; Vocomp-30.
- g. Metalcrete Industries; Metcure 30.
- h. Or approved equivalent.

## 2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
  - 1. Premolded Joint Fillers: Subject to compliance with requirements provide one of the following:
    - a. BASF Chemical Company; Expansion Joint Filler.
    - b. W.R.Meadows, Inc.; Ceramar.
    - c. Or approved equivalent.
  - 2. Expansion Joint Filler Asphalt Fiber: Subject to compliance with requirements provide one of the following:
    - a. Tamms Industries; Hornboard.
    - b. W.R.Meadows Inc.; Fibre Expansion Joint.
    - c. Or approved equivalent.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.10 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Limit water-soluble, chloride ion content in hardened concrete per requirements listed in ACI 301 and ACI 318.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use plasticizing 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.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
- D. Maintain maximum water/cement ratios for the following conditions:
  1. 0.45 for concrete exposed to de-icers or subject to freezing and thawing.
  2. 0.40 for corrosion protection of steel reinforcement in concrete exposed to chlorides from de-icing chemicals, salt, saltwater, brackish water, seawater, or spray from these sources.
  3. 0.50 for concrete to have low water permeability.
  4. 0.50 for concrete subject to moderate sulfate exposure.
  5. 0.45 for concrete subject to severe or very severe sulfate exposure.
- E. Concrete exposed to de-icers or subject to freezing and thawing shall maintain a minimum compressive strength of 4500 psi at 28 days and a maximum water-cementitious ratio of 0.45 meeting the durability requirements of ACI 301.
- F. Limit maximum air content of 3 percent in slab on grade concrete mixtures intended to receive Dry Shake Floor Finishes.
- G. Proportion and design mixes for lightweight concrete that result in an air-dry unit weight of 110 pounds per cubic foot when measured in accordance with ASTM C 567.
- H. Proportion and design mixes to limit concrete shrinkage of slab on grade to 0.04% at 28 days when measured in accordance with ASTM C 157, modified 7-day moist cure (0.00040 inches per inch).



## 2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

### A. Spread Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi (20.7 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content: Spread Footings-Non Air Entrained.

### B. Grade Beams: Proportion normal-weight concrete mixtures as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio; 0.45.
3. Slump Limit: 4 inches (100mm), plus or minus 1 inch.
4. Air-Content: Air-Entrained.

### C. Interior Slabs-on-Grade and Concrete Floor Toppings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Material Content: 470 lb/cu.yd. with 1-1/2 inch nominal maximum aggregate size; 520 lb/cu.yd. with 1 inch nominal maximum aggregate size; 540 lb/cu.yd with 3/4 inch nominal maximum aggregate size.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

### D. Interior Suspended Slabs: Proportion structural lightweight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Calculated Equilibrium Unit Weight: 110 lb/cu. ft. (1762 kg/cu. m), plus or minus 3 lb/cu. ft. (48.1 kg/cu. m) as determined by ASTM C 567.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

## 2.13 FABRICATING REINFORCEMENT

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

## 2.14 CONCRETE MIXING

### A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 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.
2. Ready mixed concrete may be re-tempered at site using not more than the quantity of water held back at the batch plant. Water held back at initial batching shall be distinctly

shown on concrete delivery ticket. Only that additional quantity of water shall be permitted for addition at the delivery site.

### PART 3 - EXECUTION

#### 3.1 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

#### 3.2 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Place vapor retarders at the top of the base course and directly under the slab on ground for slabs intended to receive moisture sensitive floor coverings. Lap the joints of the vapor retarder sheets a minimum of 6 inches and 9 inches onto adjacent vertical surfaces and seal vapor tight.
  - 2. Seal vapor retarders around penetrations and at damaged areas to maintain vapor tight seal.

#### 3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

#### 3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
  - 1. Joint pattern for slab on grade shall be square or nearly square, along columns lines and between column lines, parallel to walls, and account for discontinuities due to pits,

- trenches and equipment foundations. Joint spacing shall not exceed 1.5 to 1 length to width aspect ratio for any given slab panel unless other noted.
2. Locate construction joints and contraction joints(control joints) in slabs on grade to conform to typical joint patterns and details as indicated on drawings. Submit to Architect Engineer Joint Pattern Shop Drawing for review and approval.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect Engineer.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  3. Place shear transfer devices (dowels) at construction joints for slabs on grade as shown on drawings. Use manufactured dowel holders to accurately place and maintain dowels through concrete placement and finishing operations.
  4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one-third of the concrete thickness using wet blade machines. Construct contraction joints for a depth equal to one-fourth (unless otherwise noted) of the concrete thickness using early entry saws (Soft-Cut).
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.6 CONCRETE PLACEMENT

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

- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Do not place slab on grade before receiving notification from the Owner's designated representative that all required subgrade construction and preparation has been installed, inspected and approved.
  - 2. Do not place any concrete without approval of concrete mixes from Architect Engineer.
  - 3. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 4. Maintain reinforcement in position on chairs during concrete placement.
  - 5. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 6. Slope surfaces uniformly to drains where required.
  - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Consolidate placed concrete with internal vibrating equipment supplemented with hand-spading, rodding, or tamping. Use vibrators that are as large and powerful as possible without affecting proper execution of Work. Thoroughly work concrete around reinforcement and embedded items and into corners of forms, eliminating air and stone pockets that may cause honeycombing, pitting, or planes of weakness. Do not use vibrators to move concrete within forms.
- F. Do not place concrete during high winds, rain, sleet, or snow without adequate protection.
- G. Concrete free fall shall not exceed 10 feet for concrete containing high-range water reducing admixture (superplasticizer) or 5 feet for other concrete. Provide elephant trunks or tremies or other placing equipment approved by Registered Design Professional, or provide openings in sides of forms to limit free dropping to above requirements.

- H. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- I. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. 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. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Concrete Surfaces: Finish concrete surfaces in accordance with one of the following methods unless otherwise noted on drawings:
  - 1. Foundations above finish floor----Trowel
  - 2. Foundations below finish floor-----Float
  - 3. Elevated supported concrete floor for Mechanical and Electrical Rooms----Trowel
  - 4. Stair Treads and landings----slip resistive aggregate
  - 5. Pits and trenches----Trowel
  - 6. Pocket Fills and Column Washes----Same as adjacent slab.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces indicated, to receive trowel finish, and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated, exposed to view, or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  2. Finish slab-on-grade surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for randomly trafficked floor surface:
    - a. Trowel finish floors shall achieve composite FF40/FL30 value and minimum FF27/FL20 value for individual floor section.
    - b. Float finished floors shall achieve composite FF25/FL20 values and minimum FF18/FL13 value for individual floor sections.
    - c. Minimum values shall apply to each quarter bay section.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
  2. After broadcasting and tamping, apply float finish.
  3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.
- G. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 1.5 lb/sq.ft. for Heavy Duty applications.
  2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
    - a. **Do not apply to areas of slabs to received applied coatings, such as paint and traffic stripping. Coordinate with product applicator to mask off those areas prior to dry shake application**
  3. After final floating, apply a trowel finish. Cure concrete with moisture retaining covers or curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

### 3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Concrete Fill for Column Washes: Provide concrete washes in steel column webs as shown on Drawings. Fill in space inside column isolation joints after column has been erected. Fill can be placed either before or after surrounding slab on grade is placed.
- D. Equipment Bases and Foundations:
  - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
  - 3. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 4. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- E. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

### 3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed 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.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1 for at least 7 days, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
  - a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover such as polyethylene sheet or white burlap-polyethylene sheet for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape. In the event of blowoff or damage to the sheeting, immediately re-wet the exposed concrete surfaces thoroughly, then repair, reset, or replace the sheeting.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

F. Cure Slab on Ground for at least 7 days according to the following conditions:

1. Cure slab-on-ground surfaces with water. Apply one of the following procedures immediately after completion of placement and finishing. Do not water cure colored concrete or colored surface treatment
  - a. Slabs-on-ground and concrete bonded toppings shall be kept continuously wet by ponding, continuous sprinkling or continuous misting.
  - b. Slabs-on-ground and concrete bonded toppings intended to receive liquid floor floor treatments shall be continuously wetted and covered with specified moisture retaining coverings of waterproof sheet materials, conforming to ASTM C 171.
  - c. Slabs-on-ground and concrete bonded floor toppings that receive Trap Rock Dry Shakes; Quartz Dry Shakes and Emery Dry Shakes shall be wetted and covered with specified moisture retaining non-woven polypropylene fabric with 4 mil reflective white polyethylene covers, conforming to ASTM C 171.
2. Cure slabs-on-ground and bonded concrete floor toppings that receives metallic or non-oxidizing metallic dry shake finish using specified curing compounds meeting ASTM C 309 and ASTM C 1315. Use specified high solids (25% solids) cure and sealer. Apply cure and sealing compound immediately when water sheen has disappeared from the concrete surface and finishing operations completed. Apply cure and sealing compound in accordance with manufactures instructions at an application rate not less than 1 gallon per 200 square feet.



- a. When metallic or non oxidizing metallic dry shakes are intended to be finished with a liquid surface treatment, cure slabs on ground and concrete bonded toppings using a specified dissipating curing compound meeting ASTM C 309. After curing period has elapsed remove curing compound without damaging concrete surfaces by cleaning method recommended by curing compound manufacturer.
3. Cure slabs on ground and concrete bonded toppings that receive epoxy coatings and urethane coatings using compatible curing compounds per the Coating Manufacturer's recommendations and instructions.
4. Cure slabs-on-ground and concrete bonded toppings that receive only a sealer using specified curing and sealing compounds meeting ASTM C 309 and ASTM C 1315. Use specified high-solids (25% solids) cure and sealer. Apply cure and sealing compound immediately when sheen has disappeared from concrete surface and finishing operations completed. Apply curing compound in accordance with the manufacturers instructions at an application rate not less than 1 gallon per 200 square feet.

G. Protection:

1. Cold weather: When mean daily outdoor temperature is less than 40 degF, temperature of concrete shall be maintained between 50 and 70 degF for required curing period. When necessary, arrange for heating, covering, insulation, or housing concrete work before placement. Arrangements shall be adequate to maintain required temperature without injury as a result of concentration of heat. Combustion heaters shall not be used during first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gasses which contain carbon dioxide
2. Hot weather: When necessary to maintain evaporation control, make provision for windbreaks, shading, fog spraying, sprinkling, ponding, wet covering with light colored materials, or moisture evaporative retardants. Protective measures shall be installed as quickly as concrete hardening and finishing operations allow.
3. Do not allow vehicular traffic of any kind over newly placed slab or floor topping until end of curing period.
4. Do not allow construction loads to exceed superimposed load that the slab or floor topping is capable of carrying safely and without damage.
5. Protect concrete surfaces from damage against deicer materials; freezing and severe weather conditions; hard wheeled traffic; heavy construction traffic; impact; rain or running water; rubber tire marks; stains from grease, oils, chemicals, paints.

### 3.10 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
  1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Do not apply to concrete that is less than seven days' old and per manufacturer's recommendations.
  3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

### 3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Delay filling saw cut joints 90 days minimum after cutting. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.12 CONCRETE SLAB ON GRADE DEFICIENCIES

- A. Criteria for determining potential strength deficiency. Strength will be considered deficient and concrete work will be rejected when work fails to comply with requirements which control structure's strength including, but not limited to the following conditions:
  - 1. Concrete strength failing to comply with required compressive or flexural strength.
  - 2. Reinforcing steel size, quantity, strength, position, or arrangement at variance with Contract document's requirements.
  - 3. Concrete elements that differ from required dimensions, levelness, flatness, or location
  - 4. Curing not per Contract Documents.
  - 5. Inadequate protection from extreme temperature and other environmental conditions during early hardening and strength development stages.
  - 6. Mechanical injury, construction fires, accidents, or premature formwork removal resulting in deficient strength.
- B. Strength Deficient Repair Actions
  - 1. Action required when strength is potentially deficient: When structural strength is considered potentially deficient, the following actions may be required by the following Architect-Engineer:
    - a. Replace the deficient concrete slab.
    - b. Structural analysis or additional testing, or both.
    - c. Core testing.
    - d. Concrete work rejected by structural analysis or by load test results shall be strengthened with additional construction when required by Architect-Engineer, or replaced
    - e. Document repair works proposed to bring strength deficient concrete work into compliance with Contract Documents, and submit documentation to Architect-Engineer for acceptance.
    - f. Extend slab-on-grade warranty period.

### 3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect Engineer. Remove and replace concrete that cannot be repaired and patched to Architect Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect Engineer's approval.

### 3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
  2. Embedded bolts and anchor rods.
  3. Verification of use of required design mixture.
  4. Concrete placement, including conveying and depositing.
  5. Inspect formwork
  6. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; 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. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  6. Compression Test Specimens: ASTM C 31/C 31M.

- a. Cast and laboratory cure three compressive strength specimens for each composite sample.
  - b. Field cured test cylinders, requested and paid for by the Contractor, shall be molded at same time and from same samples as laboratory cured test cylinders.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of one laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
  - a. Test one set of one field-cured specimen at 7 days and one set of two specimens at 28 days, as requested by Contractor.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. Test results shall be reported in writing to Architect Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect Engineer but will not be used as sole basis for approval or rejection of concrete.
12. 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. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect Engineer.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

### 3.15 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 05 12 00  
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shop priming.
3. Field-installed shear connectors.
4. Grout.

B. Related Requirements:

1. Section 05 31 00 "Steel Decking" for field installation of shear connectors through deck.
2. Section 09 90 00 "Paints and Coatings" for priming and field painting.

C. Products Furnished But Not Installed Under This Section:

1. Anchor rods for columns.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data. Provide separate drawings for erection. Indicate marks for pieces on shop and erection drawings. Use marking system compatible with, and referenced to, marking system noted on Contract Drawings.
  - 2. Include embedment Drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
  - 5. Differentiate between shop connections and field connections by appropriate symbols on shop drawings. Show location, type and size of connections and connection components. Indicate members or portion of members that shall not be shop painted.
    - a. Submit calculations for all steel connections.
    - b. Submit weld design and procedures for welds not pre-qualified by ANSI/AWS D1.1.
  - 6. Show items to be provided per AISC's Structural Steel Detailing Manual.
  - 7. Submit separate setting plans and shop drawings for Anchor Rods. Show, on shop drawings, complete information about bolts, nuts and accessories, identification marking, and setting instructions, including dimensioned locations and elevations. Furnish two copies of Registered Design Professional approved shop drawings, to installer of bolts.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates: Submit summary sheets showing welder, welding operator and tacker qualifications and welding connection workmanship per ANSI/AWS D1.1-96. Do not submit individual certifications. Certifications shall be kept at manufacturer's plant for Inspector's use.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Survey of existing conditions.
- E. Source quality-control reports.
  - 1. Submit reports on completed tests and audits showing conformance or non-conformance with Contract Documents. Include visual and non-destructive testing of welds. Testing Agency shall send duplicate copies of tests and audits to Registered Design Professional and to Contractor.

## 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to Endorsement P1SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 1. Re-qualify welder, welding operator, or tack welder who has not been performing this particular welding process (for which he was qualified) for six months before employment on this project.
  - 2. Registered Design Professional reserves right to require retesting and re-qualifying of welder, welding operator, or tack welder.
  - 3. Submit weld design and procedures for welds not pre-qualified by ANSI/AWS D1.1.
- E. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. AISC 360, "Specifications for Structural Steel Buildings."
  - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- F. Defective Material or Improper Workmanship
  - 1. Defective material or improper workmanship found at mill, shop, or project site, at any time, will be rejected regardless of previous inspections.
    - a. Remove rejected material or work and provide new materials or work that conforms to Contract Documents.
    - b. Alternatively, rejected material or work may be repaired. Submit written request as specified under Article "Submittals", but do not proceed until Registered Design Professional has approved repair and method. If submittal is not approved by Registered Design Professional, remove and rejected material or work and provide new materials.
  - 2. Provide removal and replacement, or repair, at no additional cost to Owner, and pay costs attributable to delay caused by rejection and corrective action.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.



- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

## PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Welding Electrodes: E70XX series, low hydrogen for shielded metal arc gas, gas metal arc, or flux-cored arc welding processes per ANSI/AWS A5.1 or A5.5 and F7X series for submerged arc welding per ANSI/AWS A5.17 or A5.23.

### 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
    - a. Manufacturers:
      - 1) LeJeune Bolt Company
      - 2) Lohr Structural Fasteners Inc.
      - 3) NSS Industries
      - 4) Or approved equivalent
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
    - a. Manufacturers:

- 1) LeJeune Bolt Company
  - 2) Lohr Structural Fasteners Inc.
  - 3) NSS Industries
  - 4) Or approved equivalent
- C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hexhead assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  1. Finish: Plain.
- D. Shear Connectors: ASTM A 108, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
  1. Manufacturers:
    - a. Nelson Stud Welding
    - b. Bluearc Stud Welding
    - c. Inventory Sales Company "Stud Welding Division"
    - d. Or approved equivalent
- E. Unheaded Anchor Rods (Threaded, with Nut, Top and Bottom): ASTM F 1554, Grade 36ASTM F 1554, Grade 55, weldable.
  1. Configuration: Straight, or as shown on drawings.
  2. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
  3. Plate Washers: ASTM A 36/A 36M carbon steel.
  4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
  5. Finish: Plain.
- F. Headed Anchor Rods: ASTM F 1554, Grade 36ASTM F 1554, Grade 55, weldable, straight.
  1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
  2. Plate Washers: ASTM A 36/A 36M carbon steel.
  3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
  4. Finish: Plain.
- G. Threaded Rods: ASTM A 36/A 36M.
  1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
  2. Washers: ASTM A 36/A 36M carbon steel.
  3. Finish: Plain.

## 2.3 GROUT

- A. Non-Shrink Grout:
  1. Pre-mixed, non-shrink, non-metallic grout consisting of aggregate base, portland cement sand, and with necessary plasticizers, densifiers and other control ingredients.

2. Non-shrink grout shall conform to ASTM C1107, Grade B, when tested at a fluid consistency of 25 to 30 seconds per CRD 611/ASTM C939 at temperature extremes of 45 and 90 degree F and an extended working time of 30 minutes.
3. Non-shrink grout shall have a minimum compressive strength of 7,500 pounds per square inch at 28 days.
4. Non-shrink grout manufacturers:
  - a. Dayton Superior "Sure-Grip High Performance Grout"
  - b. Euclid Chemical Company, Inc. "Hi-Flow Grout"
  - c. L&M Construction Chemicals, Inc. "Crystex"
  - d. Master Builders, Inc. "928"
  - e. U.S. Grout Corporation "Five Star Grout"
  - f. Or approved equivalent

## 2.4 MANUFACTURED UNITS

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
  1. Fabricate for delivery a sequence that will expedite erection and minimize field-handling of structural steel.
  2. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  3. Mark and match-mark materials for field assembly.
  4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
  5. Furnish and fabricate per the design and details shown and per approved shop drawings. Design connections and fabricate work per Reference Standards, except where specifically amended in this Section or superseded by local or State building code requirements.
  6. Fabricate items built or anchored into adjacent concrete or masonry construction with anchorage devices, bolts, anchors and clips.
  7. Provide clips, ties, lugs, separators, bolts, fittings, shims, fillers, connectors, weld electrodes, and miscellaneous items required for fabrication and erection of field-connected materials.
  8. Provide seat and shelf angles, as required to support roof deck, floor deck, floor plate, grating and masonry. Design connections of seat and shelf angles to develop strength of angles.
  9. Furnish members of proper length and assemble without excessive use of fillers. Join and assemble members without sharp projections, serrated edges, sharp edges, or sharp corners at joints. Cope, block, miter, and grind edges with care. Furnish members free from twists, bends, distortions and open joints. Mark pieces with same identifying number or symbol as used to identify pieces on shop drawings.
- B. Columns:

1. Furnish columns in single lengths, without splices, except where multiple lengths are shown. Fabricate columns straight and true for full length per referenced AISC Specifications.
2. Fabricate columns with base and cap plates. Cut and finish column ends square at base plates, cap plates, and splices. Provide slotted holes for connections at top of wind columns to permit deflection of framing member above.
3. Fabricate base and cap plates from rolled steel plates. Press, flatten, or mill plates to obtain proper bearing per AISC requirements. Weld plates to columns at both web and flanges of column. Provide anchor bolt holes and grout holes in plates, oversized per AISC recommendations, to permit slight adjustment in column location.

C. Girders, and Beams:

1. Fabricate with natural camber up. Natural camber shall not exceed 1/8-inch for every 10 feet of span.
2. Provide double angle connections for beams and girders to develop not less than:
  - a. 50 percent of total allowable uniform load for non-composite members.
  - b. 75 percent of total allowable uniform load for composite members.
  - c. Loads shown on Drawings.
3. Connections need not exceed 100 percent of allowable web shear of member.

D. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

E. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

1. Provide holes, 1/16 -inch-diameter larger than bolt diameters for connection of wood nailers. Locate and space holes as noted; otherwise space holes 24-inches on center.

F. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

I. Bolting:

1. Provide high strength bolted, slip critical or bearing type connections as shown. Bolt design values for bearing type connections shall assume threads in shear planes. Fully pre-tension bolts in bearing type connections. Do not use bolted and welded connections in combination. Make connections of main members per referenced AISC Standards. Use minimum of two bolts for bolted connections. Where type of connections are not shown or designated:
  - a. Fabricate shop connections for welding or high-strength bolting.
  - b. Fabricate field connections for high-strength bolting.
  - c. Fabricate field connections as follows:
    - 1) Main members, members in braced bays, and purlins aligned with sway frames. High strength bolting.
    - 2) Other members: Either high-strength or common bolting.
  - d. Fabricate field connections that cannot be bolted for welding.
2. Provide holes for bolted connections during shop fabrication. Do not burn or torch-cut holes. Drill, do not punch, holes in material 7/8-inch thick or greater.
3. Do not use bolts less than 3/4 inch diameter, unless otherwise noted.

J. Welding:

1. Perform welding with specified electrodes and qualified welders, welding operators, and tack welders per specified Reference Standards. Provide necessary jigs and holding devices for shop welding. Dog or clamp down work to prevent distortion during welding. Control welding sequence to minimize residual stresses and member distortion.
2. Where possible design weld details and procedures to permit welding in flat and horizontal position using ANSI/AWS prequalified welds. Avoid undercut, insufficient throat or leg, lack of fusion, and weld spatter. Repair defective welds immediately or remove and install new welds conforming with Specifications, at no extra cost to Owner. Qualify non-prequalified welds per ANSI/AWS D1.1.
3. Place "SMAW" fillet welds larger than 5/16-inch in not less than two passes. Remove slag coating before starting succeeding pass. Weld lengths shall be net effective lengths. Add approximately 3/4-inch to theoretical length of intermittent welds to allow for craters. Fill craters.
4. Conform to minimum thickness, preheat, and interpass requirements. Minimum weld size shall be based on material thickness and shall not be reduced by preheating. Use a minimum fillet weld size of 3/16-inch. Proportion size and length of all fillets to not locally overstress connected members.
5. For welds exposed to weather, make continuous welds so as to be weather tight and grind smooth.

K. Welded Studs:

1. Surfaces to receive welded studs shall be free from dirt, loose rust, oil, excessive mill scale, paint, and materials or contaminants that would cause defective weld. Use wire brushing, sand blasting, grinding or other suitable cleaning methods.
2. Install welded studs under conditions conducive to formation of sound welds. Do not weld when steel is less than 20 degrees Fahrenheit or when steel surface is wet or

exposed to rain or snow. Preheat steel surfaces, where necessary, to 100 degrees Fahrenheit minimum.

3. Shear Studs: Furnish and install shear studs on steel members, of sizes and in locations shown. Install shear studs per Section 7 of ANSI/AWS D1.1 using an electric stud welding system and equipment recommended by stud manufacturer, modified as follows:
  - a. To provide minimum 2000 amperes power for welding.
  - b. To permit only one stud gun to operate at one time from power source.
  - c. To allow power source to regain full power between welds.
  - d. To time each welding cycle automatically.
4. Headed Studs: Furnish and install headed studs on steel members for anchorage to concrete. Unless otherwise noted, space headed studs at not more than 12-inches on center.
5. Threaded Studs: Furnish and install threaded studs on steel members in locations shown. Unless otherwise noted, space threaded studs at not more than 24-inches on center.
  - a. Furnish and install threaded studs on steel members in locations shown. Unless otherwise noted, space threaded studs at not more than 24-inches on center.

L. Future Expansion:

1. In areas noted for future expansion or extension, fabricate steel framing to permit connection of future steel framing. Provide similar holes and connections for future framing as provided for typical steel framing. Provide bolted connections for members removed in the future.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following, in compliance with Section 09 06 00 "Schedule for Finishes" and Section 09 90 00 "Paints and Coatings":
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
  2. Surfaces to be field welded.
  3. Surfaces of high-strength bolted, slip-critical connections.
  4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  5. Galvanized surfaces.
  6. Steel members to be galvanized.
  7. Top flanges of beams that shall receive welded studs for composite construction.

- B. Surface Preparation: Clean steel surfaces to be shop painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to Section 09 91 00 " Paints and Coatings", and the following specifications and standards:
  - 1. For Interior Steel Surfaces: SSPC-SP 3, "Power Tool Cleaning" unless otherwise specified in later paragraphs.
  - 2. For slip critical connections, clean shop-contact surfaces per SSP-SP6 and to Class A surface conditions per Table 3 of "Specification for Structural Joints Using ASTM A-325 or A-490 Bolts."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at a rate recommended by SSPC to provide a minimum dry film thickness of 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Strip paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection for field painting.
- D. Structural Steel Primer Paint: A modified alkyd-based anticorrosive red oxide, interior/exterior, metal primer. |

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by registered design professional. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M. unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened Pretensioned, or as indicated on drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.



1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

### 3.5 FIELD QUALITY CONTROL

- A. Inspections: Owner will engage an independent testing agency to perform the following special inspections:
  1. Verify structural-steel materials and inspect steel frame joint details.
  2. Verify weld materials and inspect welds.
  3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
  1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 05 31 00

### STEEL DECKING

#### 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. Composite floor deck.
  - 2. Steel decking accessories for connection, closure, weather tightness and drainage.
- B. Related Requirements:
  - 1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
  - 2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

##### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
  - 1. Certify welders employed for project, verifying AWS qualifications within previous 12 months.
- B. Product Certificates: For each type of steel deck.
  - 1. Provide deck profile characteristics, dimensions, structural properties, and finishes.
  - 2. Corrosion protection.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- D. Evaluation Reports: For steel deck, from ICC-ES.

## 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Properly store, handle and erect material. Replace damaged material before erection at no additional cost to Owner.
- B. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- C. Stack steel deck off the ground on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

### 2.2 COMPOSITE FLOOR DECK

- A. Manufacturers: 1-1/2 inch deep deck subject to compliance with requirements, provide products by one of the following:
  - 1. Canam Steel Corporation; Canam Group, Inc. Manufacturer of United Steel Deck - "1-1/2 B-LOK"
  - 2. Epic Metals Corporation- "EC150"
  - 3. New Millennium Building Systems, LLC, - "1.5CDI"
  - 4. Nucor Corp, Vulcraft - "1.5VLI"
  - 5. Or approved equivalent.
- B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Floor deck units shall be fabricated from Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 50 minimum, G60 (Z180)zinc coating.
2. Profile Depth: As indicated on Design Drawings.
3. Design Uncoated-Steel Thickness: As indicated on Design Drawings.
4. Span Condition: Triple span or more, where possible.

## 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners for attachment of metal roof deck and metal floor deck shall be corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
  1. Powder-actuated, drive pin type carbon steel fasteners with knurled shanks with minimum 1/2 inch diameter steel washers, zinc electroplated in conformance with ASTM B633, Sc1, Type III adequate to penetrate into steel members. Fasteners and low-velocity powder-actuated tools with safety features by:
    - a. Hilti Fastening Systems, Inc.
    - b. Ramset Fastening Systems.
    - c. Or approved equivalent
  2. Air-actuated, drive pin type carbon steel fasteners with knurled shanks with minimum 1/2 inch diameter steel washers, zinc electroplated in conformance with ASTM B633, Sc1, Type III adequate to penetrate into steel members. Fasteners and low-velocity air-activated tools by:
    - a. Hilti Fastening Systems, Inc.
    - b. Pneutek AIR/SAFE Fastening System
    - c. Or approved equivalent
  3. Self-drilling, self tapping, support fasteners No. 12-24 minimum screw size.
    - a. Hilti, Inc.
    - b. Or approved equivalent
- C. Side-Lap Fasteners: Corrosion-resistant and zinc electroplated, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm)-16 minimum screw size with pilot point.
  1. Manufacturers:
    - a. Hilti, Inc.
    - b. ITX Buildex.
    - c. Textron Fastening Systems
    - d. Or approved equivalent

- D. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 50,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- E. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- F. Galvanizing Repair Paint: Repair damaged galvanized coating on top and bottom surfaces with a zinc rich paint meeting SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install roof and floor deck panels and accessories according to applicable SDI Standards and commentary in SDI Publication No. 31, manufacturer's written instructions, approved placement plans and requirements in this Section.
- B. Installation of Floor Deck shall comply with ANSI/SDI's "QA/QC-2017 Quality Control and Quality Assurance for Installation of Steel Deck.
- C. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- D. Locate deck bundles to prevent overloading of supporting members.
- E. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- F. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- G. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- H. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- I. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

- J. Clean mud, dirt and other contaminants from top and bottom surfaces of deck prior to installation.

### 3.3 FLOOR-DECK INSTALLATION

- A. Fasten and attach floor deck to supporting members with specified mechanical fasteners spaced a maximum of 12 inches on center and as indicated on the Design Drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), and as indicated on the Design Drawings.
  - 1. Fasten nested side laps together with self-drilling, hexagonal washer head, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws with pilot point.
  - 2. Fasten interlocking side laps together by mechanically button punch or clinch.
- C. Alternately at contractors option and approved by IBI Group, fasten floor deck panels to support steel framing by arc spot (puddle) welds using a minimum 5/8 inch weld diameter spaced a maximum of 12 inches on center at each supporting members unless otherwise indicated on design drawings.
- D. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
  - 1. Deck ends shall be Butted together over supports.
- E. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- F. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- G. Provide metal closures at open, uncovered ends and edges of deck, welded in place, to provide rigid installation. In addition, provide metal closures in voids between steel deck units and top of walls and partitions.
- H. Install deck to provide an even top surface, ready to receive concrete fill. Trim deck to fit closely to adjacent construction, and force lap joints into tight contact. Installation shall prevent flow of concrete mortar through floor deck joints using pressure-sensitive tape.
- I. Provide holes in deck for passage of pipes, duct and structural supports, equipment and other openings, an similar construction. Coordinate placement of steel framing around openings.
- J. At completion of installation, clean deck to receive shear studs, free from dirt, loose rust, oil, excessive mill scale, paint and other materials or contaminants. Use wire brushing, sand blasting, grinding or other suitable cleaning method.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
  - 1. Examine placed deck for tears, dents or other damage that may compromise its structural integrity.
  - 2. Examine Mechanical fasteners to ensure steel roof deck and floor deck is properly clamped to support steel. Verify fastener nail head standoff is within manufacturers accepted tolerance. Replace under-driven and over-driven fasteners with adjacent properly installed fasteners.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

### 3.5 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION



## SECTION 05 40 00

### COLD FORMED METAL FRAMING

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Exterior wall framing at Existing Building.

##### 1.02 REFERENCES

- A. AISI SG-971 - Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 1996, with 2000 supplement.
- B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2003.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2003.
- D. ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2003.
- E. ASTM C 1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2000.
- F. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2004.
- G. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2004.
- H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002.

##### 1.03 SYSTEM DESCRIPTION

- A. Components are sized to withstand design loads per the requirements in the North Carolina State Building Code, latest edition.
- B. Deflection: Maximum deflection of 1/360 of span using service level loads.
- C. Install system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

- D. Install system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

#### 1.04 SUBMITTALS

- A. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, bridging, loading, and type and location of fasteners, and accessories or items required of related work.
  - 1. Describe method for securing members to supporting structure.
  - 3. Provide details for factory-made framing connectors.
- D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.
- E. Buy America Act Certification: Submit documentation certifying that products comply with provisions of the Buy America Act.

#### 1.05 QUALITY ASSURANCE

- A. Structural properties of framing members shall be in accordance with requirements of AISI Specification for the Design of Cold-Formed Steel Structural Members.
- B. Manufacturer: Company specializing in manufacturing the types of products specified in this section, and with minimum ten years of documented experience.
- C. Installer: Company specializing in performing the work of this section with minimum five years of experience.

#### 1.06 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated on the drawings.
- B. Coordinate work of this section with the placement of components within the stud framing system.

## PART 2 - PRODUCTS

### 2.01 FRAMING MATERIALS

- A. Studs and Track: ASTM C 955; studs formed to channel shape with punched web; U-shaped track in matching nominal width and compatible height.
  - 1. Gage and depth: As shown on drawings, but not less than:
    - a. Depth: 3 5/8 inch.
    - b. Flange: 1 3/8 inch.
    - c. Gauge: 16
    - d. Tracks: 2 inch deep leg at head; 1 ¼ inch deep leg at bottom.
      - 1) Provide double tracks where indicated or where vertical deflection criteria exceeds ¾ inch.
    - e. Horizontal bridging: 48 inches on center.
  - 2. Galvanized in accordance with ASTM A 653/A 653M G90/Z275 coating.
- B. Bracing Members: Fabricated from ASTM A 653/A 653M steel sheet, with G90/Z275 hot dipped galvanized coating.
  - 1. Base Metal: As required to meet specified performance levels within maximum depths indicated.
  - 2. Gage and depth: As required to meet specified performance levels.
- C. Framing Connectors: Factory-made formed steel sheet, ASTM A 653/A 653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.

### 2.03 ACCESSORIES

- A. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

### 2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A 153/A 153M.
- B. Anchorage Devices: Power actuated, Drilled expansion bolts, and Screws with sleeves meeting specified performance requirements.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

### 3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C 1007 requirements.
- B. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- C. Touch-up damaged galvanized surfaces with primer.
- D. Use mechanical fasteners. Do not weld structural studs unless authorized by the structural engineer of record.

### 3.03 INSTALLATION OF BRACING AND OTHER LOAD BEARING COMPONENTS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Touch-up damaged galvanized surfaces with primer.

END OF SECTION

SECTION 05 50 00  
METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
  - 1. Exterior Bollards
  - 2. Miscellaneous Metals
- B. Related Work Specified Under Other Sections
  - 1. Painting – DIVISION 9.
  - 2. Painting – DIVISION 9.

1.02 RELATED SECTIONS

- A. Section 09 90 00 – Paints and Coatings.
- B. Section 34 71 13 – Plastic Bollard Covers.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance Requirements: Where complete sizes or dimensions of structural members, connections, or fasteners of any item are not indicated, design the item to produce strength appropriate to the use intended.

1.04 SUBMITTALS

- A. Shop Drawings for fabricated items.
- B. Product Data for manufactured components.

1.05 QUALITY ASSURANCE

- A. Where fabrications are specified to comply with specific structural performance requirements, provide design sealed by a professional engineer registered in the state in which the project is located.

PART 2 - PRODUCTS

2.01 MATERIALS - METALS

- A. Steel Shapes:
  - 1. Plates, bars, angles, channels, and H-sections: ASTM A 36.

- 2. Tube:
  - a. Hot-rolled: ASTM A 501.
  - b. Cold-formed: ASTM A 500.
- 3. Pipe: ASTM A 53 (black steel and hot-dip galvanized).
  - b. Schedule 80, unless otherwise indicated or required to meet design requirements.
- B. Gray Iron Castings: ASTM A 48.
- C. Malleable Iron Castings: ASTM A 47.
- D. Aluminum Sheet: ASTM B 209; alloy and temper suitable for application and finish.
  - 1. Finishes: As indicated on drawings.
- E. Aluminum Shapes: Alloy and temper suitable for application, strength required, and finish.
  - 1. Plate: ASTM B 209.
- F. Stainless Steel: Type 302/304, satin finish (No. 4).

## 2.02 MATERIALS - MISCELLANEOUS

- A. Grout: Nonshrink, factory blended and packaged; complying with ASTM C 1107.
- B. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required.
  - 1. For exterior use or built into exterior walls: Nonferrous stainless steel, zinc coated or cadmium plated.
  - 2. Use fasteners of same material as items being fastened unless otherwise indicated.
  - 3. Bolts and studs: ASTM A 307.
  - 4. Nuts: ASTM A 563.
  - 5. Lag bolts: FS FF-B-561.
  - 6. Machine screws: FS FF-S-92.
  - 7. Wood screws: FS FF-S-111.
  - 8. Plain washers: FS FF-W-92.
  - 9. Lock washers: FS FF-W-84.
  - 10. Expansion shields: FS FF-S-325.
  - 11. Toggle bolts: FS FF-B-588.
- C. Bituminous Mastic: SSPC-Paint 12.
- D. Galvanizing Repair Paint: Zinc dust paint complying with SSPC-Paint 20 or DOD P-21035.

- E. Shop Primer: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.

## 2.03 FABRICATION - GENERAL

- A. Fabricate and shop-assemble in largest practical sections for delivery to site.
  - 1. Prepare and reinforce fabrications as required to receive applied items.
  - 2. Fabricate items with joints tightly fitted and secured.
  - 3. Make exposed joints tight, flush, and hairline.
- B. Fasteners: Use concealed fasteners if possible.
  - 1. Exposed fasteners: Flathead, countersunk type unless otherwise indicated.
- C. Anchors: Fabricate to suit conditions indicated; use anchors of same material and finish as item except where specifically indicated otherwise.
- D. Welding:
  - 1. Welding of steel: Comply with AWS D1.1 recommendations.
  - 2. Provide continuous welds at welded corners and seams.
  - 3. Exposed welds: Grind flush and smooth.
- E. Joints Exposed to Weather: Fabricate to keep water out, or provide adequate drainage of water that penetrates.
- F. All exterior steel components are to be galvanized.

## 2.04 FABRICATED ITEMS

- A. Bollards: Diameter as indicated, extra strong steel pipe, Schedule 80.
  - 1. Concrete filled with domed top.
  - 2. Shop prime paint finish.
- B. Ledge Angles, Shelf Angles, Channels, Brackets and Plates Not Attached to Structural Framing: For support of metal decking, metal stairs and metal railings.

## 2.05 FABRICATION - SHEET METAL

- A. Comply with general fabrication requirements.
- B. Bend sheet metal corners to smallest possible radius.

## 2.06 FABRICATION - SHOP COATINGS

- A. Shop prime all iron and steel fabrications.
- B. Prepare surfaces to be coated as follows:
  - 1. Solvent-clean in accordance with SSPC-SP 1.

2. Exterior fabrications: Clean in accordance with SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.
  3. Interior fabrications: Clean in accordance with SSPC-SP 3, SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.
- C. Shop Priming: Comply with SSPC-PA 1.
1. Apply primer immediately following surface preparation.
  2. Do not prime surfaces to be welded.
  3. Do not prime surfaces in direct contact bond with concrete.
  4. Apply extra coat to corners, welds, edges, and fasteners.
- D. Shop Painting: Comply with SSPC-PA 1.

## PART 3 - EXECUTION

### 3.01 INSTALLATION - GENERAL

- A. Anchor metal fabrications to substrates indicated; provide all fasteners required.
- B. Perform all field fabrication required for installation.
1. Fit joints tightly.
  2. Weld joints as indicated.
    - a. Weld in accordance with AWS code.
    - b. Exposed welds: Grind flush and smooth.
- C. Do not cut or weld items galvanized after fabrication that are indicated for bolted or screwed connections.
- D. Install items in correct location, plumb and level, without rack or warp.
- E. Coat aluminum surfaces in contact with concrete and masonry with bituminous mastic.

### 3.02 CLEANING AND TOUCH-UP

- A. Touch up damage to galvanized surfaces using galvanizing repair paint in accordance with ASTM A 780.
- B. Touch up shop paint immediately after erection.

END OF SECTION



SECTION 05 51 13  
METAL PAN STAIRS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Structural steel stair framing and supports.
- B. Pan treads to receive concrete fill, and landings.
- D. Integral balusters and handrails.
- E. Handrails at walls.

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete: Concrete fill in stair pans and landings; mesh reinforcement for landings.
- B. Section 03 30 00 - Cast-In-Place Concrete: Placement of metal anchors in concrete.
- C. Section 05 51 00 - Metal Fabrications.
- D. Section 05 52 00 - Metal Railings.
- E. Section 09 90 00 - Paints and Coatings: Paint finish.

1.03 DESIGN REQUIREMENTS

- A. Design and fabricate stair assembly to support a uniform live load of 100 lb/sq ft and a concentrated load of 300 lb/sq ft with deflection of stringer or landing framing not to exceed 1/180 of span. Test in accordance with ASTM A 935.
- B. Design and fabricate railing assemblies in accordance with ASTM E 985.
- C. Design handrail assemblies and attachments to resist lateral force of 200 lbs at any point and in any direction without damage or permanent set. Test in accordance with ASTM A 935.
- D. Design guardrail assemblies and attachments to resist the following loads:
  - 1. A concentrated load of 200 lbs applied at any point and in any direction at the top of the guardrail without damage or permanent set.
  - 2. A load of 50 plf applied horizontally at the indicated guardrail height and a simultaneous load of 100 plf applied vertically downward at the top of the guardrail.

3. A 200 lb concentrated horizontal load applied on a 1 foot square area at any point in the system including intermediate rails or other elements serving this purpose.
  4. Test in accordance with ASTM A 935.
- E. Fabricate metal stairs to comply with NAAMM AMP 510, Class Architectural.

#### 1.04 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths. Shop drawings shall include engineer's seal.

#### 1.05 QUALITY ASSURANCE

- A. Perform design and prepare shop drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.
- C. Steel Plates: ASTM A 283, Grade B or C.
- D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
- E. Ungalvanized Steel Sheet: ASTM A 611, Grade C, Type 1.
- F. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M) galvanized to ASTM A 153/A 153M for galvanized components.
- G. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

## 2.02 FABRICATION - GENERAL

- A. Fit and shop assemble components in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- F. Fabricate components accurately for anchorage to each other and to building structure.
- G. All exterior steel components are to be galvanized.

## 2.03 FABRICATION - PAN STAIRS AND LANDINGS

- A. Fabricate stairs and landings with closed risers and treads of metal pan construction using ungalvanized steel sheet, ready to receive concrete.
- B. Form treads and risers with minimum 14 gage sheet steel stock.
- C. Secure reinforced tread pans to stringers with clip angles; welded in place.
- D. Form stringers with rolled steel channels, 12 inches deep. Weld fascia plates to channels using 14 gage steel sheet across channel toes.
- E. Form landings with minimum 14 gage sheet stock. Reinforce underside with angles to attain design load requirements.
- F. Form railings with 1-1/4 inch diameter steel sections as indicated on drawings, welded to stringers.
- G. Prime paint components.

## 2.04 FINISHING

- A. Prepare surfaces to be primed in accordance with SSPC-SP 2.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Do not prime surfaces in direct contact with concrete or where field welding is required.
- D. Prime paint items with one coat.

- E. Do not paint galvanized surfaces.

### PART 3 - EXECUTION (NOT USED)

### PART 4 - EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

#### 4.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

#### 4.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

#### 4.04 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

## SECTION 05 52 00

### METAL RAILINGS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Guardrails
- B. Integral balusters and handrails.

##### 1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete: Placement of metal anchors in concrete.
- B. Section 05 50 00 - Metal Fabrications.
- C. Section 05 51 13 - Metal Pan Stairs.
- D. Section 09 90 00 – Paints and Coatings.

##### 1.03 DESIGN REQUIREMENTS

- A. Design and fabricate stair assembly to support a uniform live load of 100 lb/sq ft and a concentrated load of 300 lb/sq ft with deflection of stringer or landing framing not to exceed 1/180 of span. Test in accordance with ASTM A 935.
- B. Design and fabricate railing assemblies in accordance with ASTM E 985.
- C. Design handrail assemblies and attachments to resist lateral force of 200 lbs at any point and in any direction without damage or permanent set. Test in accordance with ASTM A 935.
- D. Design guardrail assemblies and attachments to resist the following loads:
  - 1. A concentrated load of 200 lbs applied at any point and in any direction at the top of the guardrail without damage or permanent set and have attachment devices and supporting structure transfer this loading to appropriate structural elements of the building.
  - 2. A load of 50 pounds per lineal foot applied horizontally at the indicated guardrail height and a simultaneous load of 100 plf applied vertically downward at the top of the guardrail.
  - 3. A 200 lb concentrated horizontal load applied on a 1 foot square area at any point in the system including intermediate rails or other elements serving this purpose.
  - 4. Test in accordance with ASTM A 935.
- E. Fabricate metal stairs to comply with NAAMM AMP 510, Class Architectural.

## 1.04 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths. Shop drawings shall include engineer's seal.

## 1.05 QUALITY ASSURANCE

- A. Perform design and prepare shop drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.
- C. Steel Plates: ASTM A 283, Grade B or C.
- D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
- E. Ungalvanized Steel Sheet: ASTM A 611, Grade C, Type 1.
- F. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M) galvanized to ASTM A 153/A 153M for galvanized components.
- G. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

### 2.02 FABRICATION - GENERAL

- A. Fit and shop assemble components in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- F. Fabricate components accurately for anchorage to each other and to building structure.
- G. All exterior steel components are to be galvanized.

### PART 3 - EXECUTION (NOT USED)

### PART 4 - EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

#### 4.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

#### 4.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

#### 4.04 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK



## SECTION 06 10 00

### ROUGH CARPENTRY

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Scope
  - 1. Rough carpentry items as indicated.
  - 2. Blocking as required to support finished work.
  - 3. Blocking as required to Owner's equipment.
- B. Related Work Specified Under Other Sections
  - 1. Finish Carpentry – DIVISION 6.
  - 2. Solid Surface Fabrications – DIVISION 6.
  - 3. .

##### 1.02 QUALITY ASSURANCE

- A. Requirements for Preservative Treatment
  - 1. Preservative pressure treated lumber and plywood shall be clean and free of surface deposits.
  - 2. Each piece shall be indelibly ink stamped with the quality mark of an approved independent third-party inspection agency having a follow-up testing and inspection service at the treating plant over the quality of the treated product, and whose service is certified by an approved overview agency such as American Wood Preservative Association (AWPA).
- B. Requirements for Fire Retardant Treatments
  - 1. Interior type fire retardant treated lumber and plywood shall have a flame spread rating of 25 or less when tested in accordance with ASTM E84 in a test duration of 30 minutes.
  - 2. Interior type fire retardant treated lumber and plywood shall be a low hygroscopic low corrosive type having an equilibrium moisture content of not over 28% at 92% relative humidity after testing in accordance with ASTM D3201 and meeting the treating requirements of American Wood Preservative Association (AWPA) C20 (lumber) and C27 (plywood) Type A.
  - 3. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.

4. After treatment, interior fire retardant lumber 2 inches thick or less shall be kiln dried to a moisture content of 19% or less, and plywood to 15% or less. Kiln temperature shall not exceed 160 degF.
5. Interior fire retardant formulations shall contain no ammonium phosphates, sulfates, or halides.
6. Use exterior type treatment for exterior locations.
7. Interior plywood panels to be Class A fire retardant.
8. Each piece shall be stamped with the indelible ink marking of an approved independent third party inspection agency (such as Underwriters Laboratories, Inc.) having a follow-up inspection service at the treating plant. Information on the mark shall comply with the building code.

C. Requirements of Regulatory Agencies

1. In addition to locations indicated or specified, provide fire retardant treated lumber and plywood in locations required by code, by governing authorities having jurisdiction, or by the OWNER'S Underwriters.

1.03 PROJECT CONDITIONS

- A. Deliver and store lumber and plywood at the project site in a manner to minimize exposure to moisture migration.
- B. Exercise special care in storing, handling and installation of preservative and fire retardant treated lumber and plywood so as to prevent moisture absorption of such items.

PART 2 - PRODUCTS

2.01 WOOD MATERIALS

A. General

1. Each piece of lumber shall bear the official trademark and grade of the manufacturer's association or inspection bureau under which it was manufactured and graded. Lumber shall be seasoned, surfaced four sides and kiln or air dried to moisture content specified in the association's rules, except that moisture content shall not exceed 19 percent.

B. Lumber Use and Species

1. Furring, Grounds, and Similar Use: Western Wood Products Association (WWPA) "Standard", "Number 2 Common" or better Douglas Fir-Larch, Hem-Fir, Pine, Engelmann Spruce, Cedar; or Southern Pine Inspection Bureau (SPIB) Number 2 Southern Pine.
2. Nailers, Blocking, Framing, Rough Bucks, and Rough Lumber Not Otherwise Specified: Western Wood Products Association (WWPA) "Utility", Number 3 or

better Douglas Fir, Hem-Fir, Lodgepole Pine, Western Cedars; or Southern Pine Inspection Bureau (SPIB) Number 2KD Southern Pine.

3. Sheathing: Western Wood Products Association (WWPA) "Number 4 Common" Douglas Fir-Larch, Hem-Fir, Pine, Engelmann Spruce or Cedar.
4. Framing for Utility Shelving: "C Finish" boards, Southern Yellow Pine, Sugar Pine, Douglas Fir, Engelmann Spruce, or Western Red Cedar.

C. Plywood Use and Species

1. Sheathing: American Plywood Association (APA), PS 1-83 Product Standard, 32/16 Rated Sheathing, Exposure 1, of thickness noted.
2. Exterior Plywood: American Plywood Association (APA), PS 1-83 Product Standard, BB Group 2 Exterior, of thickness noted.
3. Fire Retardant Plywood: Pressure treated in accordance with American Wood Protection Association (AWPA) Standard U1, Specification H, Use Category FA (interior) or FB (exterior), of thickness noted.
4. Utility Panels and Shelving: American Plywood Association (APA), PS 1-83 Product Standard, Exposure 1, Group 1, sanded, 3/4 inch thick unless otherwise noted.

D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
2. Engineered Wood: Use exterior grade engineered wood with phenol-formaldehyde instead of interior grade urea-formaldehyde at exterior and interior conditions.

## 2.02 FASTENING MATERIALS

- A. General: Unless otherwise indicated, use fastening materials of types appropriate for the conditions encountered, including wood to wood, wood to masonry or concrete, and wood to metal. Use anchors as shown for securing blocking, nailers and framing. Threaded stud bolts and nuts, or powder actuated fasteners, shall be used for securing wood to structural framing.
- B. Screws for Fire Retardant Lumber: Hot-Dipped Galvanized carbon steel, stainless steel, silicon bronze or copper in accordance with ASTM A 153 or ASTM B 695, Class 55 minimum (except for bolts 0.50 inch diameter or larger).

- C. Threaded Studs: Threaded studs for securing wood nailers or other items noted, complete with nut and washer.
  - 1. Erico Products, Inc. "Blue Arc Shear Connector Studs", (440-248-0100).
  - 2. Midwest Fasteners, Inc., "Weld Studs", (800-852-8352).
- D. Powder Actuated Fasteners: Drive pin type, threaded, of length to penetrate the steel member and depth of wood member, and a washer of sufficient diameter to secure the wood member. Fasteners and low-velocity powder actuated tools by same manufacturer.
  - 1. Hilti, Inc.
  - 2. Ramset, Inc.
- E. Nails and Staples: Galvanized carbon steel, per Federal Specification FF-N-105B.
- F. Screws for Other Lumber: Galvanized carbon steel per Federal Specification FF-S-107C and natural bright finish carbon steel per Federal Specification FF-S-111C.
- G. Bolts, Washers, Expansion Shields, and Nuts: Zinc-coated carbon steel, per Federal Specification FF-B-561C, FF-B-575C, FF-W-92A, FF-B-588C and FF-N-836D.
- H. Bar or Strap Anchors: ASTM A36 carbon steel 1/8 inch thick unless otherwise noted, hot dipped galvanized, with 2.0 ounce zinc coating per square foot of surface, per ASTM A123.
- I. Wood to Grouted Cavity:
  - 1. Grout: High strength, non-metallic, non-shrink grout for precision grouting and general construction Conform to ASTM C476 and ASTM C 1107. Acceptable manufacturers include Commercial Grade Quikrete, Precision Grout, Kauffman SureGrout or Engineers accepted equivalent. Grout type proportioned by volume as follows:
    - a. Portland cement or blended hydraulic cement: one part.
    - b. Hydrated lime: 0 to 1/10 part.
    - c. Fine aggregate: 2 1/4 to three times sum of volumes of cement and lime used.
    - d. Coarse aggregate: one to two times sum of volumes of cement and lime used.
    - e. Sum of volumes of fine and coarse aggregates: Do not exceed four times sum of volumes of cement and lime used.
- J. Bolt: corrosion resistant threaded J bolt meeting ASTM A 307, Grade A with ASTM A 563 hex nuts and flat washers, diameter of 1/2".
- K. Washers: Fasteners heads for screws, anchors and bolts terminating at the surface of nailers shall be provided with a minimum 5/8 inch diameter, stainless steel or similar

corrosion resistance flat washer provided by fastener manufacturer, unless washer is provided from factory as part of the fastener assembly.

- L. Adhesives: Use aliphatic or phenolic resin wood glue for general carpentry; comply with south coast air quality management district requirements for voc limits in adhesives. For wood work 30 grams/liter is the maximum VOC content.

## 2.03 WOOD TREATMENTS

### A. Preservative Treatment

- 1. Preservative Treatment: Use preservative pressure treated wood nailers, blocking, rough bucks, furring, grounds and other rough lumber items that come in contact with concrete, masonry or metal and are inaccessible in the finished work. Preservative pressure treatment shall be in accordance with American Wood Preservers Association (AWPA) Standards P5, C1, C2 and C9. Each piece shall be stamped with indelible ink with American Wood Preservative Association (AWPA) Quality Mark. Perform all milling along the grain of the wood prior to preservative pressure treatment.
  - a. Hickson Corporation, "Wolman-CCA Preservative".
  - b. Hoover Treated Wood Products Inc., "Dixie CCA".
  - c. Osmose Wood Preserving Company of America, Inc. "Osmose CCA".

### B. Fire Retardant Treatment

- 1. Fire Retardant Treatment: Use fire retardant wood for nailers, blocking, rough-bucks, grounds and other rough lumber items in areas requiring fire retardant rating and that are not exposed to the weather. Kiln dry, after treatment, to a moisture content of 19% or less for lumber and to 15% or less for plywood.
  - a. Interior Treatment:
    - 1) Hickson Corporation, "Drecon".
    - 2) Hoover Treated Wood Products, Inc., "Pryo-Guard".
    - 3) Osmose Wood Preserving Company of America, Inc. "Fire-Pro".
  - b. Exterior Treatment:
    - 1) Hoover Treated Wood Products, Inc., "Exterior Fire-X".

### C. Back Painting

- 1. Primer-Sealer: Apply one coat in the shop, on back surfaces and edges of rough lumber items that are not treated as described above.
  - a. PPG Industries, Inc. "Speedhide 6-6 Interior Undercoater".
  - b. Benjamin Moore "Alkyd Enamel Underbody 217".
  - c. Sherwin-Williams "Promar 200".

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Provide rough hardware required to complete this Work, including attachments of wood to wood, wood to masonry or concrete and wood to metal. Counterbore holes for nuts and heads of fasteners, and countersink all screws so as to be flush. Drill holes in lumber for fasteners. Furnish rough hardware items, loose, that are scheduled to be pre-set in masonry or concrete, to expedite the installation of such Work.
  - 1. In pressure treated wood, drill undersize holes for screws and nails to prevent splitting of wood members.
- B. For back painted members, after any such members are cut in the field, apply a brush coat of the same material used in the shop, to reseal the surface.
- C. When preservative pressure treated lumber is cut across the grain in the field, apply preservative to cut end in accordance with American Wood Preservers Association (AWPA) Standard M4 Section 1.5.
- D. For fire retardant pressure treated lumber cut across the grain in the field, no supplemental end treatment is required.
- E. Field cutting (ripping) along the grain is not allowed for either fire retardant or preservative pressure treated lumber.
- F. Masonry Walls:
  - 1. Grouted anchors:
    - a. Contractor shall follow grout manufacturers published instructions for preparation and installation.
    - b. Clean masonry cavity and install grout stop to prevent grout from entering below the desired cavity area.

### 3.02 FURRING AND GROUNDS

- A. Provide wood furring and grounds required to install wood sheathing, gypsum wall board, gypsum and metal lath, and wood paneling to masonry or concrete. Install in parallel rows, spaced at 16 inches on center; and in addition, to frame the perimeters of such areas and corners. Use nominal 1 inch by 3 inch solid stock unless otherwise noted. At metal lath, provide beveled edge to develop good plaster keys.
- B. Provide wood furring required to install cabinet work and other finish items to masonry, concrete, gypsum wall board or plaster substrates to properly secure these items.
- C. Secure members rigidly in place, at 2 feet on center, maximum, using flush bolts. Where members are applied over stud partition framing, bolt members in place through the substrate and into the metal stud framing.

### 3.03 NAILERS, BLOCKING, FRAMING AND ROUGH BUCKS

- A. Provide nailers, blocking, framing, rough bucks, sheathing and other rough lumber necessary for a complete installation.
- B. Verify with Owner any equipment requiring blocking that will be installed after construction. Provide and install suitable blocking as directed by Owner.
- C. Anchor wood members to concrete, masonry, or steel as shown, or required, complete with the fasteners specified. If powder actuated fasteners are used, comply with safety requirement of OSHA and fastener manufacturer. Where size and spacing are not shown or noted, secure members with 1/2 inch diameter bolts or threaded studs; not less than two for each individual piece; and at not more than 24 inches on center, maximum, for continuous members. Provide washers under bolt heads and nuts. Provide nailers and blocking in long lengths to minimize joints. When joints are necessary, join pieces without projecting edges.
- D. Lay sheathing close and nail solidly at each bearing; at not over 6 inches on center at continuous bearing members. Stagger end joints of adjacent sheets, with joint over bearings, in all cases.

### 3.04 UTILITY PANELS AND SHELVING

- A. Provide utility panels in telephone equipment rooms, electrical equipment rooms and elsewhere as required for mounting of equipment. Neatly install panels, with close butted joints where more than one sheet is required. Expansion bolt the panels to concrete or masonry substrates. At metal stud partitions, bolt panels in place through the substrate and into the metal stud framing. Unless otherwise noted, provide full 8 foot high panels.
- B. Provide wood utility shelving in janitors' closets, and where indicated. Install 1 inch x 3 inch framing to support shelving on ends and at back. Provide plywood shelving, with solid wood nosing on exposed edge; use single piece shelves in each location. Unless otherwise noted, install three (3) shelves at each indication for shelving.

### 3.05 TEMPORARY ROOF CURB COVERS – NOT USED

### 3.06 INSTALLATION

- A. Temporary Ventilation: During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.
- B. Waste Management:
  - 1. Select lumber sizes to minimize waste; reuse scrap lumber to the greatest extent possible. Clearly separate scrap lumber for use on site as accessory components, including, shims, bracing and blocking.

2. Do not leave any wood, shavings, sawdust, etc., on the ground or buried in fill. Prevent sawdust and wood shavings from entering the storm drainage system.
3. Do not burn scrap lumber that has been pressure treated.
  - a. Do not send lumber treated with pentachlorophenol, CCA or ACA to cogeneration facilities or "waste-to-energy" facilities.

C. Attachment:

1. The Contractor shall consult the fastener manufacturer's published literature and follow the recommended requirements for pre-drilling, cleaning, placement and compatibility of substrates. Follow manufacturer's requirements for fasteners spacing, substrate preparation and substrate embedment where not specified.
2. Securely attach rough carpentry work to substrate with fasteners. Anchor to resist a minimum force of 300 lbs/lineal foot in any direction.
3. Rough carpentry attachment shall meet the requirements herein and that of the current FM Loss Prevention Data Sheet 1-49, Perimeter Flashing.
4. Install bolts flush with the top surface of nailers where possible to avoid countersinking. Bolt bottom nailers then fasten upper nailers where possible. Countersink bolts, nuts and screws flush with wood surfaces only as detailed.
5. Install fasteners without splitting wood. Pre-drill where necessary. Split or damaged wood shall be removed, or repaired and/or re-secured to provide acceptable conditions.
6. For anchors, pre-drill concrete and masonry units to prevent damage or cracking of the masonry. Consult fastener manufacturer's published guides. Damaged masonry shall be repaired, and fasteners shall be removed and re-installed in an acceptable location.
7. Fastener spacing: Fasteners shall be staggered 1/3 the board width and installed within 6" of each end.
  - a. Bolts, adhesive anchors, wedge and sleeve anchors, and machine bolts securing nailers shall be spaced 48 inches on center, staggered and an additional fastener within 6 inches of each end of nailer to prevent boards from twisting at board joints. Secure at 24" on center in corners (Zone 3) of the roof area.
  - b. Screws and 1/4 inch diameter anchors securing wood to concrete or masonry units shall be spaced 12 inches on center maximum, staggered, with fasteners installed at each end of nailer lengths to prevent wood from twisting at board joints.
  - c. Screws securing wood to wood shall be installed 12 inches apart, staggered, with two screws installed within 6 inches of each end of nailer lengths to prevent wood from twisting at board joints.
  - d. Screws securing wood to steel decking shall be 12 inches apart.



- e. Self-drilling, and/or pre-drilled self-tapping screws securing wood to structural steel shall be spaced 12 inches apart, staggered, with one screw within 6 inches of each end of nailer lengths to prevent wood from twisting at board joints.
  - f. Nails securing wood to wood shall be spaced 12 inches apart, staggered, with two nails installed within 6 inches of each end of nailer lengths to prevent wood from twisting at board joints.
- 8. Plywood Sheathing Securement: Secure at 12" on center staggered each direction.
- D. Select fasteners of size and length that will not be exposed from the building interior and/or from the ground, or remove protruding fasteners, paint or finish to eliminate exposure.
- E. Thickness of wood nailers shall be flush with adjacent insulation and other materials. Additional fasteners shall be installed to ensure nailers are flush.
- F. Unless otherwise detailed, plywood used as blocking or shim shall be installed below dimensional lumber such that the fastener head terminates at the dimensional lumber surface.
- G. Wood nailers at roof perimeters, expansion joints, roof area dividers, etc. shall not be less than 3 feet long.
- H. When multiple nailers are installed stacked two high or more, offset nailers no less than 12" such that joints at nailer end do not line-up vertically.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 06 20 20

### INTERIOR FINISH CARPENTRY

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section includes all finish carpentry work, complete with accessories and related work, as indicated and specified, including but not necessarily limited to the following custom work:
  - 1. Plastic laminate cabinet work.
  - 2. Plastic laminate countertops.
- B. Related Work Specified In Other Sections
  - 1. Rough Carpentry - Division 6.
  - 2. Schedule for Finishes – Section 09 06 00.

##### 1.02 SUBMITTALS

- A. Submittals of shop drawings, product data, and samples are required for all work of the Section.
- B. Finish Carpentry Shop Drawings: Submit for review, completely detailed shop drawings showing all information necessary for the fabrication and erection of all work specified herein. The shop drawings shall show dimensions, construction details, jointing details, wood species and grade, trim, finishes, paneling layout, hardware and details relating to adjacent work.
- C. Finish Carpentry Product Data: Submit product data on all catalog-type components.
- D. Finish Carpentry Material Samples: Submit samples of each of the following items:
  - 1. Plastic laminate chips of colors, patterns and textures specified.
  - 2. Cabinet hardware, of each item proposed for use.
- E. For adhesives and glues used at Project site, including printed statement of VOC limits and certify compliance with South Coast Air Quality Management District Regulation #1168.
- F. For composite-wood products and adhesives, documentation indicating that product contains no added urea formaldehyde.

##### 1.03 QUALITY ASSURANCE

- A. Reference Standard

1. Use the "Quality Standards" of the Architectural Woodwork Institute (AWI) which are referenced and hereby made a part of this Section. Use "Premium Grade" for all work as defined in the latest edition of the AWI "Quality Standards".
2. Use plastic laminates which conforms to National Association of Plastic Fabricators and American National Standard Institute (ANSI) / National Electrical Manufacturers Association (NEMA) Publication LD 3 current edition.
3. Use grades of lumber, plywood and particleboard as defined by the rules of the recognized association of manufacturers producing the kind or species of lumber, plywood and particleboard specified in this Section. Use only lumber, plywood, and particleboard grade-stamped by the inspecting authorities.

#### 1.04 SITE CONDITIONS

- A. The woodwork manufacturer is responsible for dimensions not controlled by job conditions. Shop drawings shall show all required field measurements. The cooperation of the Contractor and the woodwork manufacturer is required to establish and maintain these field dimensions.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. It is the joint responsibility of the woodwork manufacturer and the Contractor to make certain that woodwork is not delivered until the building and storage areas are sufficiently dry and complete so that the woodwork will not be damaged. The Contractor will replace defective or damaged materials at no cost to the Owner.
- B. Crate, ship and deliver all materials to the Site and store in accordance with manufacturer's instructions and standards of the National Woodwork Manufacturers Association.
- C. Protect all finished surfaces after installation and finishing from damage and soiling. Maintain protection during subsequent work operations, and remove same upon Owner's Representative's acceptance or when instructed by Owner's Representative.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS AND FABRICATION

- A. General
  1. Use lumber bearing the official trademark and grade of the manufacturer's association or inspection bureau under which it was manufactured and graded, except as specified otherwise herein. Use seasoned lumber, surfaced four sides and kiln or air dried to moisture content specified in association's rules, except that moisture content is limited to a maximum of 11 percent.
  2. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee Board of Review.

3. Softwood Plywood: Comply with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."
4. Medium Density Fiberboard: NPA 9-87, "Voluntary Standard for Formaldehyde Emission from Medium Density Fiberboard" and ANSI/NPA Standard A208.2-2009.
5. Hardwood Plywood: Comply with HPVA HP-1, "Interim Voluntary Standard for Hardwood and Decorative Plywood."
6. Particle Board: Comply with ANSI A 208.1 Grade M-2 Exterior Glue.
7. Preservative Treatment: Comply with NWWDA I.S. 4 for exterior finish carpentry to receive water-repellent preservative treatment.
8. Fire Retardant Treatment: Where indicated, use materials impregnated with fire-retardant chemicals per AWPA C20; exterior type or interior Type A as required.

B. Lumber Use and Species

1. Furring, Grounds and Similar Use: WWPA "Standard", "No. 2 Common" or better, Douglas Fir-Larch, Hem-Fir, Pine, Engelmann Spruce, Cedar, or SPIB No. 2 Boards Southern Pine.
2. Nailers, Blocking, Framing, Rough Bucks, and Rough Lumber Not Otherwise Specified: WWPA "Utility", "No. 3" or better, Douglas Fir, Hem-Fir, Lodgepole Pine, Western Cedars, or SPIB No. 2KD Southern Pine.

C. Plastic Laminate Cores

1. Plywood: Douglas Fir or Pine, interior A-D grade conforming to P.S. 1-74, or thicknesses indicated.
2. Medium-Density Fiberboard: mat-formed medium density conforming to Commercial Standard 236-66, of thicknesses indicated.
  - a. Medium Density Fiberboard shall conform to ANSI/NPA A208.2 2016 and shall meet the following minimum standards:
    - 1) Screw holding, face: 355 lbs.
    - 2) Screw holding, edge: 300 lbs.
    - 3) Modulus of rupture: 4,500 psi.
    - 4) Modulus of elasticity: 500,000
  - b. No Added Urea-Formaldehyde Resin MDF:
    - 1) VESTA MDF manufactured by Flakeboard, or equal.
  - c. Certification: Meet CPA 3-08 EPPS including the following:
    - 1) Formaldehyde Emission Requirements: ANSI A208.2, Table A and HUD 24 CFR Part 3280.308.
    - 2) Recycled Content: 100 percent pre-consumer recycled/recovered wood content.

D. Fastening Materials

1. General: Furnish fastening materials of types appropriate for the conditions encountered, including wood to wood, wood to masonry or concrete and wood to metal.
2. Nails and Staples: Galvanized carbon steel, conforming to the requirements of Fed. Spec. FF-N-105B.
3. Screws: Galvanized carbon steel conforming to the requirements of Fed. Spec. FF-S-107C and natural bright finish carbon steel conforming to the requirements of Fed. Spec. FF-S-111C.
4. Bolts, Washers, Expansion Shields, and Nuts: Zinc-coated carbon steel, conforming to the requirements of Fed. Spec. FF-B-561C, FF-B-575C, FF-W-92A, FF-B-588C and FF-N-836D.
5. Adhesives: Aliphatic or phenolic-resin wood glue recommended for general carpentry use.
  - a. VOC Limits: Comply with South Coast Air Quality Management District requirements for VOC limits in adhesives. For finish mill work adhesive maximum VOC content is 30 grams/liter. For contact adhesive the limit is 250 grams/liter.

E. Plastic Laminate

1. Plastic Laminate: Provide high pressure plastic laminate consisting of melamine-impregnated surface papers laminated over phenolic-impregnated kraft layers under high pressure and heat, as manufactured by Formica, Nevamar, or Wilsonart, and conforming to National Electrical Manufacturers Association (NEMA) Publication No. LD3, with low gloss finish, in colors, patterns, and textures as selected, per approved samples. Provide the following types:
  - a. Use NEMA LD-3, Standard Grade GP50, nominal .050 inch thick plastic laminate for straight horizontal and vertical surfaces.
  - b. Use NEMA LD-3, Grade GP28 or PF30, nominal .030 inch thick plastic laminate as a backer sheet on underside and back of countertops.
  - c. Use NEMA LD-3, Postforming Grade PF42, nominal .042 inch thick plastic laminate for forming over curved or rounded shapes.
2. Material is to be Greenguard Indoor Air Quality Certified by the Greenguard Environmental Institute under the Greenguard Standard for low Emitting Products.
3. Match the plastic laminates indicated in Specification Section 09 06 00 – Schedule For Finishes:
  - a. Design Standard: Formica
  - b. Other acceptable manufacturers:
    - 1) Wilsonart
    - 2) Nevamar.

4. Adhesive: Water resistant, in accordance with AWI recommendations, and as recommended by plastic laminate manufacturer.
  - a. Comply with VOC limitations of project as indicated in Division 1.
5. Back Painting: Apply one coat of primer-sealer paint in the shop, on all wood surfaces and edges not covered with plastic laminate backer sheet, and that will be concealed in the finished work.
  - a. See Painting – Division 9 for acceptable paint manufacturers and types.
6. Cabinetry Door, Countertop and Drawer Edges: Three millimeter thick PVC, Solid, high impact, purified, color-thru, acid resistant, PVC edging machine-applied with hot melt adhesives. Machine profile all edges and outside corners exposed to view to a 1/8 inch radius.
  - a. Color to match surface laminate

F. Plastic Laminate Panels:

1. Unless otherwise noted, construct panels of plywood or medium density fiber board as detailed, with back and end splashes where shown, complete with supports, with all exposed surfaces (including exposed supports) and edges surfaced with plastic laminate of colors and patterns selected for each panel.
  - a. AWI Quality Grade: Premium.
  - b. All Exposed Surfaces: Plastic laminate, when PLAM indicated.

H. Cabinet Work

1. Cabinets: Provide constructed of plywood with all exposed surfaces and edges surfaced with plastic laminate.
  - a. AWI Quality Grade: Premium
  - b. Wall and Base Cabinet Construction: AWI Flush Overlay design, with cabinet interior finished with plastic laminate backer sheet.
2. Cabinet Hardware: Furnish and install all cabinet hardware:
  - a. Pulls: Provide standard aluminum pulls for all cabinets, with clear anodized finish. Provide wire pulls with 4 inches centerline to centerline of tapped threaded attachment holes.
    - 1) Stanley “4484” Satin Aluminum Finish, or equal.
  - b. Door Catch: Engineered Products Co. “No. 1000 Magnetic Catch”, or equal.
  - c. Door Hinges:
    - 1) Type 1: Stanley “HT1592” type with hospital tip, or equal; provide 2 per door; US26D finish.
  - d. Adjustable Shelf Standards and Clips: Similar to Knape & Vogt “255NP Standards and 256NP Support Clips” or Grant “120 and 121”.
  - e. Drawer Slides: Knape & Vogt “1300” or Grant “300”, or equal.
3. Provide dust panels of 1/4 inch plywood or tempered hardboard above compartments and drawers except where located directly under tops.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

#### A. General Millwork

1. Provide all wood blocking and framing required to support items of finish carpentry. Use fastening materials of types appropriate for the conditions encountered, including wood to wood, wood to masonry, and wood to metal stud framing. Counterbore holes for nuts and bolt heads, and countersink for screws. Use concealed fasteners in exposed surfaces of finish carpentry.
2. Before installing finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.
3. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements. Do not use manufactured units with defective surfaces, sizes, or patterns.
4. Furnish millwork in configurations shown and specified. AWI grading will take precedence over joiner details shown on Drawings. Provide tight joints. Miter exterior angles, cope interior angles and returns of trim moldings. Provide blind nailing where practicable. Secure work with finishing nails or screws and glue. Install trim in maximum practical lengths.
5. On surfaces exposed to view, set all nail heads and spackle. Countersink all screw heads and cover with neatly fitted wood plugs to match grain. Sand in accordance with AWI grading. Fit and scribe all work to walls or other finished work in a careful manner, so as not to injure the surface in any way.

#### B. Plastic Laminate Work

1. Install support framing for countertops not set on base cabinets and anchor to adjacent construction; install countertops on supports and secure thereto, in accordance with reviewed shop drawings.
2. Install base cabinet for counter and anchor to adjacent construction. Make all cut-outs in counter.
3. Carefully install all plastic laminate items complete in-place, including all incidental items not specifically noted elsewhere, properly aligned, set plumb and rigidly secured.
4. Provide adjustments, closures, etc., as may be necessary to close to adjacent items and construction.
5. Scribe and closely fit all items to adjacent work.
6. Provide backing, grounds, anchors, bolts, fasteners, etc., necessary for securing work in place. Set all work level and plumb, securely anchored in place.
7. Anchor cabinets to floor and walls from inside the cabinets; at stud walls, secure cabinets through the wall finish into the studs behind same.



8. Seal joints at adjacent work with sealant specified in Section 07 92 00.
9. Paint all visible surfaces in plastic laminate work, other than finish plastic laminate itself, such as recesses, reveals, visible rough hardware, etc. Paint to match color of adjacent plastic laminate.

C. Cabinets

1. Install without distortion so that doors and drawers fit openings properly and are accurately aligned.
2. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
3. Complete the installation of hardware and accessory items as indicated.
4. Maintain veneer sequence matching (if any) of cabinets with transparent finish.

D. Temporary Ventilation: During and immediately after installation of engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

E. Waste Management:

1. Select lumber sizes to minimize waste; reuse scrap lumber to the greatest extent possible. Clearly separate scrap lumber for use on site as accessory components, including: shims, bracing and blocking.
2. Do not leave any wood, shavings, sawdust, etc., on the ground or buried in fill. Prevent sawdust and wood shavings from entering the storm drainage system.

F. Clean up:

1. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.
2. Clean up and dispose of all waste material and refuse that has been brought onto the job or that has accumulated as a result of the work. Leave the work broom clean or better.
3. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and show no evidence of repair or refinishing. Adjust joinery for uniform appearance.
4. Touch up any damaged finishes to restore to new matching adjacent areas.

### 3.02 PROTECTION

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensures that woodwork is being without damage or deterioration at time of Substantial Completion

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 07 21 00

### THERMAL INSULATION

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Thermal Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.
- B. Sound Attenuation Batt insulation.

##### 1.02 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealers: for acoustical sealants
- B. Section 09 22 16 – Gypsum Board Assemblies.
- C. Section 13 34 19 – Metal Building Systems.

##### 1.03 REFERENCES

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; Latest edition.
- B. ASTM D1621 - Standard Test method for Compressive Properties of Rigid, Cellular Plastics; Latest edition.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; Latest edition.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; Latest edition.
- E. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials; Latest edition.
- F. ASTM E 136 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.
- G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; Latest edition.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Latest edition.
- I. C423 Test Method for Sound Absorption Coefficient by the Reverberation Room Method; Latest edition.

- J. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

#### 1.04 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations. Include data on all accessories, including sealants and adhesives.
- B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

#### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

#### 1.06 SEQUENCING

- A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

### PART 2 - PRODUCTS

#### 2.01 BATT INSULATION MATERIALS

- A. Unfaced Thermal Batt Insulation: ASTM C 665, Type I, and ASTM E 136; preformed glass fiber batt; friction fit, conforming to the following:
  - 1. Facing: Unfaced.
  - 2. Manufacturers:
    - a. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
    - b. Johns Manville International, Inc: [www.johnsmanville.com](http://www.johnsmanville.com).
    - c. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
  - 3. Flame Spread: 10 or less.
  - 4. Smoke Developed Index: 10 or less per ASTM E-84 or UL 723.
  - 5. FM Class 1 materials.
  - 6. FM Approved, where an approval of this type of product exists for this specific application.
- D. Sound Attenuation Batt Insulation: ASTM C665, Type I; ASTM E136; preformed glass fiber batt; friction fit, conforming to the following:
  - 1. Facing: Unfaced.
  - 2. Manufacturers:
    - a. CertainTeed Corporation.
    - b. Johns Manville International, Inc.
    - c. Owens Corning Corporation

3. Flame Spread: 10 or less.
4. Smoke Developed: 10 or less.
5. FM Class 1 Materials.

## 2.02 BOARD INSULATION MATERIALS – NOT USED

## 2.03 ACCESSORIES

- A. Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch wide.
- B. Adhesive: Type recommended by insulation manufacturer for application. Products must comply with Data:
  1. VOC emission limits: Interior Architectural Adhesives are to comply with Bay Area Resources Board Reg. 8, Rule 51.
  2. VOC limit for adhesives: 250 grams/liter.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### 3.02 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Kraft and standard foil facings will burn and must not be left exposed. The facing must be installed in substantial contact with the unexposed surface of the ceiling, wall or floor finish. Protect facing from any open flame or heat source.
- C. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- E. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- F. Coordinate installation with weather barrier installation and support banding.

3.03 INSULATION BOARDS – NOT USED

3.04 PROTECTION OF FINISHED WORK

- A. Do not permit installed insulation to be damaged prior to its concealment.

3.05 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

## SECTION 07 62 00

### SHEET METAL FLASHING AND TRIM

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and associated items.

##### 1.02 REFERENCES

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. ASTM A 653/A 653M – 11 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. AAMA 620- Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Coil Coated Architectural Aluminum.
- E. AAMA 621- Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- F. ASTM B 32 - Standard Specification for Solder Metal.
- G. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- H. ASTM B 209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
- I. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- J. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; Seventh Edition 2012.

##### 1.03 SUBMITTALS

- A. Shop Drawings: Indicate metal edge system with accessories and components in plan view, sections, and details. Include metal thicknesses and finishes, section lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work.

- B. Product Data.
- C. Samples: Submit sample of metal edge section, at least 12 inches (305 mm) long showing profile with anchoring device(s). Samples of prefinished metal in full range of manufacturer's standard colors.

#### 1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials which may cause discoloration or staining.

### PART 2 - PRODUCTS

#### 2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch (0.6 mm) thick base metal, but not less than gauge indicated.
- B. Galvanized Steel Sheet conforming to ASTM A 526, commercial quality, G90 hot-dip galvanized.
- C. Galvalume coated steel conforming to ASTM A 792 (A 792M) Grade 50B (345B) with an AZ50 (AZ150) coating when painted or AZ55 (AZ165) when unpainted.
- D. Pre-finished Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch (0.6 mm) thick base metal, but not less than gauge indicated.
  - 1. Finish: PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 621; multiple-coat, thermally-cured, fluoropolymer finish system, minimum system thickness 1.0 mil. containing 70 percent "Kynar 500" or "Hylar 5000" resin finish over epoxy primer. Provide manufacturer's standard prime coat on underside.
    - a. Color: As indicated, or, if not indicated, as selected by Architect from manufacturer's full range of standard colors.
  - 2. Provide strippable plastic protective film on prefinished surface.



3. Coating applicator shall warrant that the coatings applied will meet specified requirements for color retention, gloss retention, and film adhesion for a period of ten (10) years from date of substantial completion.
  4. Gauge as indicated on drawings.
- E. Pre-finished Galvanized Steel Sheet: Coil coated, commercial quality steel sheet, ASTM A 526 or ASTM A 527, G90 hot-dip galvanized, minimum 0.02 inch (0.6 mm) thick base metal, but not less than gauge indicated.
1. Finish: PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 621; multiple-coat, thermally-cured, fluoropolymer finish system; minimum system thickness 1.0 mil. containing 70 percent "Kynar 500" or "Hylar 5000" resin finish over epoxy primer. Provide manufacturer's standard prime coat on underside.
    - a. Color: As indicated, or, if not indicated, as selected by Architect from manufacturer's full range of standard colors.
  2. Provide strippable plastic protective film on prefinished surface.
  3. Coating applicator shall warrant that the coatings applied will meet specified requirements for color retention, gloss retention, and film adhesion for a period of ten (10) years from date of substantial completion.
  4. Manufacturer: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    - a. MM Systems Corporation.
    - b. Petersen Aluminum Corporation.
    - c. Vincent Metals Division/Rio Algom, Inc.
    - d. Other manufacturers meeting the requirements of this specification.
  5. Gauge as indicated on drawings.
- F. Pre-Finished Aluminum: ASTM B 209 (ASTM B 209M); 0.032 inch (0.8 mm) thick but not less than gauge indicated.; plain finish shop pre-coated with fluoropolymer coating of color as selected.
1. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally-cured, fluoropolymer finish system; minimum system thickness 1.0 mil. containing 70 percent "Kynar 500" or "Hylar 5000" resin finish over epoxy primer. Provide manufacturer's standard prime coat on underside;
  2. Color: As indicated, or, if not indicated, as selected by Architect from manufacturer's full range of standard colors.
  3. Coating applicator shall warrant that the coatings applied will meet specified requirements for color retention, gloss retention, and film adhesion for a period of twenty (20) years from date of substantial completion.
  4. Gauge as indicated on drawings.

5. Manufacturer: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
  - a. MM Systems Corporation.
  - b. Petersen Aluminum Corporation.
  - c. Vincent Metals Division/Rio Algom, Inc.
  - d. Other manufacturers meeting the requirements of this specification.

## 2.02 ACCESSORIES

- A. Splash Blocks: Where indicated provide and install concrete splash blocks under each downspout that is not tied into underground drainage system.
- B. Nails, Rivets, and Fasteners: Use only soft iron rivets having rust-resistive coating, galvanized nails, and cadmium plated screws and washers in connection with galvanized iron and steel. Use stainless steel nails and fasteners at pressure treated lumber.
- C. Match finish and color of exposed fastener heads to finish and color of sheet material being fastened
- D. Primer: Zinc chromate type.
- E. Protective Backing Paint: Zinc molybdate alkyd.
- F. Bituminous Coating: Heavy bodied, sulfur-free, asphalt-based paint; FS TT-C-494.
- G. Sealant: Two-component noncorrosive epoxy adhesive, recommended by metal manufacturer for sealing of non-moving joints.
- H. Plastic Cement: ASTM D 4586, Type I.
- I. Solder: ASTM B 32; Sn50 (50/50) type.

## 2.03 FABRICATION

- A. Fabricate sheet metal using sheet metal thicknesses indicated on the drawings or schedules.
- B. Form sheet metal to match profiles indicated, substantially free from oil-canning, fish-mouths, and other defects.
- C. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- D. Form pieces in longest possible lengths allowing for thermal expansion of exposed sheet metal work exceeding 15 feet running length.
  1. Flashing and trim: Provide movement joints at maximum spacing of 10 feet; no joints allowed within 2 feet of corner or intersection.
  2. Joints: Lapped minimum 3-1/2-inches.

- 3. Splice plates, concealed, .020" minimum prefinished to match the finish of the coping material, minimum 6" width, for concealed installation.
- E. Conceal fasteners and expansion provisions wherever possible.
  - 1. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- F. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- G. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.
- I. Where indicated, fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- J. 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. Gauge: As recommended by SMACNA or metal manufacturer for application, but in no case less than gage of metal being secured.
- K. Comply with SMACNA "Architectural Sheet Metal Manual" for applications indicated.
- F.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

### 3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).
- C. Isolate dissimilar metals by means of a heavy bituminous coating, approved paint coating, adhered polyethylene sheet, or other means approved by the architect.

### 3.03 INSTALLATION

- A. General: Except as indicated otherwise, comply with sheet metal manufacturer's installation instructions and recommendations in the SMACNA "Architectural Sheet Metal Manual.
- B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- E. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglet or receiver of other sheet metal fabrication. 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.

END OF SECTION

## SECTION 07 92 00

### JOINT SEALERS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Exterior weather seal in vertical walls.
- B. Internal component seals relied on to manage infiltrated water.
- C. Interior seals at perimeter of window systems.
- D. Interior acoustical sealants.
- E. Exterior weather seal in pavements - non-traffic.
- F. Structural silicone seal/adhesive applications.
- G. Sealant backers required for proper joint configuration and as bond breaker.

##### 1.02 REFERENCES (LATEST EDITION)

- A. American Society for Testing and Material (ASTM):
  - 1. C719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement.
  - 2. C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
  - 3. C920 Standard Specification for Elastomeric Joint Sealants.
  - 4. C1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants.
  - 5. C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
  - 6. C1193 Standard Guide for Use of Joint Sealants.
- B. Flat Glass Marketing Association (FGMA)
  - 1. Glazing Manual.
  - 2. Sealant Manual.

##### 1.03 PERFORMANCE REQUIREMENTS

- A. Conformance with the requirements of this Article shall be demonstrated, where applicable, by submitting appropriate manufacturer's test reports, product technical data, and certification letters.
- B. Sealed Joint Design:
  - 1. Design and install joint widths to accommodate expected movements, without failure of joint sealant.

2. In no case shall a sealed joint, susceptible to movement, be installed at less than 1/4" (6mm).
  3. Sealant and backer shall be installed of proper configuration to maximize compression/extension of sealant capability and to minimize stress at bond line on substrates.
  4. Elastomeric joint sealants: Sealants that provide and maintain watertight and airtight joints and seals without the deterioration and staining of adjacent materials.
  5. Interior joint sealants and caulks: Sealants and caulks that provide and maintain watertight and airtight joints and seals without the deterioration and staining of adjacent materials.
- C. Adhesion:
1. When tested in conformance to ASTM C794, joint sealant shall not fail in adhesion.
- D. Compatibility:
1. When tested in conformance to ASTM C1087, sealants shall be shown to be compatible with project materials coming in contact with the sealant such as backers, gaskets, and setting blocks.
- E. Staining:
1. When tested in conformance to ASTM C1248, porous substrates shall show no permanent staining.
- F. Sound Control:
1. Acoustical sealants shall be installed per manufacturer's written recommendations published in their literature and drawing details.

#### 1.04 SUBMITTALS

- A. Product Data:
1. Submit manufacturer's published product data sheets for confirmation of intent of products to be provided on project.
  2. Include color charts for manufacturer's full range of color options, including both standard and special order.

#### 1.05 QUALITY ASSURANCE

- A. Qualifications:
1. Installer shall be able to demonstrate not less than five (5) years successful experience in the installation of comparable projects.
  2. Employ craftsmen who are thoroughly skilled and completely familiar with the specified requirements. Provide the services of a competent foreman or

supervisor who shall be available at all times during the progress of the work of this Section.

3. Manufacturer shall be capable of providing the following:
    - a. Field service representation during construction
    - b. Performing laboratory tests as specified herein
    - c. Review and comment of contractor's shop drawings, as requested, relating to sealant details
  4. All sealant for the work of this section shall be provided by one manufacturer.
- B. In addition to manufacturer's recommendations, conform to guidelines of the FGMA Sealant and Glazing Manuals.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store all materials in a manner to prevent damage or deterioration, in conformance with manufacturer's instructions.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Batch numbers and expiration date shall be clearly marked on manufacturer's packaging.
- D. Provide Material Safety Data Sheet for each product.

#### 1.07 SITE CONDITIONS

- A. Do not install sealants or other materials in environmental conditions (temperature, humidity, ventilation, wind) that are beyond the limitations set by the manufacturer.

#### 1.08 WARRANTY

- A. Manufacturer shall warrant for 1 year from date of substantial completion, that the installed sealants will perform as watertight weatherseals and will not change colors when used with back-up materials and substrates that have been approved for compatibility.
- B. Defects may be defined as follows; however, this list is not inclusive of all potential problems:
  1. Adhesive or cohesive failure
  2. Staining of substrates beyond samples as tested for project
  3. Color change of sealants or adjacent materials
  4. Failure of sealant to cure

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

#### A. Acceptable Sealant Manufacturers:

1. Dow Corning Corp.  
1255 Northmeadow Parkway, Suite 104  
Roswell, GA 30076  
(770) 751-7979
2. Pecora Corporation  
165 Wambold Road  
Harleysville, PA 19438  
(800) 523-6688
3. Sonneborn, Division of ChemRex, Inc.  
889 Valley Park Drive  
Shakopee, MN 55379  
(800) 433-9517
4. Tremco  
3735 Green Road  
Beachwood, OH 44122  
(800) 321-7906
5. General Electric Co.  
260 Hudson River Rd.  
Waterford, NY 12188  
(800) 255-8886
6. Polymeric Systems, Inc  
47 Park Avenue  
PO Box 522  
Elverson, PA 19520  
(800) 228-5548
7. Sika Corporation, USA  
201 Polito Avenue  
Lyndhurst, NJ 07071  
(800) 933-7452
8. DAP Products, Inc.  
2400 Boston Street  
Suite 200  
Baltimore, MD 21224  
(800) 543-3840



## 2.02 MATERIALS

- A. VOC emission limits: Interior Architectural Sealants are to comply with Bay Area Resources Board Reg. 8, Rule 51.
  - 1. VOC limit for sealant and caulk: 250 grams/liter.
  - 2. VOC limit for primer on non-porous surfaces: 250 grams/liter.
  - 3. VOC limit for primer on porous surfaces: 775 grams/liter.
- B. Toxicity Compliance:
  - 1. Comply with Bay Area Resources Board requirements to limit use of toxic substances. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium, and their components are not permitted.
- C. Materials, General:
  - 1. Provide joint sealants that are compatible with backing material, accessories, substrates and adjacent sealants for the intended uses based on the testing, recommendations experience and written instructions of the sealant manufacturer.
  - 2. Colors for Exposed Joint Sealants: Provide joint sealant colors as selected by the Architect-Engineer from the manufacturer's full range of colors to match adjoining materials.
- D. Sealant Compound:
  - 1. Two-Part Polysulfide Sealant: ASTM C920, Type M, Grade NS, Class 25, Use T, NT, M, A, G, and O as appropriate. Furnish in standard colors as selected.
    - a. Polymeric Systems, Inc. Polysulfide PSI-350 Sealant. (96 VOC)
    - b. Sonneborn, Division of ChemRex, Inc. "Sonolastic Two Part" (100 VOC)
  - 2. One-Part Polysulfide Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, G and O as appropriate. Furnish in standard colors as selected.
    - a. Polymeric Systems, Inc. "PSI-7000 Polysulfide Rubber". (36 VOC)
    - b. W.R. Meadows Inc., "Deck-O-Seal One Step". (Verify less than 250 VOC)
  - 3. Multi-Part Polyurethane Sealant: ASTM C920, Type M, Grade NS, Class 25, Use T, NT, M, G, A, and O as appropriate. Furnish in standard colors as selected.
    - a. Pecora Corp. "Dynatrol II Sealant" (14 VOC)
    - b. Polymeric Systems, Inc. "270 Multi-Component Urethane". (96 VOC)
    - c. Tremco "Dymeric" or "Dymeric 240 FC" (Verify less than 250 VOC)
    - d. Sika "Sikaflex 2CNS". (Verify less than 250 VOC)

4. One-Part Polyurethane Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O as appropriate. Furnish in standard colors as selected.
  - a. Pecora Corp. "Dynatrol 1". (Verify less than 250 VOC)
  - b. Polymeric Systems, Inc. "PSI-901/RC-1 One Part Urethane". (35 VOC)
  - c. Sonneborn, Division of ChemRex, Inc. "Sonolastic TXI" (36 VOC)
  - d. Sika "Sikaflex 1A". (Verify less than 250 VOC)
  - e. Sika "Sikaflex 15LM". (Verify less than 250 VOC)
5. One-Part Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O as appropriate. Furnish in standard colors as selected.
  - a. Dow Corning Corp. "795 Building Sealant" (43 VOC)
  - b. General Electric Silicone Products Department "Silpruf Sealant" (Verify less than 250 VOC)
  - c. Pecora Corp. "864 Silicone Sealant" (12 VOC)
  - d. Tremco "Spectrem 1" (Verify less than 250 VOC)
6. One-Part Mildew-Resistant Silicone Sealant: Mildew-resistant formulation; ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, and O. Furnish in standard colors as selected. Use to seal joints in damp areas such as around ceramic tile, showers, tubs, sinks and other plumbing fixtures.
  - a. Dow Corning Corp. "786 Mildew Resistant Sealant". (Verify less than 250 VOC)
  - b. General Electric Silicone Products Department "Sanitary 1700 Sealant"
  - c. Pecora Corp. "898 Silicone". (12 VOC)
7. Chemical Resistant Sealant:
  - a. Pecora Corp. "GC-2 Synthacaulk". (Verify less than 250 VOC)
8. High-Performance General-Purpose Exterior (Nontraffic) Sealant.
  - a. Material: Silicone or Polyurethane.
  - b. Comply with ASTM C920, Grade NS, Class 25, Uses M, G, and A.
  - c. Type: Single- or multiple-component.
  - d. Color: Standard; match finished surfaces.
  - e. Applications:
    - a) Control, expansion, and soft joints in masonry.
    - b) Joints between concrete and other materials.
    - c) Other exterior nontraffic joints for which no other sealant is indicated.

E. Caulking Compound:

1. Acrylic Latex Caulk: Non-sag, 1-part latex base caulk, per ASTM C834 Furnish in standard colors as selected.
  - a. DAP Inc. "ALEX Acrylic Latex Caulk" (Verify less than 250 VOC)
  - b. Pecora Corp. "AC-20 Acrylic Latex Caulk" (31 VOC)
  - c. Sonneborn "Sonolac" (180 VOC)
  - d. Tremco "Acrylic Latex Caulk Tremflex 834" (Verify less than 250 VOC)

F. Sealant Backers

1. Provide backers complying with ASTM C1330 Type C of size and density to control sealant. Round, solid section, skinned surfaced, soft foam gasket as recommended by sealant manufacturer and as passed on project compatibility tests. Closed cell gassing rods are not acceptable.
2. Provide sufficient sizes and diameters of backers to accommodate varying joint widths on project, such that backers are compressed about 25% for all installations.
3. Exterior Joint Backing:
  - a. Description: Round foam rod, compatible with sealant.
  - b. Comply with ASTM D1056, sponge or expanded rubber.
  - c. Size: Oversized 30 to 50 percent larger than joint width.

G. Primers, Cleaning, Masking Supplies

1. Provide primer for specific sealant/substrate conditions as recommended by sealant manufacturer and as determined by project sample testing.
2. Provide solvents, cloths, and other supplies as recommended or acceptable by sealant manufacturer for proper joint preparation.
3. Do not use solvents that are harmful to paint finishes or other components that will be contacted.
4. Masking tape shall not leave residue when removed.

H. Bond Breaker Tape

1. Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant bond that would result in joint failure.

I. Expansion Joint Filler

1. Provide preformed expanding foam tape sealant at joints identified as building expansion joints.
2. Foam is to be open-cell polyurethane with water-based stabilized acrylics.
3. Provide in precompressed reel forms with self-adhesive backing for use in preformed joints.
4. Install in strict accordance with manufacturer's instructions.

J. Exterior Compressible Gasket Expansion Joint Sealer

1. Description: Hollow neoprene (polychloroprene) compression gasket.
2. Comply with ASTM D2628.
3. Color: Black.
4. Size and Shape: As indicated on Drawings.
5. Applications: Exterior wall and parking area expansion joints.

K. Acoustical Sealants

1. Acoustic Sealant for Exposed and Concealed Joints and annular spaces around through-penetrations: Provide manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834, ASTM C919 and the following:
  - a. Sealant effectively reduces airborne sound transmission through head-of-wall and bottom-of-wall joints and openings to accommodate through-penetrations in building construction as demonstrated by testing representative assemblies in accordance with ASTM E90.
  - b. Acoustical Sealant to maintain STC ratings at sound rated partitions as indicated on the drawings.
  - c. Sealant has flame-spread and smoke-developed ratings of less than 25 as tested in accordance with ASTM E84.
  - d. Sealant is mold and mildew resistant per ASTM G21 with a rating of zero (0), "no growth".
  - e. Sealant has movement capability of minimum 12.5% in accordance with ISO 11600.
  - f. Latex sealant according to ASTM C 834 class OP -18°C with shrinkage according to ASTM C 1241 < 25 % C.
  - g. Proposed acoustic sealant materials and methods shall conform to applicable governing codes having local jurisdiction.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Before commencing sealant installation in any assigned area, examine substrates' condition and joint width which may affect sealed joint performance. Correct deficiencies before proceeding.
- B. Compare shop drawings with actual conditions. Advise Architect of discrepancies.
- C. Coordinate interior application of joint sealants with interior finishes schedule.

3.02 PREPARATION

- A. Cleaning
  1. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.
  2. Clean joint surfaces just prior to sealant installation to remove all laitance and surface dirt.
    - a. Non-porous substrates shall be cleaned with a solvent as recommended or acceptable by sealant manufacturer, and as required depending upon contaminants to be removed. Use "two-cloth" cleaning method as described herein.

- b. Porous substrates shall be cleaned by dusting or solvent, or both as dictated by field testing and as recommended or acceptable to sealant manufacturer. Abrasion cleaning may be required to remove surface treatments or coatings.
  - 3. “Two-Cloth” Cleaning Method
    - a. Use clean, soft, absorbent, lint-free cloths. This method consists of a solvent cloth wipe followed by a dry cloth wipe.
    - b. Thoroughly clean all surfaces of loose debris.
    - c. Pour or dispense acceptable cleaning solvent onto the cloth. A plastic squeeze bottle works best for organic cleaning solvents. Do not dip cloth into solvent container, as this will contaminate the cleaning agent.
    - d. Wipe vigorously to remove surface contaminants. Rotate the cloth to clean area before re-wiping.
    - e. Immediately wipe the cleaned area with a separate clean, dry cloth. Organic solvent must be removed with the dry cloth before the solvent evaporates.
- B. Indoor Air Quality:
  - 1. Temporary ventilation: Provide temporary ventilation during work of this Section.
- C. Priming
  - 1. If primer is required per project substrate adhesion testing, mask adjacent surfaces where aesthetics is a consideration to keep excess primer or sealant off these surfaces.
  - 2. Apply primer (if required) to cleaned, dry substrates using a clean, dry cloth or brush. Do not apply too thick of coat. A white, powdery film will form if primer has been applied too thick. Remove excess primer with clean cloth.
  - 3. Allow primer to dry until all solvent is evaporated; this may take 5 to 30 minutes, depending on weather conditions.
  - 4. After inspecting for dryness, the joint is ready for backer and sealant installation. Sealant must be installed same day as joint preparation.

### 3.03 INSTALLATION

- A. Comply with the requirements of ASTM C1193 for proper sealant and backer installation.
- B. Sealant Backers
  - 1. Install proper diameter or size backer to depth in joint to develop a proper sealant bead configuration.
  - 2. Do not stretch, twist, or puncture sealant backers.
  - 3. If backers become wet due to exposure, remove and replace with dry material.

4. Install bond breaker tape where required to prevent three-sided adhesion in moving joints.
- C. Installation of Sealants
1. Completely fill voids in joints to ensure full adhesion and proper joint profile.
  2. Tool sealant concave, pushing sealant into void. Do not wet tooling aids as this may interfere with sealant cure and adhesion.

### 3.04 FIELD QUALITY CONTROL

- A. Do not allow excess sealant to contact adjacent surfaces if aesthetics is a consideration. However, should this occur, remove immediately by method of solvent, abrasion, or both as applicable. Solvents will not fully remove sealants or primers from porous surfaces.
- B. Remove masking tape before sealant cures.
- C. Dispose of all trash and solvent wipe rags in non-combustible containers.

### 3.05 PROTECTION

- A. Protect the installed sealants from damage or contamination during course of construction.

END OF SECTION

## SECTION 08 11 14

### METAL DOORS AND FRAMES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Hollow Metal Steel Doors and frames.

##### 1.02 RELATED SECTIONS

- A. See 08 91 00 Louvers and Blank-Off Panels for sidelight infill panels.

##### 1.03 REFERENCES

- A. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; Latest edition.
- B. ANSI A250.11 - Recommended Erection Instructions for Steel Frames; Latest edition.
- C. ASTM A 366/A 366M - Standard Specification for Commercial Steel (CS) Sheet, Carbon, (0.15 Maximum Percent) Cold-Rolled; Latest edition.
- D. ASTM A 569/A 569M - Standard Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial; Latest edition..
- E. ASTM A 591/A 591M - Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Applications; Latest edition..
- F. ASTM A 620/A 620M - Standard Specification for Drawing Steel (DS), Sheet, Carbon, Cold-Rolled; Latest edition..
- G. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; Latest edition..
- H. DHI A115.1G - Installation Guide for Doors and Hardware; Door and Hardware Institute; Latest edition..
- I. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; Latest edition.
- J. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; Latest edition..
- K. SDI 111 - Recommended Standard Details for Steel Doors & Frames; Steel Door Institute; Latest edition..

- L. SDI 113 - Test Procedure and Acceptance Criteria for Apparent Thermal Performance of Steel Door and Frame Assemblies; Steel Door Institute; Latest edition..
- M. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

#### 1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard details and catalog data demonstrating compliance with referenced standards; installation instructions.
- B. Certificates:
  - 1. Provide manufacturer's certification that products comply with referenced standards.
  - 2. Provide evidence of manufacturer's membership in the Steel Door Institute.
- C. Shop Drawings: Submit for approval of the following:
  - 1. Shop drawings showing all openings in the door schedule and/ or drawings; provide details of door design, door construction and methods of assembling sections, hardware locations, anchorage and fastening methods, door frame types, and finish requirements.
  - 2. Shop drawings shall use and reference the door and frame identification as found on the Architect's plans.
- D. Door, frame, and hardware schedule in accordance with SDI 111.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all products from a single manufacturer who is a member of the Steel Door Institute.
- B. Fire-rated Assemblies: Manufactured in accordance with Underwriter's Laboratories Inc. and bearing their label.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Upon delivery, inspect all materials for damage; notify shipper and supplier if damage is found.
- B. Protect products from moisture, construction traffic, and damage.
- C. Store vertically under cover. Do not use non-vented plastic or canvas shelters. Should wrappers become wet, remove immediately.
- D. Place units on 4 inch high wood sills or in a manner that will prevent rust or damage. Provide 1/4 inch space between doors to promote air circulation.



## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Acceptable Manufacturers: One of the following:

1. Amweld Building Products, Inc.
2. Ceco Door Products.
3. Curries Company.
4. Republic Builders Products.
5. Steelcraft.

### 2.02 MATERIALS

A. Steel Sheet for Doors and Frames and Panels:

1. Cold rolled steel: ASTM A 366/A 366M or ASTM A 620/A 620M.
2. Hot rolled steel: Pickled and oiled, ASTM A 569/A 569M, Type B.
3. Galvanized steel: Hot-dipped, ASTM A 653/A 653M, with G60/Z180 or A40/ZF120 coating, minimum.

B. Steel Sheet for Anchors and Accessories: Electrolytically deposited zinc coated steel; ASTM A 591/A 591M, coating 40Z (12G), minimum.

### 2.03 DOORS AND FRAMES

A. Comply with ANSI A250.8.

B. Fire-Rated Openings: Comply with NFPA 80; UL or ITS (Warnock Hersey) listed.

1. Affix permanent labels attesting to fire resistance.
2. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 30 minutes of exposure.
3. Provide manufacturer's certificate that oversized openings have been constructed in accordance with all other applicable requirements for labeled door construction.

C. Exterior Doors:

1. Level 3, Model 1 (extra heavy-duty, full flush design), with 14 gage frames.
2. Provide insulated construction with U-value of at least 0.15 when tested in accordance with SDI 113.
3. Provide manufacturer's standard foam insulated core, subject to compliance with requirements.
4. Provide top edge closed flush and sealed.

- 5. Steel stiffened grid core and stile and rail units are exempt from thermal rating requirements.
- D. Full Flush Doors: Use only honeycomb cores.
  - 1. Exception: Fire-rated doors; cores in accordance with listed construction.
  - 2. Exception: Exterior doors; cores as specified.
- E. Interior Doors: Grade II, Model 1 (heavy-duty, full flush design), with 16 gage frames.
- F. Exterior Frames: Provide welded unit type frames.
- G. Interior Frames: Provide welded unit frames, unless otherwise indicated .
- H. Galvanizing: Provide units of galvanized steel at exterior openings.
- I. Glazed Lights: Provide glazing stops and beads for indicated lights.
- J. Louvers: Provide inverted louvers in accordance with SDI 111C where indicated.
  - 1. Fixed Louvers: Inverted "V" blade, light proof, interior doors to have wood louvers finished to match door. Insect screens at all exterior door louvers.
  - 2. Fusible Link Operated Louvers: Provide at fire-rated doors scheduled for louvers.
- K. Prepare doors and frames, complete with internal reinforcements, using designated templates, to receive required finish hardware.
- L. Finishing: Provide factory-primed units for field finishing.
  - 1. Prime finish must comply with project limitations for volatile organic compounds (VOC) specified in Section 01 61 16 – VOC Content Restrictions.
  - 2. VOC Limitations only apply once the specified products are placed within the building envelope.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that project conditions are suitable before beginning installation of frames.
  - 1. For wrap-around frames, verify that completed openings are of correct size and thickness.
  - 2. For butt type frames, verify that completed openings are of correct size.
- B. Correct unsatisfactory condition before proceeding with installation.

### 3.02 INSTALLATION

- A. Install frames plumb, level, rigid, and in true alignment as recommended in ANSI A250.11 and DHI A115.1G.
- B. Install doors plumb and in true alignment and fasten to achieve the maximum operational effectiveness and appearance of the unit. Maintain clearances specified in ANSI A250.8 and NFPA 80 whichever is more restrictive.
- C. Fill welded frames in masonry construction with mortar as masonry is laid-up.
  - 1. Mix grout to provide 4 inch maximum consistency and hand trowel into place.
  - 2. Do not use grout mixed to thin "pumpable" consistency.
- D. Install doors plumb and in true alignment and fasten to achieve the maximum operational effectiveness and appearance of the unit. Maintain clearances specified. Shim as indicated in DHI A115.1G and SDI 122.

### 3.03 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled or damaged surfaces. Remove scraps and debris, and leave site and a clean condition.
- C. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 08 36 12

### SECTIONAL METAL OVERHEAD DOORS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Overhead Sectional Doors.
- B. Electric Operators and Controls.
- C. Operating Hardware Tracks and Support.
- D. All other materials, equipment, and labor needed for a complete and proper installation

##### 1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workman who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance for the work of this section.
- B. All materials and products for a complete door system shall be provided by the same manufacturer or supplier.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- D. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- E. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

##### 1.03 REFERENCES

- A. ANSI/DASMA 102 American National Standard Specifications for Sectional Overhead Type Doors.
- B. UL 325 2010 Standard Technical Panel (STP)
- C. National Electric Code, NFPA 70

##### 1.04 SUBMITTALS

- A. Submit materials list of the items proposed to be provided under this Section.

- B. Submit manufacturer's specifications with fabrication recommendations.
- C. Submit shop drawings showing layout, dimensions fabrication details, installation, anchorage and interface of the work of this Section with the work of adjacent trades.

#### 1.05 PRODUCT HANDLING

- A. Use extreme care in off-loading materials to prevent splitting, breaking, or any other type of damage.

#### 1.06 WARRANTY

- A. Provide ten-year manufacturer's warranty against face delamination.
- B. Provide 15-month manufacturer's warranty on full assembly.
- C. Provide two-year or 20,000 cycle manufacturer warranty on electric motor.

### PART 2 - PRODUCTS

#### 2.01 DOOR AND OPERATOR MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following:

- A. Overhead Door Corporation.
- B. Haas Door Co.
- C. Clopay Building Products Co.
- D. Raynor Garage Doors.

#### 2.02 INSULATED SECTIONAL OVERHEAD DOORS:

- A. Design Standard: 596 Series Thermacore by Overhead Door Corporation.
- B. Per ANSI/DASMA 102, provide vertical hi-lift sectional overhead doors capable of withstanding the effects of gravity loads and uniform wind-load pressure (velocity pressure) to meet the local building code in effect, acting inward and outward, without evidencing permanent deformation of door components.
- C. Design sectional overhead door components to operate for not less than 50,000 cycles.
- D. Steel Door Sections: Structural-quality carbon-steel sheets complying with ASTM A 653, commercial quality with a minimum yield strength of 33,000 psi and a hot-dipped galvanized.
  - 1. Steel Sheet exterior face: Minimum 20 GA galvanized sheet steel.
  - 2. Steel Sheet interior face: Minimum 26 GA galvanized sheet steel

3. Exterior Section Face: Flat, grooved, ribbed, or fluted, to suit manufacturer's standards.
  4. Fabricate door panels from a single sheet to provide sections not more than 24 inches high and nominally 2 inches deep. Roll horizontal meeting edges to a continuous, interlocking, weathertight seal, with a reinforcing flange return. Reinforce sections with continuous horizontal and diagonal galvanized steel reinforcement, as required to stiffen door and for wind loading, formed to depth, and bolted or welded in place. Provide reinforcement for hardware attachment.
  5. End Stiles: Not less than 16 GA galvanized steel channel, welded in place.
  6. Intermediate Stiles: Not less than 16GA galvanized steel with thermal break, cut to door section profile, spaced at not more than 48 inches o.c., and welded in place.
  7. Bottom Bar: Reinforce bottom section with a continuous channel or angle.
  8. Insulation: Fully encapsulated, rigid, cellular CFC-free and HCFC-free polyurethane, foamed in place to completely fill inner core of section, pressure bonded to face sheets to prevent delamination under wind load and with maximum flame-spread and smoke-developed indices of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely, with no exposed insulation material evident. R-value: Minimum 17.4 / U-value of 0.057
  9. Thermal Break: Provide integral thermal break between interior and exterior steel sheets.
  10. Air Infiltration: 0.08 cfm at 25 mph.
- E. Tracks: Provide manufacturer's steel track system, sized as follows: For all doors, 3", 11GA. Tracks to be designed for lift type indicated and clearances shown, and comply with ASTM A 653, for minimum G60 hot-dipped galvanized zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Provide 10-ball bearing rollers for heavier duty installations. Slot vertical sections of track at 2 inches o.c. for door-drop safety device. Slope tracks at proper angle from vertical or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports. Configure tracks for the following lift type as appropriate to job conditions
- a. Vertical lift clearance with no breakaway.
  - b. Vertical lift clearance with breakaway (if required).
- F. Track Reinforcement and Supports: Steel, complying with ASTM A 36 and ASTM A 123 as required for door size and weight. Support and attach tracks to opening jambs with continuous angle welded to tracks and attached to wall full height of track for no breakaway track. Support horizontal (ceiling) tracks, where occurs, with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks. Provide horizontal lateral support to all break away track portions above door head to prevent racking or separating of track.

- G. Glazing, Provide double-glazed thermal acrylic set into rectangular aluminum sash section in manufacturer's standard size and in arrangement shown. Set glazing in rubber, or neoprene glazing channel to fit standard door panel height.
- H. Weatherstripping: Provide flexible EPDM header seal and jamb weatherstripping and flexible astragal seal on bottom section.
- I. Counterbalance Mechanism: Consisting of adjustable-tension torsion springs, fabricated from oil-tempered-steel wire complying with ASTM A 229, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables, with cable safety factor of at least 5 to 1, wound around cast-aluminum or gray-iron casting grooved cable drums. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft and at intermediate points as required for support. Include cable safety device, spring anchor support bracket, and spring bumper. Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lb/ft.
- J. Finishes: Factory-applied finish to be selected from manufacturer's full range of standard finishes. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- K. Thermoset Finish for Steel and Galvanized Steel: Apply manufacturer's standard baked-on finish consisting of primer and topcoat according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.

#### 2.03 Electric Door Operators:

- A. Unless otherwise scheduled, all doors to be motorized.
- B. Operators are to be by the same manufacturer as the overhead door.
- C. Design Standard: Model RSX by Overhead Door Company.
- D. Mounting: Jackshaft Side at all locations.
- E. Electric Motors: Motor to be continuous duty, UL Listed. Capable of moving door in either direction at not less than 2/3 foot nor more than 1 foot per second.
  - 1. Horsepower Rating: ½ HP
  - 2. Rotary limit switches - synchronized with the door.
  - 3. Adjustable torque limiter clutch.
  - 4. Ball bearing power train.
  - 5. Drum type solenoid actuated brake.
  - 6. Primary reduction by belt. Secondary reduction is by chain and sprocket.
  - 7. Direct coupling to door shaft or with chain and sprocket.



8. Instant reversing continuous duty motor with automatic thermal overload reset.
  9. Heavy duty reversing contactor - electrically and mechanically interlocked.
  10. Power supply: 120V, Single Phase. Coordinate with Electrical Drawings.
  11. Comply with UL 325 -2010 Standard for continuous monitoring of safety devices. Unit is to have identifiable markings to indicate compliance.
  12. Furnish with two or four-wire, self- monitored, bottom, safety, electric, contact sensing edge with reel type connection, capable of stopping and reversing the door upon contact with an obstruction. Comply with UL 325 - 2010.
- F. Operator Control Station: Three push buttons with key, labeled: UP, DOWN, and STOP. NEMA Type 4
1. Enclosure to be NEMA Type 4 for interior, surface mounting, where indicated.
  2. Enclosure to be NEMA Type 4X for exterior, surface mounting, where indicated.
  3. Constant contact open and/or closed.
  4. Prewired for 3-wire radio receiver.
  5. Power supply: 24 VAC.
- G. Accessories: Furnish operator with the following accessories to be provided by the same manufacturer of the operator and door system:
1. Timer to Close Module: Provide auxiliary control inputs, auxiliary safety inputs auxiliary timer hold input, and an automatic door closing feature with a user-selectable time delay.
  2. Monitored Edge Interface Module.
  3. Auxiliary Output Module: Provide plug-in module with additional dry contacts that are microprocessor controlled and capable of being configured using an on-board keypad.

## PART 3 - EXECUTION

### 3.01 EXAMINATION OF CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Do not proceed until unsatisfactory conditions are corrected.
- C. Verify electrical power is available and of correct characteristics.
- D. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

### 3.02 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

### 3.03 COORDINATION

- A. Coordinate the work of this Section with other trades to assure proper and adequate provision for those trades to interface with this work and schedule this work so as not to delay the installation of other trades.
- B. Program timer control to Owner's specifications.

END OF SECTION

## SECTION 08 41 13

### ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Aluminum storefront framing systems.
- B. Aluminum storefront entrance framing and glazed doors.
- C. Aluminum framed fixed windows.
- D. Aluminum cladding, panels, flashing, hardware and trim integral with storefront system.
- E. Steel and aluminum reinforcement and anchorage of aluminum systems to building structure.
- F. Interfacing with adjacent work to maintain congruent building envelope seal.

##### 1.02 REFERENCES (LATEST EDITION)

- A. Aluminum Association (AA):
  - 1. Aluminum Standards and Data.
  - 2. Standards for Anodized Architectural Aluminum, SAA-46.
- B. American Architectural Manufacturers Association (AAMA):
  - 1. 501 Methods of Test for Exterior Walls.
  - 2. 501.2 Field Check for Metal Curtain Walls for Water Leakage.
  - 3. 603.8 Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
  - 4. 605.2 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 5. 1503.1 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- C. American Iron And Steel Institute (AISI):
  - 1. Steel Products Manual.
- D. American Society Civil Engineers (ASCE):
  - 1. Minimum Design Loads for Buildings and Other Structures.

- E. American Society for Testing and Materials (ASTM)
  - 1. A 36 Specification for Carbon Structural Steel.
  - 2. A 123 Specification for Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
  - 3. A 176 Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip.
  - 4. A 653 Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process.
  - 5. A 666 Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar for Structural.
  - 6. B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 7. B 221 Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 8. E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
  - 9. E 330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  - 10. E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  - 11. E 783 Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Door.
  - 12. E 1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.
- F. American Welding Society
  - 1. D1.1 Structural Welding Code - Steel
  - 2. D1. 2 Structural Welding Code - Aluminum
- G. Consumer Products Safety Commission (CPSC)
  - 1. 16 CFR 1201 Safety Standard for Architectural Glazing Materials
- H. Flat Glass Marketing Association (FGMA)
  - 1. Glazing Manual
  - 2. Sealant Manual

### 1.03 PERFORMANCE REQUIREMENTS

- A. Conformance with the requirements of 1.04 shall be demonstrated, where applicable, by submitting appropriate manufacturer's standard test reports, shop drawings, calculations, and certification letters.

B. Provision for Thermal Movements

1. Framing systems shall be designed and installed to provide for such expansion and contraction of component materials as will be caused by surface temperatures ranging from -20° F to a high temperature of 160° F without causing buckling, undue stress on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance or other detrimental effects. Operating windows and doors shall function normally over this temperature range.

C. Structural Properties

1. Wind loads - Design and install storefront cladding and components to withstand the following minimum windloads acting normal to the plane of the wall, as determined by method acceptable to the authority having jurisdiction and as measured in accordance with ANSI/ASTM E330.
  - a. Typical Positive Design Windload: +30 psf.
  - b. Typical Negative Design Windload: -30 psf.
  - c. Corner Positive Design Windload: +30 psf.
  - d. Corner Negative Design Windload: -30 psf.
2. Deflection Limitations
  - a. The deflection of any framing member in a direction normal to the plane of the wall when subjected to design loads specified in 1.04.C.1, shall not exceed 1/200 of its clear span or 3/4" whichever is less, except that when a plastered surface or drywall subjected to bending is affected, the deflection shall not exceed 1/360 of the span.
  - b. The deflection of a framing member overhanging an anchor point (roof, parapet, other components) shall be limited to 2L/175 where L is the length of the cantilevered member. However, further limitations may be necessary to maintain integrity of interfacing work.
3. Dead Load
  - a. The deflection of any member in a direction parallel to the plane of the wall, when carrying its full dead load, shall not exceed an amount which will reduce the glass bite below 75% of the design dimension and the member shall have a 1/8" minimum clearance between itself and the top of the fixed panel, glass, or other fixed part immediately below. The clearance between the member and an operable window or door shall be at least 1/16".
4. Uniform Structural Loads
  - a. The storefront system shall be designed and installed to withstand the design wind pressures specified under 1.04.C.1 in accordance with ASTM E30.
  - b. The storefront system shall be designed and installed to withstand 1.5 times design pressure without glass breakage, disengagement of any component, yielding of anchors or fasteners, or permanent deformation of main framing members in excess of 0.2% of the clear span.

- 5. Live Loads
    - a. Design and install storefront system to accommodate 3/8" differential live load deflection of floor or other structure to which storefront framing is anchored, without over stressing any component of system. Ability to re-glaze glass must also be maintained.
  - 6. System components must not fail when subjected to simultaneous loads resulting in cumulative movements.
- D. Air Leakage
- 1. Air leakage through the storefront shall not exceed 0.06 cfm per square foot of fixed wall area when tested in accordance with ASTM E 283 at a uniform static air pressure difference of 6.24 psf.
- E. Water Penetration
- 1. Provision shall be made to drain to the exterior face of the wall any water entering the system.
  - 2. No uncontrolled water penetration shall occur when the storefront is tested in accordance with ASTM E 331. The static air pressure difference used in the test shall be not less than 8 psf.
- F. Thermal Performance
- 1. Condensation Resistance
    - a. The fixed light area of the storefront, including glass and metal framing, shall have a condensation resistance factor, CRF, not less than 40 when tested in accordance with AAMA 1503.1.
    - b. The CRF is based on outside design temperature of +20 deg. F, interior air temperature of 68 deg. F., wind velocity of 15 mph, and inside relative humidity of 35%.

#### 1.04 SUBMITTALS

- A. Shop Drawings
- 1. Submit for architectural approval and for coordination with adjacent work.
  - 2. Incorporate all corrections and revisions from review comments, and re-submit for distribution and field use.
  - 3. The following are minimum requirements for final shop drawing approval by Architect. Failure to comply may result in submitted drawings being returned without review, and stamped rejected.
    - a. Scaled Elevations
      - 1) Fully dimensioned
      - 2) Detail references
      - 3) Locations keyed to building plan and floor
      - 4) General identification of products, glazing infill, and finishes

- b. Details
  - 1) Not smaller than 3 inches equals 1 foot.
  - 2) Overall dimensions shown
  - 3) Field installation notes
  - 4) Fasteners identified with size, spacing, and material
  - 5) Sealants identified, along with backers
  - 6) Anchorage material, size, locations
  - 7) Identify means of controlling and weeping infiltrated water
  - 8) Indicate how air seals and weatherseals will be congruent with seals at adjacent substrates. Detail interfaces to other work, especially where critical for anchorage and sealing of this work.
  - 9) Show size and type of field welds
  - 10) Glazing materials identified, including gaskets, blocks, and infill.
  - 11) Extrusion numbers noted
  - 12) Thickness and material of sheet products
- c. Installation Instructions
  - 1) Acceptable to incorporate manufacturer's standard published instructions. The instructions must be included with all submittals for approval and field use. They will remain an integral part of the shop drawings.
  - 2) Manufacturer's standard installation instructions are not an acceptable substitute for project-specific installation details or shop drawings.
- d. Door Schedule with list of hardware by door supplier.

B. Samples

- 1. Submit color range aluminum samples for each finish type and color to Architect for project verification.
  - a. 6" long extrusions
  - b. 3" square sheet

C. Product Data

- 1. Submit manufacturer's published product data sheets and typical catalog details for confirmation of intent of product / systems to be provided on project.

D. Substitutions meeting all performance criteria may be proposed for consideration prior to bid. Refer to Division 1 for instructions.

- 1. Proposed substitute products or systems (not named as "Design Standard") must be accompanied by manufacturer's literature showing conformance to all performance criteria of design standard product. Submit for review and acceptance. Products other than the Design Standard may not be considered if data is incomplete or non-conforming.

E. Test Reports

- 1. Submit test reports with bid for proposed substitute products. Test reports for approved products are not required.

F. Certificates

1. Submit certification attesting that Installer's experience meets criteria specified under "Quality Assurance".
2. Submit certifications from sealant and glazing manufacturers, where integral with this work, accepting intended construction details which affect performance and their warranties.

G. Operation and Maintenance Instructions

1. Before project close-out, provide any manuals, instructions, and manufacturer's warranties for work installed.

H. Structural Calculations/Substantiation

1. Provide substantiation of structural adequacy of detailed connections and structural framing members, including fasteners. Substantiation is acceptable in the following forms of submittal:
  - a. Structural calculations signed and sealed by a registered structural engineer, licensed in the state where project is located, or
  - b. Certification letter signed and sealed by engineer listing shop drawing sheets reviewed, along with dates of sheets.
2. Submission of one of the above is required before full approval of shop drawings will be given.

1.05 QUALITY ASSURANCE

A. Qualifications

1. All aluminum framing systems and doors required for this project shall be provided by a single manufacturer.
2. All aluminum framing systems required on this project shall be installed by a single Contractor.
3. Installer shall be able to demonstrate not less than five (5) years successful experience in the installation of comparable projects.
4. Welding shall be done by skilled and qualified welders licensed where required by local building regulations. Welding shall be in conformance with AWS Structural Welding Code D1.1 for steel and D1.2 for aluminum.
5. Testing laboratories, certifying lab test reports, shall be AAMA accredited to conduct specified tests. Exception allowed if performance tests are conducted at contractor's or manufacturer's laboratory, then tests shall be performed by accredited laboratory personnel.

B. Regulatory Requirements

1. Whether shown on Contract Documents or not, Installer shall abide by safety glazing standard 16 CFR1201, or by applicable building code if superseded.



C. Pre-Installation Conference

1. Before substantially commencing work on site, the Installer shall meet with the General Contractor to coordinate and plan schedules, verify understanding of, and compliance with, project shop drawings, and to coordinate with work of adjacent trades.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store all materials, assemblies, and components in a manner to prevent damage or deterioration.
- B. Follow manufacturer's instructions for handling and storage

1.07 SITE CONDITIONS

- A. Do not install sealants or other materials in environmental conditions (temperature, humidity, ventilation, wind) that are beyond the limitations set by the manufacturer.

1.08 WARRANTY

- A. The Installer and Manufacturer of the storefront framing system(s) shall jointly warrant for two (2) years from date of substantial completion, that the work is not defective in workmanship or materials and conforms to the final, approved shop drawings, except for reasonable variances not impairing the usefulness thereof.
- B. Warranty and enforcement shall not deprive the Owner of other available actions, rights, or remedies.
- C. This warranty applies to both patent and latent defects.
- D. Responsibility of the Installer/Manufacturer during the warranty period shall be to repair or replace defective work. No cost of the remedial work shall be borne by the Owner.
- E. Defects may be defined as follows; however, this list is not inclusive of all potential problems:
  1. Air infiltration beyond specified limits
  2. Water penetration (as defined by AAMA Metal Curtain Wall Manual)
  3. Doors and hardware not operating properly
  4. Finish degradation beyond normal
  5. Structural failures of framing members or anchors not subjected to unusual loads.
- F. Warranties for glass and sealants are specified elsewhere.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Aluminum framing systems and doors from one of the following manufacturers.
  - 1. Design Standard: Kawneer Company, Inc  
(800) 837-7002.
  - 2. EFCO Corporation  
(800) 221-4169
  - 3. Oldcastle Building Envelope  
10405-M Granite Street, Charlotte, NC, 28273  
(866) 221-0394
  - 4. YKK AP America, Inc.  
5630 Gwaltney Drive, Atlanta, GA 30336  
(800) 955-9551

### 2.02 MATERIALS

- A. Extruded Aluminum
  - 1. Alloy and temper recommended by manufacturer for type use and finish.
  - 2. Alloys conform to the requirements published in the Aluminum Association's "Aluminum Standards and Data."
  - 3. Extruded bars, rods, shapes, and tubes shall conform to ASTM B221.
  - 4. Thickness as required to conform with structural and finish criteria.
  - 5. Minimum 20% pre-consumer and 20 % post-consumer recycled aluminum content.
- B. Sheet Aluminum
  - 1. Alloy suitable to match extrusions when finished and to meet structural criteria.
  - 2. Sheet and plate shall conform to ASTM B209
  - 3. Thickness shall be sufficient to avoid oil-canning and dents where subjected to pedestrian traffic, at exterior or interior. Thickness shall be as further required to resist windload and as shown on the Drawings.
  - 4. Minimum 20% pre-consumer and 20 % post-consumer recycled aluminum content.
- C. Carbon Steel for Anchors
  - 1. Alloys shall conform to the requirements published in the American Iron and Steel Institute's Steel Products Manual.
  - 2. Structural shapes, plates, and bars shall conform to ASTM A36.
- D. Galvanized Carbon Steel

1. Where embedded in concrete or in contact with dissimilar metals, provide in conformance with:
  - a. Sheet - ASTM A653
  - b. Hot dip for shapes, plates, bars, and strip ASTM A123
- E. Stainless Steel
  1. For exterior trim and flashing, where required in the drawings, provide type 302 or 304, conforming to ASTM A666.
  2. For interior applications, provide type 400 series, conforming to ASTM A176.
- F. Fasteners
  1. Provide materials and plating to resist galvanic action and to meet strength requirements for specific applications. For joining specific materials, provide as follows:
    - a. All materials in “wet” areas (exposed to exterior air), to be joined using stainless steel type 18-8. Where preference is to use self-drilling fasteners in wet area, only Elco Dril-Flex with Stalgard coating is acceptable.
    - b. All materials in “dry” areas (not exposed to exterior air) may be jointed using stainless steel or zinc plated steel.
  2. Avoid exposing head of screws, but where necessary, use flat head screws with painted heads to match material being fastened. Show on shop drawings for architectural review. Standard flat head screws supplied with finish hardware is acceptable.
- G. Isolate dissimilar metals with non-metallic shims. Where load bearing, provide solid shims.
- H. Anchors and Reinforcement
  1. Use aluminum wherever practical to avoid contact of dissimilar metals. Otherwise use galvanized or stainless steel in areas exposed to outside moisture, and primer coated steel in areas not exposed to outside moisture.

## 2.03 STOREFRONT AND FIXED WINDOW SYSTEMS

- A. Furnish and install a storefront system meeting performance criteria specified herein and as shown on the Contract Drawings. Storefront system to accommodate specified doors and hardware.
- B. Design Standards:
  1. Exterior: Trifab VG 451T, by Kawneer Company, Inc.
  2. Interior: Trifab VG 450, by Kawneer Company, Inc.
  3. Or equal, subject to approval by Architect.
- C. Storefront:

1. Exterior: center glazed.
2. Interior: center glazed.
3. Frame Size: Approximately 2" wide x 4 1/2" deep.
4. Style: Same sight line and general configuration as frames for fixed windows.

D. Fixed Windows

1. Same physical appearance and dimensions as Storefront.

2.04 ACCESSORIES

- A. Provide high-performance sill flashings.
- B. Provide thermally-broken extruded aluminum sub-sills by storefront manufacturer.
- C. Provide formed and sealed extruded aluminum end dams.

2.05 ENTRANCE DOORS - EXTERIOR

- A. Medium Stile Swing Doors, single-acting.
- B. Design Standard: AA425 Series by Kawneer Company, Inc.
  1. Thickness/Depth: 2 ¼ inches.
  2. Top Rail: 4 ¼ inches wide.
  3. Vertical Stiles: 4 ¼ inches wide.
  4. Bottom Rail: **10 inches wide.**
  5. Glazing Stops: Square, suitable for 1" thick infill glazing.
  6. Finish: Same as storefront framing.

2.06 ENTRANCE DOORS - INTERIOR

- A. Wide Stile Swing Doors, single-acting, high thermal performance unless otherwise indicated.
- B. Design Standard: 350 Series by Kawneer Company, Inc.
  1. Thickness/Depth: 1 ¾ inches.
  2. Top Rail: 3 ½ inches wide.
  3. Vertical Stiles: 3 ½ inches wide.
  4. Bottom Rail: **10 inches wide.**
  5. Glazing Stops: Square, suitable for ¼ inch thick infill glazing.
  6. Finish: Same as storefront framing.

## 2.07 DOOR HARDWARE

- A. Comply with applicable handicap accessibility codes and the Americans with Disabilities Act (ADA).
- B. Coordinate with Division 8 door hardware supplier.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
  - 1. Bottom Rail Applied Weatherstripping on all doors.
  - 2. Sill Sweep Strips: Resilient seal type, of neoprene, provide on all doors.

## 2.08 FINISHES

- A. Aluminum surfaces bonding to structural silicone shall be finished other than mill, providing adhesion sufficient to pass sealant adhesion “pull” test.
- B. Aluminum is to have anodic coating. The finish shall conform to the following requirements:
  - 1. Exterior exposed: Anodized - Architectural Class I as described in the Aluminum Association Standards for Anodized Architectural Aluminum, SAA-46, AADAF-45 and AAMA 612.
    - a. Class I – Clear Anodized AA-M10C22A41
- C. Provide manufacturer’s five-year warranty on all anodized finishes.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Before beginning installation in any assigned area, examine structure and surrounding work which affects the installation of the work of this section. Report in writing to General Contractor any errors or conditions that require correcting. Do not proceed in that specific area until resolved; doing so constitutes acceptance of the conditions.
- B. Compare shop drawing details which depict surrounding substrates and structure with actual conditions. Change shop drawings to reflect as-built conditions where significant. Advise Architect of discrepancies requiring structural or aesthetic resolution.

### 3.02 INSTALLATION

- A. Install storefront framing in strict accordance with approved shop drawings and manufacturer’s installation instructions.
- B. Incorporate all integral components of the framing systems such as flashing, end dams, and water diverters that are required to:

1. Protect the interior against water infiltration when subjected to specified windloading during rain.
  2. Protect insulating glass unit seals from path of infiltrated water, even if water does not migrate to interior of building.
- C. Design and install perimeter seals that effectively back up all infiltrated water into the framing system. Design and install infiltrated water to quickly weep from the system.
- D. Maximum allowable tolerances for framing and trim members:
1. Variations in plane, plumb, and level - 1/8" per 12', 1/2" in any total length
  2. Offset from true alignment between members abutting - 1/16"
  3. Variations in framing member location - 1/8"
- E. Variations in structural anchorage or attachments from what is shown on approved shop drawings is not allowed without substantiating calculations and architectural approval.
- F. Installation of doors shall be checked and adjusted as necessary to ensure proper operation and adequate weather-stripping contact.
- G. Coordinate installation of adjacent trades to permit proper sequencing, protection from damage, and interfacing of common seals.

### 3.03 FIELD QUALITY CONTROL

- A. Field Water Tests
1. Owner may retain qualified independent testing consultant to perform field water hose testing in conformance with AAMA 501.2.
  2. Testing will be scheduled to allow minimum one (1) week notice to all persons requested for attendance.
  3. Testing will be scheduled for two (2) locations per framing type, incorporating joints and perimeter conditions, and as further determined by testing personnel. Testing may be performed as follows:
    - a. At 10% completion of installation, and
    - b. At 50% completion of installation,
    - c. Or at other % completions, at discretion of Owner.
  4. If water penetration occurs, corrections shall be made by the Installer to the test area and all previously installed work as applicable. Retesting will be conducted of the failed area, at no cost to Owner. Testing will continue at initially failed area until passed.
  5. Acceptance of installation is contingent upon successful passing of all test areas and corrections, if any, to similar work installed.
  6. In the event of significant and continued failures, the Owner maintains the right to order additional tests at Installer's cost.

B. Field Chamber Air & Water Tests

1. Owner may schedule two (2) field air leakage tests to verify that installed work meets the performance criteria specified, by method of erecting a test chamber to create a pressure differential across the wall specimen, in conformance with ASTM E 783.
  - a. Air infiltration test will be conducted at a uniform static test pressure of 6.24 psf. The maximum allowable rate of air leakage shall not exceed .060 cfm/sf of fixed wall area.
2. Owner may schedule two (2) field water penetration tests to verify that installed work meets the performance criteria specified, by method of erecting a test chamber to create a pressure differential across the wall specimen, in conformance with ASTM E 1105.
  - a. Water penetration tests will be conducted at a uniform static test pressure of 8 psf.
3. Scope of tests to include minimum two lites wide and floor to ceiling tall. Include perimeter sealed joints to adjacent substrates. Include splice joints if applicable.
4. Installer Responsibilities
  - a. Cooperate with Owner's testing personnel to facilitate erecting and removal of test chamber, spray apparatus, scaffolding as required, and testing.
  - b. Observe testing. Minimum one week's notice will be given of scheduled test date.
  - c. Correct installed work as required as a result of testing, at no cost to Owner.

3.04 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the glazing has been installed.
- B. Clean harmful materials from surfaces immediately to avoid permanent damage.
- C. Upon completion of work, clean installed work inside and outside.
- D. Remove construction debris and legally dispose of waste materials during course of work.

3.05 ADJUSTING

- A. Adjust operating hardware to function properly prior to acceptance of work by Owner.

3.06 PROTECTION

- A. Protect completed work from damage or deterioration beyond normal weathering until final acceptance.

END OF SECTION



SECTION 08 63 00

PRISMATIC UNIT SKYLIGHTS  
(BID ALTERNATE)

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated Fixed Unit Skylights
- B. Prefabricated Insulated Curbs.

1.02 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry.
- B. Section 07 62 00 – Sheet Metal Flashing and Trim.
- C. Section 13 34 19 – Metal Building Systems.

1.03 REFERENCES

- A. Aluminum Association (AA)
  - 1. Specifications for Aluminum Structures.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
  - 1. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- C. ASTM International (ASTM)
  - 1. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- D. National Fenestration Rating Council (NFRC)
  - 1. NFRC 100 - Procedure for Determining Fenestration Product U-Factors.
  - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance of Normal Incidence.
- E. North American Fenestration Standard (NAFS):
  - 1. AAMA\WDMA\CSA\101\I.S.2\A440 - The Voluntary Performance Specification for Windows, Skylights, and Glass Doors.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. Skylights must conform with all federal, state and local code bodies having jurisdiction, and be designed to withstand all forces of nature deemed necessary by those code bodies for the specified project location.
- B. Plastic unit skylights shall conform to recommendations of the AA Specifications for Aluminum Structures.
- C. Skylights must be designed to carry a minimum 30 psf tributary roof load or greater per site as specified in the current International Building Code or prevailing model code.
- D. Skylights must be tested and labeled in accordance to AAMA\WDMA\CSA\101\I.S.2\A440 as required by Section 2405.5 of the 2012 International Building Code.
- E. Drop Test:
  - 1. A 200 lb (91 kg) drop test from a height of 24 inches (610mm) above the center (highest point) of dome shape and at mid points of both the 5 foot (1524mm) and 6 foot (1829mm) side (approximately 15 inches (381mm) and 18 inches (457mm) from center).
  - 2. The 200 lb (91 kg) load must be contained within a flexible bladder or sack having approximate dimensions no larger than 30 inches long, 20 inches wide, and 8 inches high (762mm x 508mm x 203mm), filled with course sand or pea gravel.
  - 3. The dome must withstand the sack drop without inverting or breaking.
  - 4. Finished skylight domes sealed in frame must also handle 500 lb (227 kg) on 1 square foot (.09 sm) point loading without inverting.
  - 5. The drop test must be witnessed and certified by the test laboratory which provides the NAFS certification.
- F. Skylights must be certified by the NFRC. Provider shall be certified by the NFRC and listed as an approved manufacturer with verified product performance on the NFRC website (<http://www.nfrc.org>).
- G. Skylights must be certified by the NAFS.
- H. Manufacturer to provide third party testing reports certifying Visible Light Transmittance (VLT) and Haze properties of glazing type and levels as required for ASHRAE 90.1 under ASTM D1003.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience in manufacturing products of the same type and scope as specified.

- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.08 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Design Standards:
  - 1. Unit Skylights and Frames by Sunoptics Prismatic Skylights, Sacramento, CA.
  - 2. Prefabricated Curbs by Sunoptics Prismatic Skylights, Sacramento, CA.

#### 2.02 PRODUCTS

- A. Unit Skylight Domes: Factory fabricated, aluminum framed with plastic thermal break, sealed and insulated, triple-glazed dome skylights with no exposed metal to the interior.
  - 1. Model SIG, 5060, TGZ CC2 CL1, LENS CLWHCL 800 MD MI ITBR.
  - 2. Units shall be factory glazed and fully fabricated, ready for job installation.
  - 3. Nominal opening size: 60 inch wide, 72 inches long.
  - 4. Outer light glazing: 100% impact modified clear prismatic acrylic of sufficient thickness recommended to meet the specified performance requirements. Minimum hail resistance level of Class 1 as tested by certified engineering firm.
    - a. Appearance: Clear (colorless), translucent, prismatic refractive surface.
    - b. Thickness: Manufacturer's standard thickness for unit size, unit configuration, and specified wind loading.

5. Intermediate light glazing: Acrylic plastic sheet.
    - a. Appearance: White, translucent, prismatic refractive surface.
    - b. Thickness: Manufacturer's standard thickness for unit size, unit configuration, and specified wind loading.
  6. Inner light glazing: Acrylic plastic sheet.
    - a. Appearance: Clear (colorless), translucent, prismatic refractive surface.
    - b. Thickness: Manufacturer's standard thickness for unit size, unit configuration, and specified wind loading.
  7. Energy Requirements: Glazing material shall have a maximum light distribution characteristic that maximizes the shading factor. Per Addendum D of ASHRAE 90.1 – 2007, the diffusing qualities of glazing shall have a minimum haze factor of 90% or greater. The combined inner/outer lens target values shall be as follows:
    - a. Light Transmittance: 62 percent minimum.
    - b. Diffusion / Haze Factor: 100 percent min.
    - c. Solar Heat Gain Coefficient: 0.33 maximum. NFRC 200
    - d. “U” Value: 0.62 or lower (glazing and framing) in accordance with NFRC 100 or “unlabeled skylight ” default requirements of ASHRAE 90.1 – 2010.
- B. Unit Skylight Frames - General: Self-flashing, thermally-broken, insulated aluminum curb. Extruded ASTM B 221 alloy 6063 T5 aluminum with reinforced, welded corners; integral condensate drainage system on interior weeping moisture to outside; flange to receive counterflashing or curb.
1. Glazing retainer (outer frame): Extruded or formed aluminum.
  2. Insulated and thermally broken with closed-cell foam.
  3. Vinyl weather sweep attached to all sides where frame meets curb.
  4. Continuous silicone seal all sides where glazing meets frame
  5. Continuous silicone seal between individual glazing panes touch.
  6. Continuous, pre-installed 1-1/2” x 1/4” foam rubber gasket between frame and curb.
  7. Thermal Break: Exterior grade vinyl in White color.
  8. Weeps: A minimum of one weep slot on each side of frame.
  9. Predrilled openings for manufacturer-supplied fasteners.
  10. Finish: Mill-finished aluminum.
- C. Prefabricated Curbs at Standing Seam Metal Roofs: Non-structural, insulated, extruded or formed Galvalume Steel with bottom flange for attachment to roof deck and integral cricket on high side.
1. Model AMBC 19A 18 Ga with Guard.

2. Curb Dimensions: Determined by skylight manufacturer's inside dimension of extruded aluminum.
3. Insulated curbs: Inner and outer metal faces, with internal insulation of at least 1.5 inch-thick closed cell foam.
4. Height: 8" minimum above roof surface to bottom of counterflashing or frame.
5. Integral fall-through Guard: 3/16 inch welded wire mesh, 6 inches on center grid, OSHA 1910 and 1926.502 compliant safety security guard.
6. Finish, interior surface: Factory primed, white paint.
7. Finish, exterior surface: Mill finished galvalume.

## 2.03 ACCESSORIES

- A. Fasteners (For anchorage of skylight to roof curb): #12 x 1 1/2 inch (38mm) 300 series stainless steel screws with washers. Provide fasteners in sufficient quantity for complete installation.
- B. Washers: Neoprene/stainless steel bonded washers.

## 2.04 FABRICATION

- A. Skylights must be factory assembled and glazed ready for installation.
- B. Fabricate skylights weather tight and free of visual distortions and defects.
- C. Protect exterior drip / counter flashing and drainage ports from weather and air-borne debris.
- D. Miter and full penetration weld all corners of curb and retaining frames.
- E. Retaining frames that secure the glazing panels along each side under spring tension must be sealed with a silicone sealant along the full perimeter of the retaining frame.
- F. Skylight frames must be pre-drilled for anchorage to roof curbs.
- G. Seal glazing panels to base frame allowing for sufficient expansion and contraction. Provide exterior weep-hole arrangement.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared. Verify that substrates and openings are rigidly set, at proper lines and elevation, properly sized, and ready to receive units

- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Do not proceed with installation until conditions detrimental to proper installation have been corrected.
- D. Coordinate installation with roofing work and other adjacent elements of building envelope to ensure watertight construction

### 3.02 PREPARATION

- A. Remove protective material from prefinished surfaces immediately after installation.
- B. Clean surfaces thoroughly prior to installation. Comply with plastic glazing manufacturer's recommendations for cleaning of glazing surfaces to avoid scratches.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Coat contact surfaces of dissimilar metals with one or more coats of isolation coating.
  - 1. The following metals are not considered dissimilar: aluminum, stainless steel, cadmium, and zinc
  - 2. Apply one 15-mil dry film thickness coat of bituminous isolation coating to metal surfaces other than galvanized steel which will be in contact with cementitious materials.

### 3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- B. Install products in correct location, plumb and true, without warp or twist.
- C. Pack shim spaces with batt insulation

### 3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch up marred or abraded areas of finished elements before Substantial Completion. If satisfactory touch-up cannot be accomplished, remove and replace element

END OF SECTION

## SECTION 08 71 00

### DOOR HARDWARE

#### PART 1 - GENERAL

##### 1.01 SUMMARY

A. Section Includes:

1. All door hardware, except that to be furnished by the aluminum storefront entrance door manufacturer, which is specified elsewhere.
2. Electronic access control system components.

##### 1.02 RELATED SECTIONS

- A. Division 08 sections for doors.
- B. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
- C. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
- D. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

##### 1.03 REFERENCES

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; Latest published version.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association, Inc.; Latest published version (ANSI/BHMA A156.1).
- C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.2).
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; Builders Hardware Manufacturers Association, Inc.; Latest published version (ANSI/BHMA A156.4).
- E. BHMA A156.5 - American National Standard for Auxiliary Locks & Associated Products; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.5).
- F. BHMA A156.6 - American National Standard for Architectural Door Trim; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.6).
- G. BHMA A156.7 - American National Standard for Template Hinge Dimensions; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.7).
- H. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Builders Hardware Manufacturers Association, Inc.; Latest published version (ANSI/BHMA A156.8).

- I. BHMA A156.12 - American National Standard for Interconnected Locks & Latches; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.12).
- J. BHMA A156.13 - American National Standard for Mortise Locks & Latches; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.13).
- K. BHMA A156.15 - American National Standard for Closer Holder Release Devices; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.15).
- L. BHMA A156.21 - American National Standard for Thresholds; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.21).
- M. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition.
- N. DHI A115W Series - Specifications for Wood Door and Frame Preparation for Hardware; Door and Hardware Institute; Latest published version.
- O. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; Latest published version.
- P. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Wood Flush Doors; Door and Hardware Institute; Latest published version.
- Q. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- R. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; Latest published version.
- S. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; Latest published version.
- T. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

#### 1.04 SUBMITTALS

- A. See Section 01 34 00 Submittals for submittal procedures.
- B. Supplier Qualifications: To the architect, for information.
- C. Product Data: Manufacturer's data for each different piece of hardware, with installation instructions.
- D. Hardware Schedule: Show manufacturers complete identification for every item for every door.
  - 1. Cross-reference to item names and designations in contract documents.
  - 2. Indicate door/frame materials and sizes.
  - 3. Explain number codes and abbreviations.
  - 4. Indicate hardware mounting heights or locations, if different from those specified.
  - 5. Indicate finish for each item.
- E. Operation and Maintenance Data: For operating parts and finishes.



- F. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### 1.05 QUALITY ASSURANCE

- A. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of experience, and who employs an architectural hardware consultant (AHC).
- B. The A.H.C. shall be made available at reasonable times to consult with the Architect / Contractor or Owner regarding all matters affecting the Hardware on this Project.
- C. Qualifications of Architectural Hardware Consultant(s) (AHC): Certified by the Door and Hardware Institute.
- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- F. **The Hardware Supplier shall install all Finish Hardware using installers fully familiar with and capable of correctly installing all Finish Hardware. The General Contractor shall not install the Finish Hardware.**

#### 1.06 PROJECT CONDITIONS

- A. Sequence submittal of hardware schedule and door and frame submittals, allowing adequate time for review and resubmittal, if required, so that construction is not delayed; provide adequate information for review.
- B. Provide hardware installation templates to installers of hardware and to fabricators of other work which is required to be prepared in the shop or factory for hardware installation.
- C. Coordinate shop drawings of other work so that proper preparation is made.

#### 1.07 PRE-INSTALLATION MEETING

- A. Convene prior to commencing work of this section. Prior to the installation of electronic hardware, the General Contractor shall arrange a conference between the Hardware Supplier, Installer, Owner's integrator, electrical contractor and related trades to review materials, procedures and coordination of the related work.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hardware at the times and to the locations required for timely installation.
- B. Package each item separately or in container with items of same set only.
- C. Mark each item or package with hardware set number from hardware schedule.

#### 1.09 MAINTENANCE

- A. Provide all adjustment and maintenance tools recommended by hardware manufacturers.

#### 1.10 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Coordinate the automatic door operators with the electrical trade for 110/120V power to operator motor.
- C. Furnish templates for door and frame preparation.
- D. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

#### 1.11 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
- B. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
  - a. Mechanical Warranty
    - 1) Locks: Cylindrical – 3 years; Mortise: - 3 years; Electrical – 1 year.
    - 2) Exit Devices: 3 year
    - 3) Closers: 25 year
    - 4) Automatic Operators: 2 years

#### 1.12 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

### PART 2 - PRODUCTS

#### 2.01 GENERAL HARDWARE REQUIREMENTS

- A. Provide items as directed by the Owner during a meeting scheduled by the hardware supplier with the Owner.
- B. Select style and features of each item to suit configuration and construction of door and frame and door operation indicated.

#### 2.02 MATERIALS - GENERAL

- A. Manufacturers:
  - 1. Obtain all items of each type from the same manufacturer.
- B. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
- C. Fire-Rated Doors: NFPA 80.

- D. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
- E. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- F. Manufacturer's Names and Trade Names: Display of names, logos, or other identification is acceptable on lock or hinge edge of door, but not where visible on either face of door.
  - 1. Exception: Manufacturer's name or other identification on rim of lock cylinders.
- G. Fasteners: Provide hardware prepared by the manufacturer with fastener holes for machine screws, unless otherwise indicated.
  - 1. Provide all fasteners required for secure installation.
  - 2. Select fasteners appropriate to substrate and material being fastened.
  - 3. Use flathead Phillips screws unless otherwise indicated.
  - 4. Use stainless steel fasteners.
  - 5. Exposed screws: Match hardware finish.
  - 6. For hardware exposed when door is closed, use concealed fasteners unless otherwise indicated, and unless stock units of the item specified are not available for installation with concealed fasteners.
  - 7. Where it is not possible to reinforce substrate adequately for screws, use through-bolts with sleeves or use sex bolts.
    - a. Do not use where head or nut would be exposed on face of door, unless specifically indicated or made necessary by other requirements.
    - b. Finish exposed heads and nuts the same as hardware on that side of the door.
  - 8. Use expansion shield anchors in concrete and masonry.
- H. Finish on All Exposed Metal Items: ANSI/BHMA A156.18, Satin Stainless Steel (630).
- I. Cable and Connectors:
  - 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
  - 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
  - 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

- A. Butt hinges for all doors, excluding aluminum storefront entries.
  - 1. Basis of Design and Product: Ives 5BB series.
  - 2. Five-knuckle, flush-barrel butt hinges.

3. Comply with applicable requirements of ANSI/BHMA A156.1.
  4. Use heavy weight hinges.
  5. Use full mortise hinges unless otherwise specified.
  6. Use stainless steel base metal.
  7. Dimensions: As indicated, within limits prescribed by ANSI/BHMA A156.7.
    - a. Size(s): 4-1/2 by 4-1/2 inches.
    - b. Size hinges to suit thickness of door, including applied facings.
    - c. Exception: Where both leaves are to be installed into wood, template size units are not required.
  8. Hinge pins: Stainless Steel.
    - a. Provide non-removable pins or safety studs for out-swinging doors with keyed lock or exit only function.
    - b. Provide non-rising pins for interior doors.
  9. Provide flat button hinge tips with matching finish.
  10. Quantity: Provide 3 hinges on each door.
- B. Continuous hinges for all aluminum storefront entries.
1. Basis of Design: Ives.
  2. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
  3. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
  4. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
  5. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
  6. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
  7. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
  8. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.04 EXIT DEVICE

- A. Basis of Design and Product: Von Duprin 98/35A Series.
- B. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
- C. Cylinders: Refer to “KEYING” article, herein.
- D. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.

1. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
  2. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
  3. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
  4. Provide flush end caps for exit devices.
  5. Provide exit devices with manufacturer's approved strikes.
  6. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
  7. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
  8. Provide hex-key dogging as specified at non fire-rated openings.
- E. Provide electrified options as scheduled.
- F. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
- G. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
- H. Special Options:
- a. Provide delayed egress devices, where scheduled, that are UL 294 listed, meet National Fire Protection Association (NFPA) and International Building Code (IBC) governing delayed egress, and/or other local and national fire codes acceptable to authority having jurisdiction as required.
    - 1) Provide non-handed and field sizable device with 3/4 (19mm) throw deadlocking latch bolt. Device incorporates an internal RX switch that detects attempt to exit from applying less than 15lbs to the push pad, which causes this switch to start an irreversible alarm cycle. Key switch in device is capable of arming, disarming, or resetting the device; and indicator lamp determines status of the device
    - 2) Provide devices capable of standard 15 second release delay and indefinite release delay as required by code, when tied into fire alarm system will release immediately when an alarm condition exists.
    - 3) Provide devices with all control inputs – door position input, external inhibit input, fire alarm input; auxiliary locking; nuisance alarm and internal horn; and, remote signaling output self-contained in the device assembly.

## 2.05 ELECTRIC POWER TRANSFER

- A. Basis of Design and Product: Von Duprin EPT-10.
- B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified.
- C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.06 POWER SUPPLIES

- A. Basis of Design and Product: Schlage/Von Duprin PS900 Series.
- B. Provide power supplies approved by manufacturer of supplied electrified hardware.
- C. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
- D. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed
- E. Provide power supplies with the following features:
  - 1. 12/24 VDC Output, field selectable.
  - 2. Class 2 Rated power limited output.
  - 3. Universal 120-240 VAC input.
  - 4. Low voltage DC, regulated and filtered.
  - 5. Polarized connector for distribution boards.
  - 6. Fused primary input.
  - 7. AC input and DC output monitoring circuit w/LED indicators.
  - 8. Cover mounted AC Input indication.
  - 9. Tested and certified to meet UL294.
  - 10. NEMA 1 enclosure.
  - 11. Hinged cover w/lock down screws.
  - 12. High voltage protective cover.

## 2.07 LOCK GUARDS AND FLUSH BOLTS

- A. Basis of Design: Ives.
- B. Lock Guards: Stainless steel, and all exterior doors.
- C. Manual Flush Bolts: Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes.
  - 1. BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.
  - 2. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height.
  - 3. Provide dust-proof strikes at each bottom flush bolt.

## 2.08 CYLINDRICAL LOCKS

- A. Basis of Design and Product: Schlage ND series.
- B. Basis of Design and Product: Sargent 10-Line (for electrified locks only).
- C. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
  - 1. Cylinders: Refer to “KEYING” article, herein.
  - 2. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.

3. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
4. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
6. Provide electrified options as scheduled in the hardware sets.
7. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
8. Lever Basis of Design: Schlage Athens (ATH).

## 2.09 MORTISE LOCKS

- A. Basis of Design and Product: Schlage L9000 series.
- B. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors
  1. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
  2. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
  3. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
  4. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
  5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
  6. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified locksets that comply with the following requirements:
    - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
    - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
    - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
    - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
    - e. Connections – provide quick-connect Molex system standard.

7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
8. Lever Basis of Design: Schlage Athens (ATH).

## 2.10 CYLINDERS

- A. Basis of Design and Product: Schlage.
- B. Provide interchangeable cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
- C. Construction Keying:
  1. Replaceable Construction Cores.
    - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
      - 1) 3 construction control keys
      - 2) 12 construction change (day) keys.
    - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

## 2.11 KEYING

- A. A temporary construction core master key system shall be provided for use during construction period. Replace with final keyed Interchangeable Cores once the building is turned over to the Owner.
- B. Coordinate with Owner prior to keying of permanent cores.
- C. Scheduled System:
  1. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- D. Requirements:
  1. Provide permanent cores keyed by the manufacturer according to the following key system.
    - a. Master Keying system as directed by the Owner.
  2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
  3. Provide keys with the following features:
    - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    - b. Patent Protection: Keys and blanks protected by one or more utility patent(s).
  4. Identification:
    - a. Mark permanent cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    - b. Identification stamping provisions must be approved by the Architect and Owner.



- c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
  - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
- 5. Quantity: Furnish in the following quantities.
  - a. Change (Day) Keys: 3 per cylinder/core.
  - b. Permanent Control Keys: 3.
  - c. Master Keys: 6.

## 2.12 KEY CONTROL

- A. Basis of Design and Product: Telkee.
- B. Acceptable Manufacturers:
  - 1. HPC
  - 2. Lund.
- C. Requirements:
  - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
    - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
    - b. Provide hinged-panel type cabinet for wall mounting.

## 2.13 DOOR CONTROL DEVICES

- A. Closers - General:
  - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
  - 2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
  - 3. Pressure Relief Valve (PRV) Technology: Not permitted.
  - 4. Basis of Design and Products: LCN 4050 and 1450 series as scheduled.
- B. Surface-Mounted Closers:
  - 1. Comply with requirements of ANSI/BHMA A156.4, Grade 1.
    - a. Provide the following features:
      - 1) Additional 15 percent adjustment in closing force.
      - 2) Delayed action.
      - 3) Built-in, factory-set dead stop.
      - 4) Hold open.
  - 2. Style: C02011, and C02021.

3. Closer Body: 1-3/8-inch (35 mm) diameter with 5/8-inch (16 mm) diameter pinion journal diameter heat-treated pinion journal and full complement bearings
  4. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
  5. Parallel arms: Provide for all closers; use larger size than normal.
  6. Finish: Metallic paint finish, color similar to metal hardware on same door.
- C. Door Stops/Holders: .
1. Basis of Design: Ives.
  2. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
  3. Where a wall stop cannot be used, provide universal floor stops.
  4. Where wall or floor stop cannot be used, provide overhead stop.
  5. Provide roller bumper where doors open into each other and overhead stop cannot be used.
- D. Overhead Stops/Holders: Comply with requirements of ANSI/BHMA A156.8.
1. Basis of Design: Glynn Johnson.
  2. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
  3. Provide friction type at doors without closer and positive type at doors with closer.
  4. Overhead stops: Style: C01511.

## 2.14 PUSH-PULL AND PROTECTION PLATES:

- A. Basis of Design: Ives.
- B. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled using Stainless Steel with stainless steel countersunk screws.
  1. Push: 6 x 16
  2. Pull: 6 x 16 with round C-shaped handle.
- C. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
  1. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
  2. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 2.15 SEALS, THRESHOLDS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, RAIN DRIPS AND GASKETING

- A. Basis of Design: Zero International.
- B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings
5. Sealant for Setting Thresholds: Butyl-rubber or butyl-polyisobutylene sealant.
6. Rain Drips: Extruded aluminum; 2-1/2 inch extension from face of door frame.

#### 2.16 ACTUATORS

- A. Basis of Design: LCN.
- B. Requirements: Provide actuators as specified in the hardware groups.

#### 2.17 SILENCERS

- A. Basis of Design: Ives.
- B. Provide "push-in" type silencers for hollow metal or wood frames.
- C. Requirements:
  1. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
  2. Omit where gasketing is specified.

#### 2.18 DOOR POSITION SWITCHES

- A. Basis of Design: Schlage.
- B. Provide recessed or surface mounted type door position switches as specified.
- C. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

#### 2.19 COAT HOOKS

- A. Basis of Design: Ives.
- B. Provide coat hooks as specified, or equal.

#### 2.20 FINISHES

- A. Finish: BHMA 626/652 (US26D); except:
  1. At jambs and head Hinges at Exterior Doors: BHMA 630 (US32D)
  2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)

3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

2.21 THRESHOLDS:

- A. Ribbed aluminum.
- B. Select style to suit changes in elevation and to fit door hardware and frames.
- C. Saddle type threshold.

2.22 SEALANT FOR SETTING THRESHOLDS:

- A. Butyl-rubber or butyl-polyisobutylene sealant.

2.23 RAIN DRIPS:

- A. Extruded aluminum; 2-1/2 inch extension from face of door frame.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install hardware for all doors, except hardware supplied by aluminum storefront supplier.
- B. Factory- or shop-prepare all work for installation of hardware.

3.02 INSTALLATION

- A. **The Hardware Supplier shall install all Finish Hardware using installers fully familiar with and capable of correctly installing all Finish Hardware. The General Contractor shall not install the Finish Hardware.**
- B. Follow hardware manufacturer's recommendations and instructions.
- C. Install surface-mounted items after substrates have been completely finished; install recessed items and recessed portions of items before finishes are applied and provide suitable, effective protection.
  1. When surface-mounted items are installed before final finish, remove, store, and reinstall, or apply suitable effective protection.
- D. Mount at heights specified in the Door and Hardware Institute's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

- 1. Exception(s): As required by applicable regulations, codes and laws.
- E. Install hardware in correct location, plumb and level.
- F. Reinforce substrates as required for secure attachment and proper operation.
- G. Thresholds: Apply continuous bead of sealant to all contact surfaces before installing.

### 3.03 ADJUSTMENT

- A. Adjust each operable unit for correct function and smooth, free operation.
- B. Adjust door closers to overcome air pressure produced by HVAC systems.
- C. If hardware adjustment is completed more than one month before substantial completion, readjust hardware not more than one week before substantial completion.

### 3.04 INSTRUCTION OF OWNER'S PERSONNEL

- A. Instruct the Owner's personnel in operation and maintenance of hardware, including finishes.

### 3.05 CLEANING

- A. Clean hardware; clean other work soiled during hardware installation.

### 3.06 CONTRACT CLOSEOUT

- A. Deliver all keys and extra blanks directly to the Owner.

### 3.07 HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

## Manufacturer List

<u>Code</u>	<u>Name</u>
BE	Best Access Systems
GLY	Glynn-Johnson
IVE	Ives
LCN	LCN Closers
SCH	Schlage Electronics
NA	National Guard
PE	Pemko
RO	Rockwood
ST	Stanley
VO	Von Duprin
YA	Yale
ZER	Zero International

Hardware Group No. 1

For use on Door #(s):

101

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL-9848-NL-OP-110MD- CON-CYL 24 VDC	626	VON
1	EA	FSIC CORE	23-030	626	SCH
1	EA	90 DEG OFFSET PULL	8190HD 10"	626	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	SET	SEALS/GASKETING	BY DOOR MANUFACTURER		
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-223	A	ZER
1	EA	CARD READER	BY SECURITY VENDOR		
1	EA	DOOR CONTACT	679-05	WHT	SCE
1	EA	POWER SUPPLY	PS902 BBK KL900 120/240 VAC	LGR	SCE
	EA	PROVIDE FACTORY POINT TO POINT DIAGRAMS PROVIDE RISER DIAGRAM			

DOOR NORMALLY CLOSED AND LOCKED.

ENTRY VIA KEY OR VALID CREDENTIAL. PRESENTING CREDENTIAL TO READER RETRACTS  
EXIT DEVICE LATCHBOLT ALLOWING ENTRY VIA ACTIVE LEAF.

FREE EGRESS AT ALL TIMES.

COORDINATION REQUIRED FOR ELECTRICAL INSTALLATION AND ACCESS CONTROL  
CONFIGURATION.

Hardware Group No. 2

For use on Door #(s):

101A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PUSH/PULL BAR	9190HD-10"	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	EA	MOUNTING PLATE	4050A-18 AS REQ'D	689	LCN
1	EA	CUSH SHOE SUPPORT	4050A-30 AS REQ'D	689	LCN
1	SET	SEALS/GASKETING	BY DOOR MANUFACTURER		

Hardware Group No. 03

For use on Door #(s):

113                      113A                      119

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU STOREROOM LOCK	ND80TDEU ATH RX CON 12V/24V DC	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050A EDA	689	LCN
1	SET	SEALS/GASKETING	188SBK PSA	BK	ZER
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-223	A	ZER
1	EA	CARD READER	BY SECURITY VENDOR		
1	EA	DOOR CONTACT	679-05	WHT	SCE
1	EA	POWER SUPPLY	PS902 BBK KL900 120/240 VAC	LGR	SCE
	EA	PROVIDE FACTORY POINT TO POINT DIAGRAM PROVIDE RISER DIAGRAM			

DOOR NORMALLY CLOSED AND LOCKED.

ENTRY VIA KEY OR VALID CREDENTIAL. PRESENTING CREDENTIAL TO READER TEMPORARILY RELEASES LEVER ALLOWING ENTRY.

FREE EGRESS AT ALL TIMES.

OPENING IS FAIL SECURE UPON LOSS OF POWER.

COORDINATION REQUIRED FOR ELECTRICAL INSTALLATION AND ACCESS CONTROL CONFIGURATION.



Hardware Group No. 04

For use on Door #(s):  
102

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD ATH	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	COAT AND HAT HOOK	554	626	IVE

Hardware Group No. 5

For use on Door #(s):  
107

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S ATH	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 6

For use on Door #(s):  
104                      108

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S ATH	626	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ FC	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	SET	SEALS/GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	544A-223	A	ZER

Hardware Group No. 07

For use on Door #(s):

105 106

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303 8" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ FC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	OH STOP	450S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 08

For use on Door #(s):

111

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80TD ATH	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	OH STOP	450S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 09

For use on Door #(s):

112 125 133

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	PASSAGE SET	ND10S ATH	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 10

For use on Door #(s):  
109

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S ATH	626	SCH
1	EA	SURFACE CLOSER	1450 EDA FC	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 11

For use on Door #(s):  
107A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S ATH	626	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ FC	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	SET	SEALS/GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	544A-223	A	ZER

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 08 80 00

### GLAZING

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Glazing in storefronts, windows, and aluminum entrance doors.
- B. Glazing in exterior hollow metal door, transom, and sidelight frames.
- C. Glazing in doors.
- D. Glazing in interior hollow metal borrow-light and sidelight frames.
- E. See Glass Schedule at end of this Section.

##### 1.02 REFERENCES (LATEST EDITION)

- A. American Society for Testing and Materials (ASTM)
  - 1. C509 Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
  - 2. C864 Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
  - 3. C1036 Standard Specification for Flat Glass
  - 4. C1048 Standard Specification for Heat Treated Flat Glass
  - 5. C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
  - 6. C1115 Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories
  - 7. E773 Standard Test Methods for Seal Durability of Sealed Insulating Glass Units
  - 8. E774 Standard Specification for Sealed Insulating Glass Units
  - 9. E1300 Standard Practice for Determining the Minimum Thickness of Annealed Glass Required to Resist a Specified Load
- B. Consumer Products Safety Commission (CPSC)
  - 1. 16 CFR 1201 Safety Standard for Architectural Glazing Materials
- C. National Fire Protection Association (NFPA)
  - 1. NFPA 80: Fire Doors and Windows.
  - 2. NFPA 257 – Fire Tests of Window Assemblies.
- D. Underwriters Laboratories, Inc. (UL)

1. UL 9 – Fire Tests of Window Assemblies.
  2. UL 10C – Positive Pressure Fire Tests of Door Assemblies.
- E. Flat Glass Marketing Association (FGMA)
1. Glazing Manual
  2. Sealant Manual

### 1.03 PERFORMANCE REQUIREMENTS

- A. Glass Strength
1. Provide glass thickness capable of resisting an equivalent design load, as defined by ASTM E1300, with a probability of failure of approximately 8 lites per thousand.
    - a. For monolithic annealed lites determine glass thickness per ASTM E1300.
    - b. For heat treated, tempered, laminated, and insulating glass units, determine per manufacturer's method.
- B. Glass Deflection
1. Using ASTM E1300, Appendix X1, provide glass having sufficient thickness to limit center deflection, relative to glass edges, per following criteria.
    - a. At 50% design windload, deflection shall not exceed 1% of least glass dimension, and not more than 1".
    - b. At 150% design windload, deflection shall be limited to prevent glass disengagement from frame.
- C. Heat Treatment
1. Provide heat treated glass when thermal stress analysis determines a solar absorption of 60 % or more, or where unfavorable shadow patterns occur on glass.
  2. Provide heat treated glass as further required for strength to resist windload.
  3. Provide fully tempered glass or other approved glazing for "safety glazing" applications. Heat strengthened glass is not an approved product.
- D. Fire-rated wired glazing material for use in borrowed lites with fire rating requirements of 45 minutes with hose stream test.

### 1.04 SUBMITTALS

- A. Product Data
1. Submit manufacturer's published product data sheets for confirmation of intent of products/systems to be provided on project.
  2. Bids proposing substitute products must be accompanied by manufacturer's literature showing conformance to all performance criteria.

3. Product Test Listing: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.
- B. Samples
1. Submit 12" x 12" labeled samples of insulated glass products specified for project verification.
  2. Samples shall have finished edges.
- C. Certificates
1. Provide certification from glass fabricator of acceptance of results of all required analysis and shop drawing checks as specified under "Quality Assurance".
  2. Provide certifications that installer's and glass fabricator's experience meets criteria specified under "Quality Assurance".
- D. Shop Drawings
1. On shop drawings submitted for Architectural approval, show and describe the following as a minimum:
    - a. Glass thickness
    - b. Description of glass, including: manufacturer, coatings, tint, heat treatment, special edge seal/adhesive, laminate, pattern, and frit, as applicable.
    - c. Nominal glass bite at framing
    - d. On elevations, indicate which lites are tempered.
- E. Warranties
1. Properly executed warranties are to be provided prior to final acceptance of work.

## 1.05 QUALITY ASSURANCE

- A. Qualifications
1. Installer shall be able to demonstrate not less than five (5) years successful experience in the installation of comparable projects.
  2. Glass fabricator shall be able to demonstrate not less than ten (10) years successful experience in the fabrication of specified glass products, and capable of providing the following:
    - a. Review and comment of glazing shop drawings and installation instruction as relating to:
      - 1) Proper system drainage and protection of insulation glass unit seals.
      - 2) Proper glass edge bite and support
      - 3) Other conditions that affect warranty
    - b. Thermal stress analysis
    - c. Glass strength and deflection checks

3. All glass shall be provided by a single manufacturer and fabricated by a single fabricator.
    4. Glass Manufacturer to be ISO 9001 Certified.
  - B. In addition to manufacturer's recommendations, conform to guidelines of the FGMA Glazing Manual.
  - C. Safety Glazing
    1. Conform to CPSC 16 CFR 1201 for requirements of safety glazing, or as superseded by local governing code.
    2. Tempered glass shall be permanently marked with certification label of Safety Glass Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- 1.06 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver, handle, and store all materials to prevent damage or deterioration, in conformance with manufacturer's instructions.
  - B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- 1.07 SITE CONDITIONS
  - A. Do not install glazing products in environmental conditions that are beyond the limitations set by the manufacturer.
  - B. Glazing channels shall be clear of water or ice and construction debris before installing glass.
- 1.08 WARRANTY
  - A. Insulating Glass Units
    1. Fabricator shall warrant to the Owner that the edge seal will not fail in adhesion or moisture vapor seal for a period of ten (10) years from date of substantial completion, when handled and installed in accordance with good industry practices and fabricator's instructions. Fogged or de-laminated I.G. units constitute failure.
    - 1.

## PART 2 - PRODUCT

### 2.01 PRIMARY GLASS PRODUCTS

- A. Manufacturers of primary glass shall be one of the following:
  1. PPG Industries.
  2. AGC Industries.



3. Guardian Industries Corp.
  4. LOF/Pilkington.
- B. Design Standards for Insulated Glazing Units:
1. Types IV and V: + Solarban 60 (2) Solargray + Clear by PPG Industries.
- C. Provide primary glass products that meet the requirements of ASTM C 1036.
- D. Clear Float Glass - Provide Type I (transparent glass, flat), Class I (clear), Quality q3 (glazing select).
- E. Glass lites shall not be less than 0.25 inch nominal thickness.

## 2.02 GLASS FABRICATORS

- A. Fabricators providing reflective sputter coatings, insulating glass units, laminating glass, ceramic frit spandrel, screen printed glass, acid-etched glass, tempered, and heat strengthened glass shall be one of the following or other certifying conformance to qualifications criteria:
1. AGC Flat Glass North America
  2. Guardian Industries
  3. Visteon Float Glass
  4. PPG Industries
  5. Oldcastle Glass
  6. Armstrong Glass Company

## 2.03 HEAT-TREATED FLAT GLASS PRODUCTS

- A. Provide heat-treated glass products that meet the requirements of ASTM C 1048.
- B. Manufacture heat-treated glass by horizontal (roller hearth) process, with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated.
- C. Tempered glass (Kind FT) shall have a minimum surface compression of 10,000 psi.
- D. Heat Strengthened glass (Kind HS) shall have a minimum surface compression of 3,500 psi, and a minimum edge compression of 5,500 psi.
- E. Tempered glass shall be permanently identified with the Safety Glazing Certification Council (SGCC) label, located inconspicuously at a corner, indicating certification of the product.
- F. Heat-treated glass with ceramic coating complying with ASTM C1048, Condition B (spandrel glass, one surface ceramic-coated), Type I (transparent glass, flat), Quality Q3 (glazing select) and with other requirements as specified.
- G. GANA/GTA 66-9-20, Specification for Heat-Strengthened or Fully Tempered Ceramic Enameled Spandrel Glass for Use in Building Window/Curtain Walls and Other Architectural Applications.

## 2.04 COATED GLASS PRODUCTS

- A. Metallic oxide reflective coatings applied by high performance wet chemical or vacuum deposition shall be applied to #2 surface of monolithic, or #2 or #3 surfaces of insulating glass units. Pyrolytic deposition coatings may be applied to #1 (exterior) surface.
- B. Quality Inspection Guidelines
  - 1. Pinhole Inspection
    - a. Glass is to be inspected from a distance of six (6) feet (1.8m). Pinholes larger than 1/16" (1.5mm) in diameter are not allowed.
    - b. Within any 12" (305mm) diameter circle, there shall be no more than four (4) pinholes, only one of which may exceed 1/32" (1mm) diameter.
  - 2. Scratch Inspection
    - a. Glass is to be inspected from a distance of ten (10) feet (3m). Scratches or rub marks shall not exceed 1/2" (12mm) x 1/32" (1mm).

## 2.05 INSULATING GLASS UNITS

- A. Provide pre-assembled units sealed with an organic sealant, enclosing a desiccated air or 90% argon gas space.
- B. Performance classification shall be Class "A" as determined by testing in accordance with specification ASTM E774.
- C. Spacer shall be aluminum with manufacturer's standard keyed or bent corner.
- D. Desiccant shall be manufacturer's standard silica gel, molecular sieves, or silica gel/molecular sieve blend.
- E. Provide dual-seal assembly consisting of polyisobutylene primary seal and silicone secondary seal.
- F. For structural silicone applications utilizing sealed insulating units, the silicone seal/adhesive shall be designed to withstand 50% of the design negative windload pressure.

## 2.06 GLAZING ACCESSORIES

- A. Dense Elastomeric compression Seal Gaskets
  - 1. Provide molded or extruded gaskets of material compatible with interfacing sealants, complying with ASTM C 864, Option I, of profile and hardness required to maintain watertight seal. Color black.
    - a. EPDM
    - b. Neoprene
    - c. Silicone - Comply with ASTM C 1115, classification CH7S3
- B. Cellular Elastomeric Preformed Gaskets

1. Provide extruded or molded closed cell, integral-skinned EPDM, Neoprene, or silicone of profile and hardness required to maintain watertight seal, complying with ASTM C 509, Option I, Type II, color black.

C. Setting Blocks

1. Provide setting blocks of material which has been tested to be compatible with interfacing glazing sealants and insulating glass unit seals. Hardness shall be Shore 'A' durometer of 85 +/-5.
  - a. EPDM
  - b. Neoprene
  - c. Silicone - Comply with ASTM C 1115, classification CH9S3.
2. Provide blocks of sufficient width to transfer the deadload of the glazing to the framing. Block shall be sized to support both lites of an insulating unit without inducing stress at edge seal.
3. Provide blocks of sufficient length as recommended by FGMA Glazing Manual and as further required by glass fabricator. In no case (excluding door glazing) shall less than two (2) blocks be used to support deadload, or less than 4" long per block. Cutting blocks down from size supplied and intended, whether in length or profile, is not allowed.
4. Spacing of setting blocks shall be at 1/4 points typically, and in no case closer to ends of supporting horizontal than 1/8 points.
5. Profile of setting blocks shall allow water to flow past, even if block is inadvertently set diagonally in glazing pocket.

D. Anti-Walk Edge Blocks

1. Provide solid edge blocks at vertical edges of glass of material and size as intended by framing manufacturer. Further comply with recommendations of glass fabricator and FGMA Glazing Manual.
2. Provide "W" type anti-walk blocks at vertical glass edges where solid blocks cannot be installed.

E. Spacers for Structural Glazing Systems

1. Spacer blocks, tapes, or extrusions adjacent to structural silicone shall be compatible as tested in accordance with ASTM C 1087 and complying with ASTM C 1115.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Glazier shall inspect framing prior to commencing glass installation. He shall report deficiencies and proceed only after such deficiencies are corrected. Items to inspect include, but are not limited to the following:

1. Compare framing openings to shop drawings for size and squareness.
2. Check that glazing channels are free of debris
3. Inspect weep system for conformance to shop drawings and that holes are not clogged. Check that weep pathways are open.
4. Ensure all necessary blocks and gaskets are in place.
5. Inspect internal joinery seals and splices that they are watertight. Check that corner seals do not interfere with glazing.

### 3.02 PREPARATION

#### A. Pre-Installation Meeting

1. General Contractor and Glazier shall meet to coordinate glazing work. Include other trades as affected and applicable. Ensure that stored and in-place glass will not be susceptible to damage by adjacent trades. Coordinate such that once glazing channels are cleaned and inspected, work from adjacent trades do not contaminate areas ready for glazing.

#### B. Protection

1. Protect surrounding areas from potential falling or breaking glass during installation or handling. Comply with applicable safety codes.
2. Use rolling blocks when rotating glass. Protect insulating glass edge seals from damage.

### 3.03 GLAZING

- A. Conduct final inspection of framing and glass for defects just prior to glazing.
- B. Do not proceed with installation of glass products unless ambient air temperature is above 40 degrees F (4.4 degrees C).
- C. Comply with recommendations from FGMA Glazing Manual.
- D. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
- E. Install necessary blocks, gaskets, baffles, water deflectors, and sealant per shop drawings and as required by framing manufacturer.
- F. Install and seal glazing stops per framing manufacturer's instructions and shop drawings.
- G. Prepare glass surfaces per sealant manufacturer's instructions prior to installing weatherseal and structural sealants.
- H. Install wedge gaskets per good industry practices, being careful not to stretch gasket while installing. Run gaskets long and crowd slightly into corners.
- I. Install temporary clips to allow structural silicone sealant to cure without being moved out of plane.
- J. Provide weep system as recommended by GANA Glazing Manual.
- K. Install so that appropriate UL markings remain permanently visible.

### 3.04 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the glazing has been installed.
- B. Promptly remove cork separator buttons from glass.
- C. Clean harmful contaminants from glass immediately.

### 3.05 PROTECTION

- A. Glazier shall advise General Contractor of procedures required by interfacing trades to maintain a protected glazing installation.
- B. Trades causing spills, caustic rundown or splatter, or breakage shall notify the Construction Manager immediately so that replacement or repair can be made by the Glazier.

### 3.06 GLASS SCHEDULE

- A. Type 'I'
  - 1. ¼" thick clear, float glass.
- B. Type 'II'
  - 1. ¼" thick clear, tempered glass
- C. Type 'III'
  - 1. ¼" thick clear wire glass for fire rated assemblies
- D. Type 'IV'
  - 1. Insulating Glass Units: Double-paned, Low-E, meeting the following performance criteria:
    - a. Overall thickness: 1".
    - b. Inboard lite: ¼" thick, clear.
    - c. Outboard lite: ¼" thick, gray tint.
    - d. Low-E coating on the No. 2 surface.
- E. Type 'V'
  - 1. Tempered Insulating Glass Units: Double-paned, Low-E, meeting the following performance criteria:
    - a. Overall thickness: 3/4".
    - b. Inboard lite: ¼" thick, clear, tempered.
    - c. Outboard lite: ¼" thick, gray tint, tempered.
    - d. Low-E coating on the No. 2 surface.

END OF SECTION

## SECTION 08 91 00

### LOUVERS AND BLANK-OFF PANELS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Dual Drainable Fixed Extruded Aluminum Louvers in Walls
- B. Louver accessories.
- C. Insulated Metal Blank-Off panels for Hollow Metal frames.

##### 1.02 REFERENCES

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; Latest edition.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; Latest edition.
- C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; Latest edition.
- D. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.; Latest edition.
- E. AMCA 511 - Certified Ratings Program for Air Control Devices; Air Movement and Control Association International, Inc.; Latest edition.
- F. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; Latest edition.
- G. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; Latest edition.
- H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; Latest edition.

##### 1.03 SUBMITTALS

- A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- C. Test Reports: Independent agency reports showing compliance with specified performance criteria.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum 3 years of documented experience.
- B. Structural Requirements: Design all materials to withstand wind and snow loads as required by the applicable building code. Maximum allowable deflection for the louver structural members to be 1/180 or 0.75 inch, whichever is less. Maximum allowable deflection for the louver blades to be 1/120 or 0.50 inch across the weak axis, whichever is less.

#### 1.05 PROJECT CONDITIONS

- A. Coordinate work of this section with installation of mechanical ductwork and electrical services to motorized devices.
- B. Verify substrates are ready to receive louvers.

#### 1.06 WARRANTY

- A. Provide 20-year manufacturer warranty against distortion, metal degradation, and failure of connections.
- B. Provide 10-year coverage against degradation of factory-applied exterior finish.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Exhaust and Intake Louvers in Metal Panel Walls:
  - 1. Stationary, dual-drainable, extruded aluminum louver.
  - 2. Design Standard: Airolite: Product Type K6846.
    - a. Equal products by Ruskin.
    - b. Equal products by Arrow United Industries.
    - c. Equal products by Construction Specialties, Inc.
    - d. Equal products by other manufacturer's meeting performance criteria.
  - 3. Finish: factory-applied Polyvinylidene Fluoride Coating: Minimum 70% Kynar 500/Hylar 500 resin, two-coat finish, complying with AAMA 2605.

#### 2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified under AMCA 511.
  - 1. Wind Load Resistance: Design to resist positive and negative wind loads of 30 psf without damage or permanent deformation.
  - 2. Free Area: Minimum 50%.
  - 3. Intake Louvers: Minimum free area velocity at beginning point of water penetration: 1,200 fpm when tested in accordance with AMCA 500-L.



4. Intake Louvers: Minimum air volume flow rate at beginning point of water penetration: 10,300 cfm when tested in accordance with AMCA 500-L.
  5. Intake Louvers: Maximum static pressure at beginning point of water penetration: 0.20 inches H<sub>2</sub>O when tested in accordance with AMCA 500-L.
  6. Dual Drainable Blades: Continuous rain stop at front or rear of blade with dual drainable gutters aligned with vertical gutter recessed into both jambs of frame.
  7. Screens: Provide aluminum insect screens at all intake louvers and bird screens at all exhaust louvers.
  8. Unless otherwise indicated, steel frames – heads, sills, jambs and mullions - are to be 16 gauge minimum material thickness.
  9. Unless otherwise indicated, fixed steel louver blades are to be 16 gauge minimum material thickness
  10. Unless otherwise indicated, aluminum frames – heads, sills, jambs and mullions - are to be 0.081 inches minimum material thickness.
  11. Unless otherwise indicated, fixed aluminum louver blades are to be 0.081 inch minimum material thickness.
- B. Mullions: Fixed intermediate mullions are to be concealed, and provided wherever vertical support is required to meet performance criteria.
- C. Finishes: Louvers are to have the finish coatings as indicated. Color to be selected by Architect from manufacturer's standard range of options.

## 2.03 LOUVER MATERIALS

- A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch (0.6 mm) thick base metal, but not less than gauge indicated.
- B. Extruded Aluminum: ASTM B 221 (ASTM B 221M) Alloy 6063-T5, 6063-T6 or 6061-T6.
- C. Aluminum Sheet: ASTM B3209, Alloy 1100, 3003 or 5005.
- D. Bird Screen: Interwoven wire mesh of stainless steel, 0.047" (1.2 mm) diameter wire, ½" (13 mm) open weave, diagonal design.
- E. Insect Screen: 18 x 16 size stainless steel mesh with a .047" (1.2 mm) thick galvanized steel frame. Screens and screen frames to be standard mill finish.

## 2.04 LOUVER ACCESSORIES

- A. Blank-Off Panels: 20 gage (1 mm) galvanized steel sheet skins with insulated core of polyisocyanurate foam core. 2" (50 mm) thick; R Value to equal 10 minimum, painted black on exterior side.
  1. Provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct. Provide at existing louvers to be abandoned.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Fasteners and Anchors: Aluminum or Stainless steel.

- D. Sill Flashings: Of same material and finish as louver frame, formed to required shape, single length in one piece per location, pitched to drain with interior up-tuned edge. Pre-finished to match louver.
  - 1. End Damns: Loose angle of same material as flashing; Silicone in place and sealed weather tight.
- E. Gaskets: Closed cell compression gaskets shall be provided between bottom of the mullion or jamb and the top of the sill to insure leak tight connections.
- F. Flanges: Of same material and finish as louver frame, formed to required shape, single length in one piece per location. Pre-finished to match louver.

## 2.05 INSULATED BLANK-OFF PANELS FOR HOLLOW METAL FRAMES

- A. Galvanized 20 ga steel sheet.
- B. Insulation: Textile type glass fibers banded together with a thermosetting resin. Min. R-Value of 4.2 per 1 inch of thickness.
- C. Thickness: 1 inch.
- D. Fabrication: Pan-in-Pan Design; Silicon wet-sealed and mechanically fastened to the hollow metal frame with stainless steel fasteners.
- E. Finish: factory-applied prime coating suitable for field painting.
- F. Design Standard: NCA Manufacturing: Louver Blank-Off panel, Insulated.
  - 1. Equal products by other manufacturer's meeting performance criteria.

## PART 3 -EXECUTION

### 3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on shop drawings.

### 3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Provide proper separation of dissimilar materials where substrate material is other than aluminum.
- C. Install louvers level and plumb.
- D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- E. Secure louver frames in openings with concealed fasteners.
- F. Install insulated blank-off panels against existing through-wall louvers using non-corroding metal brackets and fasteners. Apply clear silicone sealant around perimeter to prevent air and water infiltration.

### 3.03 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.
- C. Remove all applied labeling, unless required by local authorities.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 09 05 61

### MOISTURE VAPOR EMISSION CONTROL

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Independent Concrete Slab Moisture Testing to determine suitability of concrete substrate conditions.
- B. Pre-formed moisture suppression membrane installed over concrete subfloor as a floor covering underlayment wherever resilient floor coverings are indicated.
- C. See Quantity Allowance in this Section.

##### 1.2 RELATED SECTIONS

- A. Allowances - Division 1.
- B. Unit Prices – Division 1
- C. Section 09 65 19 - Resilient Tile Flooring.

##### 1.3 REFERENCES

- A. ASTM D2646-05- Standard Test Methods for Backing Fabric Characteristics of Pile Yarn Floor Coverings.
- B. ASTM G21-15- Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- C. ASTM D5197 – 09e1 – Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology).
- D. ASTM D5729-97 (2004)e1 – Standard Test Method for Thickness of Nonwoven Fabrics.
- E. ASTM E96-05 – Standard Test Methods for Water Vapor Transmission of Materials.
- F. ASTM F710 – Standard Practice Preparing Concrete Floors.
- G. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 34 00.
- B. Product Data: Manufacturer's data indicating product physical characteristics, performance criteria, and limitations of use, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.

3. Installation methods.

- C. Warranty Registration: Manufacturer's warranty registration with concrete subfloor moisture test results and building ambient air temperature and relative humidity test results.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2 year experience installing similar products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 COORDINATION

- A. Coordinate the work of this section and directly related sections with concrete floor construction and repair.
- B. Coordinate the work of this section and directly related sections with finish flooring work.

PART 2 PRODUCTS

2.1 MOISTURE SUPPRESSION SYSTEM FOR FLOORING PRODUCTS

- A. Free-standing, dimensionally stable, composite product, engineered as a moisture suppression membrane to be used on concrete floors where high moisture exists.
  - 1. Dimensions: Minimum 4 feet wide (1.52 m) roll.
  - 2. Mold, Mildew and Fungal Resistance, ASTM G21: Passed
  - 3. Moisture Vapor Transmission rate, ASTM E96: 0.044 g/hr/ sq m
  - 4. 100% VOC Free
- B. Accessories: Joining of moisture suppression underlayment seams.

1. Description: Membrane manufacturer's moisture suppression tape with pressure sensitive adhesive.
2. Properties: Moisture suppression and adhesion per manufacturer's specifications.
3. Dimension: Minimum 4 inches wide (102 mm) in double-sided rolls.

## 2.2 QUANTITY ALLOWANCE

- A. Products in this Section are to be included in an Allowance. See Division 1.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Concrete Subfloor:
  1. Verify internal RH of the concrete according to ASTM F-2170.
  2. Record readings and submit with manufacturer's warranty registration.
  3. Do not install if relative humidity levels within the concrete exceed 99.55% RH or 12 pH.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 PREPARATION

- A. Concrete Sub Floor:
  1. Prepare floor according to manufacturer's instructions including removal of existing materials on concrete surface, grinding protrusions flat, and filling low spots with water-resistant (moisture resistant, or exterior grade) cementitious patching or leveling compound.
  2. Remove debris and excessive dust from the surface.

### 3.4 UNDERLAYMENT INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install moisture suppression membrane with smooth film side facing concrete slab.
- C. Install in accordance with membrane manufacturer's current written installation instructions.
- D. If any jobsite condition interferes with compliance with manufacturer's instructions, contact

manufacturer and obtain written job-specific procedures. Notify Architect or Owner's representative describing the interfering jobsite condition and manufacturer's job-specific instructions.

- E. Install finish material upon moisture suppression membrane immediately after placement. Minimize all foot traffic and/or rolling loads directly on surface of membrane prior to installation of finish materials.

### 3.5 FLOORING INSTALLATION

- A. Adhesives: Spray adhesives, latex, acrylics, urethanes, poly-urethanes, epoxies, modified mortar, and other non-solvent based adhesives to be applied at finish flooring manufacturer's recommended "non-porous spread rates".
- B. Protection: Protect moisture suppression membrane from damage during flooring installation. Do not tear, rip, puncture, or delaminate membrane when applying trowel-on adhesive. Repair damaged areas according to membrane manufacturer's instructions before flooring installation. Provide continuous, intact moisture suppression membrane under entire finished flooring area.
- C. Vinyl Tile: Adhere directly to moisture suppression membrane using tile manufacturer's recommended adhesive.

### 3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION



## SECTION 09 06 00

## SCHEDULE FOR FINISHES

COLOR CODE	MATERIAL	LOCATION	DESCRIPTION
		For Reference Only See Drawing for Specific Locations	
RF-01 <b>Base Bid</b>	Commercial Luxury Vinyl Tile	Super / Open Office / Crew Area / Break / Corridor (Cooler Storage Rm & IT Closet excluded)	To Match: Mfr.: Parterre Style: Instinct Color: Coastal- 412DW304 Size: 12" x 24" Pattern: Ashlar  Contact: Faith Kilafwasru; faith@kingbostrom.com
RF-02 <b>Base Bid</b>	Resilient Flrg Slip Retardant	Lockers / Corridor / Toilets / Showers	To Match: Mfr.: Armstrong Style: Safety Zone Sheet Color: Spice White- 5A256 Size: 6" x 66" Pattern: Contact: Kayla Sandler; KRSadler@armstrongflooring.com
RES-01 <b>Bid Alternate</b>	Resinous	Super / Open Office / Crew Area / Break / Corridor / Lockers / Toilets / Showers (Cooler Storage Rm & IT Closet excluded)	To Match: Mfr.: Stonhard Product: Stongard MR – 40 mil Color: Charcoal Texture: Orange peel in all spaces, except textured in Shower Rms, Toilet Rms & Locker Rms Sheen: Matte  Contact: Justin Clark; justin.clarke@stonhard.com
WOF-01	Walk-Off Tile	Vestibule	To Match: Mfr.: EF Contract Style: Access (AX) Color: Ingress- AX904 Size: 24" x 24" Pattern: Monolithic  Contact: Faith Kilafwasru; faith@kingbostrom.com

COLOR CODE	MATERIAL	LOCATION	DESCRIPTION
		For Reference Only See Drawing for Specific Locations	
RSB-01	Commercial Wall Base	General Wall Base	To Match: Mfr.: Tarket Collection: BaseWorks Thermoset Rubber Wall Base Product: 4" Color: Moon Rock WG- 29
PT-1	Paint	General Wall Color – Unless Noted Otherwise	To Match: Mfr.: Sherwin Williams Color: 7008 Alabaster 255-C2 Sheen: Flat
PT-2	Paint	Interior HM Doors and Frames	To Match: Mfr.: Sherwin Williams Color: 1015 Skyline Steel 283-C3 Sheen: Semigloss
PT-3	Paint	Exterior HM Doors and Frames	To Match: Mfr.: Sherwin Williams Color: 7019 Gauntlet Grey 244-C6 Sheen: Semigloss
PT-4	Paint Accent Color	Toilet & Shower Room / Break Room Wet Walls Only	To Match: Mfr.: Sherwin Williams Color: 6495 Great Falls 172-C6 Sheen: Semigloss
PT-5	Paint	Wood Window Stools	To Match: Mfr.: Sherwin Williams Color: 7690 Townhall Tan 292-C2 Sheen: Semigloss
PT-6	Paint	To Be Determined	To Match: Mfr.: Sherwin Williams Color: TBD Sheen: TBD
PL-1	Plastic Laminate	Cabinets	To Match: Mfr.: Wilsonart Product Type: Standard Laminate Color: Neo Walnut 7991-38 Finish: Fine Velvet Finish
PL-2	Plastic Laminate	Countertops	To Match: Mfr.: Wilsonart Product Type: Premium Laminate Color: Calcutta Marble 4925K-07 Finish: Textured Gloss

FACTORY FINISHED PRODUCT COLOR CODES			
TP-1	Toilet Partitions - HDPE	Toilets	To Match: Mfr.: Scranton or ASI Color: Shale
LK-01	Lockers	Locker Room	To Match: Mfr.: Penco Color: 012 Tawney Tan

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 09 22 16

### GYPSUM BOARD ASSEMBLIES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Metal stud wall framing, non-structural.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.
- D. Framing accessories.

##### 1.02 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry: Wood blocking for support of wall-mounted equipment.
- B. Section 07 21 00 – Thermal Insulation: Sound Attenuation Batt Insulation.
- C. Section 07 92 00 – Joint Sealants.

##### 1.03 REFERENCES

- A. ASTM C 36/C 36M - Standard Specification for Gypsum Wallboard; 1999.
- B. ASTM C 79/C 79M - Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board; 1997.
- C. ASTM C 442 - Standard Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board; 1999a.
- D. ASTM C 475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 1994.
- E. ASTM C 630/C 630M - Standard Specification for Water-Resistant Gypsum Backing Board; 1996a.
- F. ASTM C 1178 - Standard Specification for Coated Glass Mat Water Resistant Gypsum Backing Panel
- G. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 1999.
- H. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 1999a.

- I. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 1999.
- J. ASTM C 1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases; 1998.
- K. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 1999.
- L. ASTM E 413 - Classification for Rating Sound Insulation; 1987 (Reapproved 1999).
- M. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2000.
- N. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

#### 1.04 SUBMITTALS

- A. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.

#### 1.05 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

#### 1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Gypsum Board:
  - 1. G-P Gypsum Corporation; [www.gp.com](http://www.gp.com).
  - 2. National Gypsum Company; [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - 3. USG Corporation; [www.usg.com](http://www.usg.com).

#### 2.02 METAL FRAMING MATERIALS

- A. Non-Loadbearing Framing Studs and Runners: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf. Systems to receive water resistant gypsum board or backer board: Maximum deflection of 1/360 of partition

height. Interior suspended ceilings and soffits: Maximum deflection of 1/360 of distance between supports. Cavity shaftwall systems: Withstand minimum positive and negative pressure of 5 psf.

1. Studs: C shaped with knurled faces.
  2. Runners: U shaped, sized to match studs.
  3. Ceiling Channels: C shaped.
  4. Furring: Hat-shaped sections, minimum depth of 3/4 inch.
  5. Depth of sections: As indicated.
  6. Provide 25 gauge studs, except as otherwise indicated or specified. Provide heavier gauge if required.
  7. At door and borrowed light frames, provide (2) 25 gage minimum studs at each jamb. Where wall is indicated or specified to be typically framed with 20 gauge studs, provide (2) 20 gauge studs at each jamb.
  8. Not used. Depth of sections: As indicated.
  10. Corrosion protection: G40 hot-dipped galvanized coating per ASTM A525.
- B. Partition Head to Structure Connection: Provide mechanical anchorage devices that accommodate 1" downward and 1/2" upward deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
  2. Products: Provide vertical deflection stud track system.
    - a. MaxTrak (SLT) by ClarkDietrich Building systems, or equal, as approved by UL for 1-hour and 2 –hour fire rated systems.

## 2.03 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Wallboard: ASTM C 36/C 36M; sizes to minimize joints in place; ends square cut.
1. Thickness: As indicated.
  2. Edges: Tapered.
  3. Facing paper and liner to be 100% recycled natural-finish paper.
- B. Ceiling Board: ASTM C 1396 (Section 12), non-sag type.
1. Thickness: ½ inch.
  2. Core: with additives to resist sagging.

- C. Fire Rated Gypsum Wallboard: ASTM C 36/C 36M; Type X or C to match required tested assemblies by UL, GA, or WH; sizes to minimize joints in place; ends square cut.
  - 1. Thickness: As required to match tested fire rated assembly indicated.
  - 2. Edges: Tapered.
  - 3. Facing paper and liner to be 100% recycled natural-finish paper.
- D. Moisture and Mold Resistant Gypsum Backing Board: ASTM C 1396 (Section 5); regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
  - 1. Thickness: As indicated.
  - 2. Edges: Tapered.

## 2.04 ACCESSORIES

- A. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board on all partitions with sound attenuation insulation.
- B. Corner Beads: Galvanized steel.
- C. Edge Trim: Bead type(s) as detailed.
- D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
  - 1. Ready-mixed vinyl-based joint compound.
  - 2. Joint Tape at glass-mat sheathing board: vapor-retardant foil tape.
- E. Screws: ASTM C 1002; self-drilling type; cadmium-plated for exterior locations.
- F. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- G. Vapor-retardant Foil Tape: Aluminum foil/fiberglass scrim/Kraft paper(FSK Facing) with water-based adhesive.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

### 3.02 FRAMING INSTALLATION

- A. Metal Framing: Fabricate and install systems according to manufacturer's instructions, but not less than that required to comply with ASTM C754.



- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
  - 1. Level ceiling system to a tolerance of 1/1200.
- C. Studs: Space studs as indicated.
  - 1. Extend stud framing through ceiling to structure above only where indicated.
  - 2. Partitions Terminating at Structure: Attach top runner to structure. See drawings for minimum connection required. Maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at masonry or concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
  - 1. Orientation: Horizontal.
  - 2. Spacing: As indicated.
- F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- G. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.

### 3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Batts Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Place one bead continuously on substrate before installation of perimeter framing members.
  - 2. Place continuous bead at perimeter of each layer of gypsum board.
  - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

### 3.04 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C 840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

- C. Single-Layer Fire-Rated: Install gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Gypsum Sheathing: Install horizontally, with edges butted tight and ends occurring over firm bearing.
- E. Installation on Metal Framing: Use screws for attachment of all gypsum board.
- F. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

### 3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
  - 1. Not more than 30 feet apart on walls over 50 feet long.
  - 2. Where feasible, align control joint with one side of a door frame and extend from top of frame to above ceiling.
  - 3. In corridors, align control joints on both side walls with each other.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

### 3.06 JOINT TREATMENT

- A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.

### 3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

### 3.08 FINISH LEVEL SCHEDULE

- A. Level 1: Above finished ceilings concealed from view.
- B. Level 2: Utility areas and areas behind cabinetry.
- C. Level 3: Walls scheduled to receive textured wall finish.
- D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
- E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

### 3.09 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 09 51 00

### ACOUSTICAL CEILINGS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

##### 1.02 REFERENCES

- A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 1997.
- B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1996.
- C. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint; 1996.
- D. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 1998.

##### 1.03 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years experience.

##### 1.04 SUBMITTALS

- A. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.

##### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

##### 1.06 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

- B. Install acoustical units after interior wet work is dry.

#### 1.07 EXTRA MATERIALS

- A. Provide 40 sq ft of each type of acoustical unit for Owner's use in maintenance of project.

#### 1.08 WARRANTY

- A. Provide single source manufacturer's warranty for both suspensions system and tile for a period of 30 years from the date of substantial completion.

### PART 2 - PRODUCTS

#### 2.01 ACOUSTICAL UNITS

- A. Manufacturers:
  - 1. Armstrong World Industries, Inc; [www.ceilings.com](http://www.ceilings.com).
  - 2. Celotex Corporation.
  - 3. USG Interiors, Inc.; USG Corporation
- B. Acoustical Units
  - 1. Type: Wet-formed mineral fiber or fiberglass as indicated in Schedule.
  - 2. Surface Finish: Factory-applied vinyl latex paint, white, unless otherwise noted.
  - 3. Flame Spread/Fire Resistance: Class A: Flame Spread 25 or under (UL Labeled) per ASTM E 84.
  - 4. See Schedule for Types.

#### 2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
  - 1. Provide same manufacturer as for acoustical units.
- B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.
- C. Exposed Steel Suspension System: Formed galvanized steel, commercial quality cold rolled, with painted finish; Heavy-duty.
  - 1. Profile: Tee; 15/16 inch wide face, 11/16 inch tall web height.
  - 2. Construction: Double web, Rotary Stitched, Peakform bulb profile on main beams.
  - 3. Product: See Schedule for Types.

## 2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
  - 2. Provide longest possible length and minimize splicing.
- C. Hangar Wire: Minimum 12 gauge.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Verify that ceiling height indicated will clear the existing window head frames.
- D. Verify that above ceiling items of work will fit within the space allocated before installation of ceiling grid.

### 3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
  - 1. Tie both ends of wire by wrapping around itself a minimum of three (3) complete 360 degree tight turns.
  - 2. Install support hanger wire is that it is taut.
  - 3. Install as required by manufacturer to meet seismic performance criteria indicated on documents.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Where patching, repairing, or attaching to existing ceilings match existing grid layout.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- J. Do not eccentrically load system or induce rotation of runners.
- K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Use longest practical lengths and minimize splicing.
  - 2. Miter corners.
  - 3. Meet local building code criteria for seismic loading.
  - 4. Maintain levelness throughout.

### 3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
  - 1. Cut to fit irregular grid and perimeter edge trim.
  - 2. Make field cut edges of same profile as factory edges.

### 3.04 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

### 3.05 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

### 3.06 SCHEDULE

- A. Type 1: Typical throughout, unless otherwise indicated. Tile: Armstrong Fine Fissured #1732; 24" x 24" x 5/8"; NRC: 0.55 minimum; CAC 35 minimum; LR: 85% minimum; Pre-Consumer Recycled content: 35% minimum; No added VOC/ Formaldehyde content, or approved equal. Grid: Prelude XL 15/16", white finish, by Armstrong, or approved equal by listed manufacturer.



- B. Type 2: Use in Lockers, Corridor, Toilets & Showers, and Cooler Storage Room. Tile: Armstrong Ceramaguard Fine Fissured #607; 24" x 24" x 5/8"; NRC: 0.55 minimum; CAC 35 minimum; LR: 80 % minimum; Pre-Consumer Recycled content: 35% minimum, or approved equal. Grid: Prelude Plus XL 15/16", white finish, by Armstrong, or approved equal by listed manufacturer.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 09 65 19

### RESILIENT FLOORING

#### PART 2 – GENERAL

##### 1.01 SUMMARY

- A. Scope
  - 1. Resilient flooring work as shown, scheduled, or specified, complete with accessories and trim for a finished installation.
  - 2. Resilient wall base.
  - 3. Moisture vapor control.
  - 4. Independent Testing to determine suitability of substrate conditions.
  - 5. Final stripping, cleaning and sealing.
- B. Related Work Specified In Other Sections
  - 1. Allowances – Division 1.
  - 2. Alternates – Division 1.
  - 3. Moisture Vapor Emission Control – Division 9.
  - 4. Schedule for Finishes– Division 9.

##### 1.02 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum five years documented experience.
- C. Testing Agency
  - 1. Retain the services of an Owner-approved, independent testing agency to perform required calcium chloride, relative humidity, and PH tests on the concrete subfloors.

##### 1.03 SUBMITTALS

- A. Submit product data for resilient flooring material.
- B. Submit samples of proposed resilient flooring materials.
- C. Submit product data for adhesives and sealants used at Project site, including printed statement of VOC limits, and certify compliance with South Coast Air Quality Management District Regulation #1168.
- D. Submit calcium chloride, relative humidity, and PH test results a minimum of 30 days prior to scheduled installation of flooring products.

#### 1.05 OPERATION AND MAINTENANCE DATA

- A. Submit maintenance data for care and cleaning of resilient flooring materials per Division 1 requirements.

#### 1.06 MAINTENANCE MATERIALS (EXTRA STOCK)

- A. Furnish to the Owner extra materials for maintenance purposes of each material provided, of same lot, run or batch used, including but not limited to the following:
  - 1. Floor Tile: Not less than 2% (to the nearest full carton) of the amount of each type and color installed.
  - 2. Resilient Base: Twenty linear feet of each type and color in roll form.

#### 1.07 PRODUCT STORAGE

- A. Deliver products to the Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).
- C. Move products into spaces where they will be installed at least 48-hours before installation, unless longer conditioning periods are recommended in writing by the manufacturer.

#### 1.08 PROJECT CONDITIONS

- A. Environmental Requirements
  - 1. Rooms or areas scheduled to receive resilient flooring shall be continuously maintained at not less than 65 deg F from at least 48 hours prior to installation to at least one week after installation.
- B. Protection
  - 1. Protect completed work from traffic and damage with durable temporary coverings. Do not allow traffic during first 24 hours after installation of resilient flooring materials.
- C. Sequencing, Scheduling
  - 1. Do not start installation of resilient flooring until other finish work, including painting, has been completed in each room or area.
  - 2. Install flooring before installation of floor-mounted millwork and cabinetry.

### PART 3 – PRODUCTS

#### 2.01 MATERIALS

- A. Resilient Flooring (RF-01): Commercial Luxury Vinyl Tile,
  - 1. Face size 18 inch x 18 inch,
  - 2. Thickness: 2.5 mm thick

3. Wear layer: 20 mil or 0.020 inch (0.5 mm).
  4. Fire Hazard Classification: Class A.
  5. Provide tile to match colors/patterns specified in Schedule for Finishes 09 06 00.
  6. Acceptable Manufacturer's:
    - a. Armstrong.
    - b. Mohawk Flooring.
    - c. Shaw.
    - d. Tandus-Centiva.
    - e. Mannington.
- B. Resilient Flooring (RF-02): Slip-Retardant Flooring,
1. Face size 72 inch x 66 ft,
  2. Thickness: 2.0 mm thick
  3. Through-Pattern Wear Layer.
  4. Fire Hazard Classification: Class A.
  5. Static Load Resistance: ASTM F 970;  $\leq 1000$  psi
  6. Provide tile to match colors/patterns specified in Schedule for Finishes 09 06 00.
  7. Acceptable Manufacturer's:
    - a. Armstrong.
    - b. Mohawk Flooring.
    - c. Tarkett.
    - d. Gerflor
- C. Coved Resilient Base: 4-inch or 6 inch by 1/8 inch thick, with Satin finish, conforming to ASTM F-1861, Group 1, **Type TS**, Cove Style, in colors and type to match colors/patterns specified in Schedule for Finishes 09 06 00.
1. Design Standard:
    - a. Tarkett: Product **Type TS**.
    - b. Substitutions: Permitted, provided specified technical and appearance requirements are met.
  2. Other Acceptable Manufacturers:
    - a. Burke
    - b. Roppe.
    - c. Mannington.
  3. Dimensions:
    - a. Height: 4 inch as scheduled.
    - b. Thickness: 1/8 inch.
    - c. Length: Roll form, 120 foot length.
    - d. Corners: Preformed inside corners; Field-formed outside corners.
- E. Adhesives: Approved waterproof adhesives and cements of brands and types recommended and guaranteed by the approved resilient materials manufacturers for application of resilient materials to the various types of surfaces to be covered.
1. Low VOC rating in compliance with the CRI Green Label Plus requirements.
  2. Use flooring manufacturer's recommended anti-microbial adhesive for excessive moisture suitable for use up to the following conditions:
    - a. Calcium Chloride test results up to, but not exceeding, 10 lbs. per ASTM F1869.

- b. Internal Relative Humidity (IRH) test results up to, but not exceeding, 90% per ASTM F 2170.
  - c. Alkali test results up to, but not exceeding, pH 10 per ASTM F 170.
- F. VOC Limits: Comply with South Coast Air Quality Management District Requirements for VOC limits in adhesives, shown below:
  - 1. Carpet 50 grams/liter.
  - 2. Wood Floor 100 grams/liter.
  - 3. Rubber Tile 60 grams/liter.
  - 4. VCT 50 grams/liter.
  - 5. Cove Base 50 grams/liter.
- G. Stripping, Finishing and Sealing Materials: Use products approved by flooring manufacturer for use on its flooring products in accordance with its warranties.
- H. Underlayment Material: For isolated flooring irregularities. Type as recommended by the resilient flooring manufacturer, for patching defects in substrates to receive resilient flooring material.
- I. Edge Strips: Vinyl, minimum 1" wide with beveled edges.
  - 1. Install at transition to hard flooring finishes that vary in thickness.
  - 2. Install at transition to unfinished concrete slab.
  - 3. Coordinate with edge strips provided by other floor finish trades.

## PART 4 – EXECUTION

### 3.01 PREPARATION

- A. Clean and prepare surfaces as required to receive adhesives and resilient materials. Remove all surface contaminants that would prevent bonding of resilient materials.
- B. Substrates shall be made dry, clean and free of all foreign material such as dust, wax, solvents, paint, grease, oils, old adhesive residue, curing and hardening/ curing compounds, sealers and other foreign material that might prevent adhesive bond.
- C. Fill all cracks, holes, low spots and other irregularities to produce a smooth, even surface.
- D. HVAC System: Must be operational and maintaining the following conditions:
  - 1. Temperature: The installation site, carpet and adhesive must be between 65°F and 95°F. The adhesive will not function properly when applied over an extremely cold surface. Do not begin the installation if the subfloor temperature is below 50°F.
  - 2. Humidity: The installation site's ambient relative humidity must not exceed 65%.
- E. Conduct Internal Relative Humidity (IRH) testing for all concrete substrates according to ASTM F 2170. Calcium Chloride tests may be conducted in addition to IRH and must be performed per the latest edition of ASTM F 1869.

1. Three internal relative humidity tests should be conducted for areas up to 1000 SF. One additional test, for each additional 1000 SF.
  2. Test results exceeding 90% RH may require corrective action per manufacturer's recommendations, which may include the installation of moisture vapor emission control specified elsewhere in Division 9.
- F. Provide Alkali test according to ASTM F 170 on scheduled concrete slab areas to insure concrete slab acceptability. Remove curing agents in and around the test area prior to conducting test. Test results shall fall within flooring manufacturer's acceptable pH levels for specified adhesive prior to installation.
1. Readings below 7.0 or in excess of 10.0 may require corrective action per manufacturer's recommendations, including a clear water rinsing.
- G. Conduct Calcium Chloride test on scheduled concrete slab areas to receive flooring according to ASTM F1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor Using Anhydrous Calcium Chloride" to insure concrete slab acceptability. Remove curing agents in and around the test area prior to conducting test.
1. Conduct three tests for areas up to 1,000 SF. Conduct one additional test for each additional 1,000 SF.
  2. Test results exceeding 10.0 lbs per 1,000 SF per 24 hours may require corrective action per manufacturer's recommendations, which may include the installation of moisture vapor emission control specified elsewhere in Division 9.
- H. Provide a 72-hour Qualitative Bond Test in a 48-inch by 48-inch area using the specified adhesives. Remove curing agents, old adhesives, inhibitors, oil and grease in the scheduled area prior to test to assure proper installation.
- I. Notify Owner's Representative if test results fall outside of manufacturer's acceptable levels prior to installation.
- A. Do not proceed with installation until satisfactory test results are achieved, or until moisture mitigation measures have been performed.

### 3.02 INSTALLATION

- A. General
1. Install all materials as recommended by the manufacturer and per the additional requirements of this Section. Align all joints and lay all joints tight with each finished surface in flush, true plane. Roll or press all materials in place to insure contact with sub-surfaces.
  2. Maintain temperature of materials a minimum of 22 °C (70 °F,) for 48 hours before installation.
  3. Maintain temperature of rooms where work occurs between 21 °C and 27 °C (70 °F and 80 °F), for at least 48 hours, before, during and after installation.
  4. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

5. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings

B. Floor Tile

1. Center each room or area with respect to the principal permanent walls and start laying tile from such centers. Apply adhesive to substrates. Lay tiles to show grain or pattern running in one direction only. Where field pattern does not work out to full units at perimeter, lay out the pattern to provide perimeter units of equal width, but not less than half tile wide. Where tile is same pattern and color for adjacent rooms or areas, continue tile through doorways. At depressed floor covers for embedded utility boxes, fill covers with accurately cut and fitted tile firmly cemented to cover.
2. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
3. Where tiled floor terminates at an untiled floor, install continuous reducer strip.
4. Install proper type of threshold as scheduled or indicated.
5. Install static-conductive tile so that completed installation complies with the requirements of NFPA Bulletin No. 56A.

C. Resilient Base

1. Install resilient base in adhesive on all vertical surfaces scheduled and indicated; continue into all recesses, closets, projections, and on toe spaces of equipment or cabinet items as required. Use longest lengths practicable.
2. Field-form all outside corners, heating and cooling base as necessary to permanently set the shape; notch and miter cove for inside corners; use long lengths to form corners so as to extend beyond corners as far as possible, but not less than 6 inch from corner.
3. Use preformed sections for all inside corners. Preformed sections shall extend not less than 6 inch from corner.

### 3.03 LOCATION

- A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework, and other equipment occurs, except where mounted in wall recesses.
- B. Extend tile flooring for room into adjacent closets and alcoves, unless otherwise indicated.
- C. Extend tile flooring under millwork and cabinets within rooms, unless otherwise indicated.

### 3.04 SITE ENVIRONMENTAL PROCEDURES

- A. Temporary Ventilation: Ventilate floor coverings prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F



minimum, to 90 degrees F maximum continuously for minimum 72 hours. Do not ventilate within limits of Work unless otherwise approved by Architect.

### 3.05 ADJUSTING AND CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.
- B. Clean adhesives from adjacent finished surfaces as the work progresses; pay all costs incurred if adjacent finished surfaces cannot be cleaned to their original condition and need to be repaired or replaced.
- C. Clean all resilient flooring materials upon completion of installation.
  - 1. Use only products on Owner's preferred manufacturer list for floor finishing and stripper.
  - 2. Apply four (4) coats of Floor Finish on clean, dry, hard-surface flooring. Apply first coat of finish immediately after cleaning and sealing; apply final coat of finish just prior to occupancy by the Owner.
  - 3. Within 48 hours of applying the final coat of finish, dry burnish the floor using a beige combination pad.
  - 4. Green Seal certified products shall be used.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 09 67 23

### RESINOUS FLOORING (BID ALTERNATE)

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. General Use Resinous System – rigid epoxy.
- B. Control joint fillers and accessories.
- C. Sealants between resinous floor and other materials.
- D. Primers.
- E. Surface Testing.

##### 1.02 SUMMARY

- A. Definitions: Resinous flooring includes penetrating epoxy primer, multi-component mortar consisting of epoxy resin, curing agent and aggregate, epoxy undercoat, aggregate, clear epoxy coating, and clear polyurethane sealer.

##### 1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Submit minimum 12 inch square samples of floor coating system showing progressive construction of floor the system by layers, standard color for selection, and finish texture of coating.
- C. Submit sample joint approximately 3/8 inch wide sealed with recommended sealant.
- D. Manufacturer's Certification, Approval or Manufacturer Trained Documentation: Include affirmation that installer is authorized by, certified by, or trained by the manufacturer to install specified system.
- E. Material Test Reports: For each resinous flooring component.
- F. Submit for review, floor coating manufacturer's printed product data for coating system and sealant and manufacturer's chart of standard colors.
  - 1. Submit manufacturer's printed installation instructions including unrestrained edge details and instructions for cleaning and/or pretreating substrate materials.

- G. Submit documentation of installer's experience and a listing of completed installations, similar to specified systems, for the past 5 years. References shall include current contact names and phone numbers.
- H. Guarantee
  - 1. Guarantee to the Owner, in writing by the manufacturer, that the installed floor coating system will remain free of defects in materials and workmanship for a period of 1 year after acceptance, from:
    - a. Loosening of the bond.
    - b. Scaling, crumbling, popping, spalling, pitting and fading of the coating.
    - c. Hardening, crumbling, or softening of the joint sealant.
    - d. Chemical incompatibility between coating and sealant.
    - e. Loss of adhesion between sealant and concrete.
    - f. Loss of adhesion between sealant and coating.
  - 2. Repair or replace any or all portions of the work that fail during guarantee period, promptly and at no cost to the Owner using methods and materials specified for the initial construction.
  - 3. Should the signer of the guarantee fail, or refuse, on reasonable notice (24 hours) to correct such failures as may occur, the Owner may employ other means to correct the situation at no additional cost to the Owner.
  - 4. If the flooring contractor is an independent applicator, said applicator must provide a written guarantee to match the manufacturer's guarantee in duration for the associated labor and workmanship.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience installing resinous flooring in projects of similar size and complexity.
- B. ISO 9002: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9002 registered quality system.
- C. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- D. Manufacturer Field Technical Service Representatives: Resinous flooring contractor shall retain the services of the manufacturer's Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.
  - 1. Field Technical Services Representatives shall be employed by the manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.
- E. Unless more stringent requirements are required in the contract documents, comply with manufacturer's air and surface temperature limits and relative humidity requirements during application and curing of primer and coating.

- F. Field Samples: On floor area selected by Owner, provide full-thickness resinous system samples that are minimum 48-inches square of each resinous system required. Simulate finished lighting conditions for review of in-place samples
1. Include 48-inch length of integral cove base, where such base is indicated.
  2. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until Owner approves field samples.
  3. After field samples are approved, these surfaces will be used to evaluate resinous flooring.
  4. Obtain Owners written approval of field samples before applying resinous flooring.
  5. Final approval of colors will be from field samples, not from samples submitted for verification.
  6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials to the Project site in their original unopened containers, packages, and bundles, bearing labels that identify manufacturer's name, brand name, grade or type, and fire and smoke hazard classifications.
- B. Upon delivery, immediately inspect shipments to assure their compliance with the requirements of the Contract Documents and approved submittals, and that products are properly protected and undamaged. Report damaged or defective items. Remove broken, damaged, or unlabeled items, and all broken containers and their contents from the project site. Dispose of in a legal manner and replace with new materials at no additional cost to the Owner.
- C. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store products in a manner to prevent damage, soiling, loss, deterioration, and contamination. Store products subject to damage by the elements in weathertight enclosures. Maintain temperature and humidity within the ranges required by the manufacturer.

#### 1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient and substrate temperature of 60 degrees F during installation of mortar materials.
- B. Environmental Requirements
1. Maintain temperature, moisture, humidity, and ventilation in areas to receive floor coatings within the ranges required by the product manufacturer before, during, and after installation.
  2. For flexible urethane systems, maintain material and substrate temperature between 65 and 85 deg F (18 and 30 deg C) during resinous flooring application and for not less than 24 hours after application

3. Do not start installation until other finishing work has been completed and surfaces to be covered can be maintained in the degree of cleanliness required by the product manufacturer.
- C. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- D. Protection
  1. Protect the work during installation from mechanical damage, soiling, contamination and deterioration.
  2. Provide and maintain temporary protection using 1/8 inch thick Masonite, or similar hardboard material, to prevent damage to adjacent surfaces during application of protective coatings.
  3. Maintain protection during subsequent work operations, and remove it upon acceptance by or when instructed by the Owner's Representative.

#### 1.07 WARRANTY

- A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) one full year from date of substantial completion.
- B. Installer shall furnish a single, written warranty covering workmanship for a period of (1) one full year from date of substantial completion.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Design Standard: Stonhard, Inc.; Stongard MR.
  1. Contact Justin Clarke at [justin.clarke@stonhard.com](mailto:justin.clarke@stonhard.com) or 704-351-3049.
- B. Other Acceptable Manufacturers:
  1. General Polymers
  2. Dex-O-Tex
  3. Dudick
  4. Life Sciences of Maryland
  5. Dur-A-Flex
  6. Sika
  7. Elite Crete Systems

#### 2.02 GENERAL USE RESINOUS COATINGS

- A. Resinous Floor Coating (RES): Three component, liquid applied, urethane membrane system with a pigmented topcoat.
- B. System Components: Manufacturer's standard components that are compatible with each other and as follows

1. Primer Coat(s):
  - a. Basis of Design: Stonhard Primer 150
  - b. Resin: Epoxy.
  - c. Formulation Description: high solids green concrete primer.
  - d. Application Method: 15 mil notched squeegee.
  - e. Number of Coats: One.
2. Body Coat(s):
  - a. Basis of Design: Stonproof ME7
  - b. Resin: Urethane Membrane.
  - c. Formulation Description: 100% solids elastomeric.
  - d. Application Method: 30 mil notched squeegee.
  - e. Number of Coats: One.
3. Topcoat for general service sealing:
  - a. Basis of Design: Stonkote GS4
  - b. Resin: Epoxy.
  - c. Formulation Description: 100% solids, epoxy.
  - d. Type: pigmented.
  - e. Finish: TBD.
  - f. Number of Coats: one.
4. For allowed equals and substitutions, see Section 01 60 00 - Product Requirements.
5. Total overall thickness: Nominal 45 mils nominal thick.
6. Finish: Orange Peel with aluminum oxide textured surface for slip resistance at Locker room, Shower rooms, and Toilet Rooms.
7. Physical Properties:
  1. Elongation: 200% per ASTM D 412.
  2. Tensile Strength: 1,200 psi per ASTM D 412.
  3. Hardness: 70, Shore D per ASTM D 2240.

## 2.03 COLOR

- A. Manufacturers: All product colors to match the specified color selections in the Schedule for Finishes 09 06 00 using manufacturer's commonly available products.

## 2.04 PREPATORY FILLER MATERIALS

- A. Provide elastomeric joint filler compound and joint sealants as recommended and/or supplied by floor coating manufacturer. The systems shall include all recommended fillers and sealants for the conditions.
  1. All materials shall be compatible with the finish system.
  2. Place in conjunction with concrete slab-on-grade isolation and control joints.

- B. Pitching and Leveling: Use a three component fast setting trowel able epoxy based grout designed for permanent repairs under flooring system.
- C. Levelling Compound: Use flooring manufacturer's recommended levelling compound and compatible primer to correct levelness/flatness deficiencies exceeding the flooring system tolerance (1/8" in 10').

## 2.05 PRIMER

- A. Provide surface primer as recommended and/or supplied by floor coating manufacturer. All materials shall be compatible with the finish system warranty.
  - 1. Primer: Resinous flooring manufacturer's approved primer providing protection from moisture transmission up to 8 pounds per one thousand square feet per twenty-four hours as tested using the Calcium Chloride Test and/or from ASTM F2170 Relative Humidity tests readings of up to 80%
  - 2. See Unit Price Schedule for Primer to be used when moisture and relative humidity exceed limits indicated above.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Coordinate this Work with the work of other trades doing adjacent or concurrent work so as to insure proper, timely, and adequate interface.
- B. Comply with manufacturer's recommendations, requirements, or prohibitions regarding conditions under which the Work is to be done.

### 3.02 PROJECT CONDITIONS

- A. Concrete substrate shall be properly cured for a minimum of 60 days prior to testing and prior to the work of this section.
- B. Utilities, including electric, water, heat (air temperature between 60 and 85°F/16 and 30°C) and finished lighting to be supplied by General Contractor for a minimum of 30 days in the areas to receive resinous flooring prior to testing and prior to the work of this section.
- C. Job area to be free of other trades during, and for a period of 24 hours, after floor installation.

### 3.03 INSPECTION

- A. Inspect the Work in place and notify the Owner's Representative in writing of defects in the work of other trades that will affect the proper installation or function of the Work of this Section.



- B. Do not start work until unsatisfactory conditions have been corrected. Starting the Work shall constitute acceptance of the base or adjoining work and conditions at the site under which the work is to be done.

### 3.04 PREPARATION

- A. Clean and prepare surfaces as required to receive adhesives and resilient materials. Remove all surface contaminants that would prevent bonding of resilient materials. Remove all dirt, loose and scaly surfaces, and mortar and plaster droppings, surface projections and unsound areas. Area to receive material shall be to the degree of cleanliness recommended by the manufacturer of the succeeding material, using recommended or appropriate equipment and materials to achieve the required degree of cleanliness.
- B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
  - 1. Mechanically prepare substrates as follows:
    - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and re-circulates the shot by vacuum pickup.
    - b. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
- D. Unrestrained edges, such as door openings, shall be straight and aligned with stop, with unframed floor openings uniform. Provide keys and even transitions for topping systems.
- E. Chip clean all joints, cracks, and holes. Remove concrete that is spalled, loose, weakened upper crust, and patching materials to solid, clean concrete.
- F. Remove and patch unacceptable sub floor areas with non-sagging fixatrop patch. Areas extending beyond the design requirements of the patch material shall be identified to the Owner and replaced.
- G. For completion of preparation, vacuum surfaces to remove dust and loose particles.
- H. Fill all cracks, holes and low spots to produce a smooth, even surface; use specified manufacturer's approved underlayment.
- I. Conduct Calcium Chloride test on scheduled concrete slab areas to receive flooring according to ASTM F1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor Using Anhydrous Calcium Chloride" to insure concrete slab acceptability.
  - 1. Remove curing agents in and around the test area prior to conducting test.
  - 2. Conduct three tests for areas up to 1,000 SF. Conduct one additional test for each additional 1,000 SF.
  - 3. Notify Owner's Representative if test results fall outside of manufacturer's acceptable levels prior to installation.

- J. Conduct Internal Relative Humidity (IRH) testing on scheduled concrete slab areas to receive flooring according to ASTM F 2170.
  - 1. Conduct three tests for areas up to 1,000 SF. Conduct one additional test for each additional 1,000 SF..
  - 2. Notify Owner's Representative if test results fall outside of manufacturer's acceptable levels prior to installation.
- K. Provide a 72-hour Qualitative Bond Test in a 48-inch by 48-inch area using the specified adhesives. Remove of curing agents, old adhesives, inhibitors, oil and grease in the scheduled area prior to test to assure proper installation.
- L. Provide Alkali test on scheduled concrete slab areas to insure concrete slab acceptability. Remove curing agents in and around the test area prior to conducting test. Test results shall fall within flooring manufacturer's acceptable pH levels prior to installation.

### 3.05 INSTALLATION

- A. Install the Work in accordance with the specifications, applicable reference standards, and manufacturer's printed installation instructions.
- B. Prime substrate for adhesion of flooring system.
- C. Apply each coat to minimum thickness indicated.
- D. Where epoxy flooring terminates at another floor finish or where not abutting a vertical surface, sawcut slab at floor finish termination to 1/2" depth and at a 90 degree angle to floor. Chip out concrete with a chipping hammer in the direction of where the epoxy flooring will be installed to provide trough width of 3/4 minimum and 1-1/2 maximum.
- E. Provide reducer strips, or other approved transition method, at unrestrained edges.
- F. Where the flooring system covers a control or isolation joint in the concrete substrate, installer shall sawcut a 1/4 inch wide joint into the finished cured floor and fill with elastomeric joint filler compound.
- G. Check wet film thickness periodically using steel depth gauge or other approved measuring device to insure proper thicknesses.
- H. Completed floor system shall be smooth and uniform, of specified thickness, with color and finish texture to match approved samples.

### 3.06 PATCHING AND CLEANING

- A. Clean the floor system materials from adjacent finished surfaces as the Work progresses.
- B. If adjacent finished surfaces cannot be cleaned to their original condition, repair or replace such finished surfaces as directed by the Owner's Representative, at no additional cost to the Owner.
- C. Clean up and dispose of all waste material and refuse that has been brought onto the job or that has accumulated as a result of this Work. Leave the Work broom clean as a minimum.

### 3.07 REPAIR PROCEDURE

- A. Owner will perform final inspection before area is put in service. Repairs of unacceptable areas shall be made at no cost to Owner. Contact Owner's Representative to arrange inspection.
- B. Defective Areas (1/4" system)
  - 1. Sawcut, at 90 degrees to floor, around defective area.
  - 2. Remove coating with hammer and chisel or bushhammer.
  - 3. Remove dust and debris with vacuum cleaner.
  - 4. Apply new coating.
  - 5. New material shall be flush with original surface and tight against sawcut.

### 3.08 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 4 days after installation or manufacturer's recommended duration.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 09 90 00

### PAINTS AND COATINGS

#### 1.0 SUMMARY

##### A. Scope:

1. Provide all material, labor and equipment to produce painted and finished surfaces as shown and scheduled on the DRAWINGS and as specified herein, to provide properly finished surfaces throughout. This SECTION, in conjunction with the color/finish schedules on the DRAWINGS or in the SPECIFICATIONS or issued separately, establishes the scope of the painting work, the surfaces to be painted, and the paint systems to be used.
2. Interior items and surfaces that are exposed.
3. Surface preparation, priming, and finishes in addition to shop primers and treatment of surfaces specified elsewhere.
4. Also included herein is the painting of all exposed mechanical and electrical work such as metal piping (including color coding), conduit, ductwork, supports, equipment and fixtures, except items which are factory finished.
5. Do not paint exposed surface where the paint, color or room finish schedules indicate that a surface is not to be painted or remain natural.
6. If the paint, color or room finish schedule does not identify a surface or item to be painted, paint the surface or item the color and finish of adjacent surfaces and materials, even if the schedules do not indicate finish or color. Verify color and finish with the Owner's Representative.
7. Seal joints between resinous flooring's integral wall base trim strip and wall. Refer the FINISH SCHEDULE on drawings for extent.
8. Seal internal corner joints at all CMU partitions prior to painting.
9. Seal joints between all millwork and lavatory countertops and adjoining painted surfaces after painting.

#### 1.1 REFERENCES

##### A. Steel Structures Painting Council (SSPC):

1. SSPC-SP 1 - Solvent Cleaning.
2. SSPC-SP 2 - Hand Tool Cleaning.
3. SSPC-SP 3 - Power Tool Cleaning.
4. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
5. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
6. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.

##### B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

#### 1.2 SUBMITTALS

##### A. Submit under provisions of Section 01 34 00 - Submittals.

- B. Product Data: For each paint system indicated, including.
  - 1. Product characteristics.
  - 2. Surface preparation instructions and recommendations.
  - 3. Primer requirements and finish specification.
  - 4. Storage and handling requirements and recommendations.
  - 5. Application methods.
  - 6. Cautions for storage, handling and installation.
- C. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish surfaces for verification of products, colors and sheens.
  - 2. Finish area designated by Architect.
  - 3. Provide samples that designate primer and finish coats.
  - 4. Do not proceed with remaining work until the Architect approves the mock-up.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
  - 1. Product name, and type (description).
  - 2. Application and use instructions.
  - 3. Surface preparation.
  - 4. VOC content.
  - 5. Environmental handling.
  - 6. Batch date.
  - 7. Color number.
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

### 1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within

limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.6 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

## PART 2 PRODUCTS

### 2.0 MANUFACTURERS

- A. Acceptable Manufacturers
  - 1. The Sherwin-Williams Company (Basis of Design)
  - 2. PPG Paints
  - 3. Benjamin Moore

### 2.1 APPLICATIONS/SCOPE

- A. Interior Paints and Coatings:
  - 1. Concrete: Poured, precast, tilt-up, cast-in-place, cement board, plaster.
  - 2. Masonry: Concrete masonry units, including split-face, scored, and smooth block.
  - 3. Metal: Aluminum, galvanized steel.
- B. Exterior Paints and Coatings:
  - 1. Concrete: Cementitious siding, flexboard, transite, and shingles (non-roof).
  - 2. Masonry: Concrete masonry units, cinder or concrete block.
  - 3. Concrete: Concrete floors, patios, porches, steps and platforms, (non-vehicular).
  - 4. Metal: Aluminum, galvanized steel, metal siding and trim.
  - 5. Metal: Miscellaneous iron, ornamental iron, ferrous metal.
  - 6. Wood: Floors (non-vehicular), and platforms.
  - 7. Wood: Siding, trim, shutters, sash, and miscellaneous hardboard.
  - 8. Architectural PVC, plastic, fiberglass.
  - 9. Drywall: Gypsum board, and exterior drywall.
  - 10. Vinyl: Siding, EIFS, synthetic stucco.

### 2.2 PAINT MATERIALS - GENERAL

- A. Paints and Coatings:
  - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
  - 2. For opaque finishes, tint each coat including primer coat and intermediate

coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.

- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- D. Color: Refer to Finish Schedule for paint colors, and as selected.

## 2.3 INTERIOR PAINT SYSTEMS

- A. CONCRETE - Walls and Ceilings, Poured Concrete, Precast Concrete, Unglazed Brick, Cement Board, Tilt-Up, Cast-In-Place including Plaster Walls and Ceilings.
  - 1. Epoxy Systems (Water Based):
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (8 mils wet, 3.2 mils dry).
      - 2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46- Series.
      - 3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46- Series (4 mils wet, 1.5 mils dry per coat).
- B. MASONRY: CMU - Concrete, Split Face, Scored, Smooth, High Density, Low Density, Fluted.
  - 1. Latex Systems:
    - a. Semi-Gloss Finish High Performance:
      - 1) 1st Coat: S-W PrepRite Block Filler, B25W25 (75-125 sq ft/gal) At heavy duty conditions as indicated, apply to a Dry Film Thickness (DTF) of 10 mils, or 250 Dry Microns.
      - 2) 2nd Coat: S-W Pro Industrial Semi-Gloss Acrylic Coating, B66-650 Series.
      - 3) 3rd Coat: S-W Pro Industrial Semi-Gloss Acrylic Coating, B66-650 Series (7.4 mils wet, 2.5 mils dry per coat).
  - 2. Epoxy Systems (Water Based) (Wet Areas, Restrooms, Showers, Wash Areas):
    - a. Gloss Finish:
      - 1) 1st Coat: S-W Loxon Block Surfacer, A24W200 (50-100 sq ft/gal).
      - 2) 2nd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series.
      - 3) 3rd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series (5.0 mils wet, 2.0 mils dry per coat).
- C. METAL: Ferrous, Galvanized, Hollow Metal Doors & Frames
  - 1. Alkyd Systems (Water based):
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-



- 1310 Series (5.0 mils wet, 2.0 mils dry).
  - 2) 2nd Coat: S-W Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
  - 3) 3rd Coat: S-W Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).
- D. WOOD - (Walls, Ceilings, Doors, Trim):
1. Alkyd Systems (Water based):
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils wet, 1.8 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series.
      - 3) 3rd Coat: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series (4 mils wet, 1.7 mils dry per coat).
- E. DRYWALL - (Walls, Ceilings, Gypsum Board and similar items)
1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W ProMar200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series.
      - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series (4 mils wet, 1.6 mils dry per coat).
    - b. Eg-Shel / Satin Finish:
      - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series.
      - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).
    - c. Low Sheen Finish:
      - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series.
      - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series (4 mils wet, 1.6 mils dry per coat).
    - d. Flat Finish:
      - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series.
      - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series (4 mils wet, 1.6 mils dry per coat).
  2. Epoxy Systems (Water Based) (Kitchens, Janitor Closets, Restrooms, Showers):

- a. Gloss Finish:
  - 1) 1st Coat: S-W ProMar200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
  - 2) 2nd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series.
  - 3) 3rd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series (5.0 mils wet, 2.0 mils dry per coat).

## 2.4 EXTERIOR PAINT SYSTEMS

- A. CONCRETE (Cementitious Siding, Flexboard, Transite Board, Shingles (Non-Roof), Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement).
  - 1. Latex Systems:
    - a. Gloss Finish:
      - 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (5.3-8.0 mils wet, 2.1-3.2 mils dry).
      - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series.
      - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series (4.0 mils wet, 1.3 mils dry per coat).
    - b. Satin Finish:
      - 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (5.3-8.0 mils wet, 2.1-3.2 dry).
      - 2) 2nd Coat: S-W A-100 Exterior Latex Satin, A82 Series.
      - 3) 3rd Coat: S-W A-100 Exterior Latex Satin, A82 Series (4.0 mils wet, 1.5 mils dry per coat).
    - c. Flat Finish (Self Cleaning):
      - 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (5.3-8.0 mils wet, 2.1-3.2 mils dry).
      - 2) 2nd Coat: S-W Loxon Self-Cleaning Acrylic Coating Flat, LX13 Series.
      - 3) 3rd Coat: S-W Loxon Self-Cleaning Acrylic Coating Flat, LX13 Series (5.0 – 7.0 mils wet, 2.1 – 2.9 mils dry per coat).
- B. MASONRY: Concrete Masonry Units (CMU) - Cinder or Concrete Block.
  - 1. Latex Systems:
    - a. Gloss Finish:
      - 1) 1st Coat: S-W PrepRite Block Filler, B25W25 (75-125 sq ft/gal).
      - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series.
      - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series (4.0 mils wet, 1.3 mils dry per coat).
    - b. Satin Finish:
      - 1) 1st Coat: S-W PrepRite Block Filler, B25W25 (75-125 sq ft/gal).
      - 2) 2nd Coat: S-W A-100 Exterior Latex Satin, A82 Series.
      - 3) 3rd Coat: S-W A-100 Exterior Latex Satin, A82 Series (4.0 mils wet, 1.5 mils dry per coat).
- C. METAL: Ferrous, Previously Coated Metal Siding and Trim
  - 1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: DTM Bonding Primer, B66A50Series (5.0-12.0 mils

- wet, 2.0-5.0 mils dry). SPRAY APPLIED
- 2) 2nd Coat: S-W Sher-Cryl HPA Semi-Gloss, B66-350 Series.
- 3) 3rd Coat: S-W Sher-Cryl HPA Semi-Gloss B66-350 Series (6.0 - 10.0 mils wet, 2.5 - 4.0 mils dry per coat). SPRAY APPLIED

D. METAL: Ferrous, Galvanized

- 1. Latex Systems:
  - a. Semi-Gloss Finish:
    - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0-10.0 mils wet, 1.8-3.6 mils dry).
    - 2) 2nd Coat: S-W Sher-Cryl HPA Semi-Gloss, B66-350 Series.
    - 3) 3rd Coat: S-W Sher-Cryl HPA Semi-Gloss B66-350 Series (6.0 - 10.0 mils wet, 2.2 - 3.7 mils dry per coat).

E. WOOD: Siding, Trim, Shutters, Sashes, Hardboard-Bare/Primed.

- 1. Latex Systems:
  - a. Gloss Finish:
    - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4.0 mils wet, 1.4 mils dry).
    - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series.
    - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series (4.0 mils wet, 1.3 mils dry per coat).

## PART 3 EXECUTION

### 3.0 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.
- C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

### 3.1 SURFACE PREPARATION

- A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
  - 1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
  - 2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry before

painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.

3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
  4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.
- B. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
- C. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
- D. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.
- E. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyl primer.
- F. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior

surfaces must be spackled with exterior grade compounds. BARE DRYWALL MUST BE PRIMED WITH 2 TOPCOATS FOR CONSISTENT FINISH.

- G. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. BARE DRYWALL MUST BE PRIMED WITH 2 TOPCOATS FOR CONSISTENT FINISH.
- H. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.
- I. Previously-coated Metal Siding and Trim: Pressure Wash surface to remove dirt, chalking, and other surface impurities. Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.
- J. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
  - 1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
  - 2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
  - 3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
  - 4. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
  - 5. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products,

and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.

6. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
- K. Vinyl Siding, Architectural Plastics, EIFS and Fiberglass: Clean vinyl siding thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color, unless the paint system features Sherwin-Williams VinylSafe technology. Painting with darker colors that are not Sherwin-Williams VinylSafe may cause siding to warp. Follow all painting guidelines of the vinyl manufacturer when painting. Only paint properly installed vinyl siding. Deviating from the manufacturer's painting guidelines may cause the warranty to be voided.
- L. Stucco: Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments such as Loxon.
- M. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

### 3.2 INSTALLATION

- A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.
- B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- G. Inspection: The coated surface must be inspected and approved by the Architect just

prior to the application of each coat.

### 3.3 SEALANTS

- A. Install a thin coved bead of clear silicone sealant along edges of all millwork and lavatory counters that abut painted surfaces. Do not paint over sealant.

### 3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK



## SECTION 10 14 00

### PLASTIC SIGNS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Engraved plastic signs for interior use.

##### 1.02 REFERENCES

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.
- B. 2010 Americans with Disabilities Act Standards for Accessible Design.

##### 1.03 SUBMITTALS

- A. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Plastic Signs:
  - 1. APCO Graphics: [www.apcosigns.com](http://www.apcosigns.com)
  - 2. Advance Printing Products, Inc.
  - 3. Best Manufacturing Co: [www.bestsigns.com](http://www.bestsigns.com).
  - 4. Mohawk Sign Systems, Inc: [www.mohawksign.com](http://www.mohawksign.com).
  - 5. AOA Signs: [www.aoasigns.com](http://www.aoasigns.com).

##### 2.02 INTERIOR SIGNS

- A. Interior Signs:
  - 1. Follow signage diagrams in Drawings.
  - 2. Comply with applicable provisions of ANSI/ICC A117.1, including Braille.
  - 3. Comply with applicable provisions of 2010 Americans with Disabilities Act Standards for Accessible Design, including Braille.
  - 4. Color: opaque white or black acrylic base.
  - 5. Total Thickness: 1/16 inch.

6. Size: all signs sized to accommodate copy, no abbreviations permitted.
7. Edges: Rounded, unless otherwise indicated.
8. Manufacture from clear matte acrylic that is sub-surface printed with background color and laminated to base.
9. All signage to have written copy under pictograms to comply with 2010 Americans with Disabilities Act Standards for Accessible Design.

## 2.03 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install plumb and level with floor or adjacent vertical edge
- C. When tactile sign is provided at a door, install sign as follows:
  1. At single leaf doors, locate 18 inches from the centerline of the tactile characters to the edge of single-leaf doors.
  2. At double doors with one active leaf, locate sign on the inactive door leaf.
  3. At double doors with two active leafs, locate to the right-of the right hand door leaf.
  4. When there is no wall space at the latch side of a single door or at the right side of double doors, locate sign at the nearest adjacent wall.
- D. Signs containing tactile characters shall be located so that a clear floor space of 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and the 45 degree open position.
- E. Height Above Finished Floor or Ground: Install at a minimum height of 48 inches to baseline of lowest line of tactile characters and a maximum of 60 inches to baseline of highest line of tactile characters.

### 3.02 SCHEDULE

- A. "Women" at Women's Toilet.
- B. "Men" at Men's Toilet.
- C. "EXIT" at all exit doors.

END OF SECTION

## SECTION 10 21 13

### TOILET AND SHOWER COMPARTMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Solid plastic Toilet Compartments.
- B. Solid plastic Dressing Compartments at Shower Rooms.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Samples: Submit two samples of partition panels, 2 x 2 inch in size illustrating panel finish, color, and sheen.

##### 1.03 COORDINATION

- A. Coordinate the work with placement of support framing and anchors in wall.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Plastic Toilet Compartments:
  - 1. Ampco Products, Inc.: [www.ampco.com](http://www.ampco.com).
  - 2. ASI Global Partitions, Inc.: [www.globalpartitions.com](http://www.globalpartitions.com).
  - 3. Scranton Products Co., Inc: [www.scrantonproducts.com](http://www.scrantonproducts.com).

##### 2.02 COMPONENTS

- A. Toilet Compartments: Solid molded high-density Polyethylene (HDPE) plastic panels, doors, and pilasters, floor-mounted, headrail-braced.
- B. Shower Compartments: Solid molded high-density Polyethylene (HDPE) plastic panels and pilasters, floor-mounted, overhead braced.
- C. Door and Panel Dimensions:

1. Thickness: 1 inch.
  2. Door Width: 24 inch.
  3. Door Width for Handicapped Use: 34 inch.
  4. Height: 55 inch.
- D. Pilasters:
1. Height: 81 ½ inch.
  2. Thickness of Pilasters: 1 inch.
  3. Overhead rail braced
- E. Urinal Screen Dimensions:
1. Thickness: 1 inch.
  2. Screen Width: 24 inch.
  3. Height: 48 inch.
- F. Color: To match Design Standard indicated in 09 06 00 Schedule for Finishes.

## 2.03 ACCESSORIES

- A. Pilaster Shoes: Formed stainless steel with polished finish, 3 inch high, concealing floor fastenings.
1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Toilet and Shower Compartment Head Rails: Extruded, satin-finished anodized aluminum, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Pilaster Brackets: Continuous/Full-height type, polished stainless steel.
- D. Wall Brackets: Continuous/full-height, double ear or “H” type, anodized extruded aluminum (6063-T5 alloy) wall brackets, pre-drilled.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
- F. Hardware:
1. Heavy-duty 8” aluminum hinge with gravity-acting cam.
    - a. Slide latch, strike/keeper and hinges to be through bolted onto doors and pilasters using stainless steel, vandal-resistant through bolts.
    - b. Keeper to allow for emergency access into the stall by lifting up on the bottom of the door.
    - c. All doors to swing closed under their own weight.

2. Door Latch: Slide type with exterior emergency access feature.
3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
4. Coat hook with rubber bumper; one per compartment, mounted on door.
5. Provide door pull for out-swinging doors.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

### 3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

### 3.03 ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/8 inch.

### 3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position in-swinging doors in partial opening position when unlatched.

- C. Adjust hinges of out-swinging doors to return to a fully closed position.
- D. Adjust adjacent components for consistency of line or plane.

END OF SECTION

## SECTION 10 22 15

### CHAIN-LINK MESH PARTITIONS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Chain-Link Fences: Interior Industrial.
  - 2. Personnel Gates: Manual, sliding.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Determine minimum post size, group, and section according to ASTM F 1043 for framework up to 10 feet (3.66 m) high, and post spacing not to exceed 8 feet (3 m).

##### 1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
  - 1. Fence and gate posts, rails, and fittings.
  - 2. Chain-link fabric, reinforcements, and attachments.
  - 3. Gates and hardware.
- B. Shop Drawings: Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

## PART 2 - PRODUCTS

### 2.1 CHAIN-LINK FENCE FABRIC

- A. General: Height indicated on Drawings. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with ASTM A 392, CLFMI CLF 2445, and requirements indicated below:
  - 1. Steel Wire Fabric: Class II B, metallic-coated core wire with a diameter of 0.148 inch (3.76 mm).
    - a. Mesh Size: 2 inches (51 mm).
  - 2. Selvage: Knuckled at both selvages.

### 2.2 INDUSTRIAL FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1043 for framing, ASTM F 1083 for Group IC round pipe, and the following:
    - 1. Group: IA, round steel pipe, Schedule 40.
    - 2. Fence Height: 10 feet (2.44 m).
    - 3. Strength Requirement: Heavy industrial according to ASTM F 1043.
    - 4. Post Diameter and Thickness: According to ASTM F 1043.
    - 5. Post Size and Thickness: According to ASTM F 1043.
      - a. Top Rail: 1.66 inches (42 mm).
      - b. Line Post: 2.375 inches (60 mm).
      - c. End, Corner and Pull Post: 2.875 inches (73 mm).
      - d. Horizontal-Slide Gate Post: According to ASTM F 1184.
- 1) Openings up to 12 Feet (3.7 m): Steel post, 2.875-inch (73-mm) diameter, and 4.64-lb/ft. (6.91-kg/m) weight.



- 2) Openings Wider Than 12 Feet (3.7 m): Steel post, 4-inch (102-mm) diameter, and 8.65-lb/ft. (12.88-kg/m) weight.
- 3) Guide posts for Class 1 horizontal-slide gates equal the gate post height, 1 size smaller, but weight is not less than 3.11 lb/ft. (4.63 kg/m); installed adjacent to gate post to permit gate to slide in space between.

6. Coating for Steel Framing:

a. Metallic Coating:

- 1) Type A, consisting of not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating per ASTM A 123/A 123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating per ASTM A 653/A 653M.
- 2) Type B, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
- 3) External, Type B, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than 0.3-mil- (0.0076-mm-) thick, zinc pigmented coating.
- 4) Type C, Zn-5-Al-MM alloy, consisting of not less than 1.8-oz./sq. ft. (0.55-kg/sq. m) coating.
- 5) Coatings: Any coating above.

## 2.3 TENSION WIRE

A. General: Provide horizontal tension wire at the following locations:

1. Location: Extended along top and bottom of fence fabric.

B. Metallic-Coated Steel Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire complying with ASTM A 817, ASTM A 824, and the following:

1. Metallic Coating: Type I, aluminum coated (aluminized) by hot-dip process, with the following minimum coating weight:
  - a. Matching chain-link fabric coating weight.
2. Metallic Coating: Type III, Zn-5-Al-MM alloy with the following minimum coating weight:
  - a. Matching chain-link fabric coating weight.

## 2.4 INDUSTRIAL HORIZONTAL-SLIDE GATES

A. General: Comply with ASTM F 1184 for single slide gate types.

1. Classification: Type II Cantilever Slide, Class 1 with external roller assemblies.

2. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F 1184 for materials and protective coatings.
- B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F 1184 and the following:
  1. Gate Fabric Height: As indicated.
  2. Gate Opening Width: As indicated.
  3. Frame Members:
    - a. Tubular Steel: 1.66 inches (42 mm) round.
  4. Bracing Members:
    - a. Tubular Steel: 1.90 inches (48 mm) round
- C. Frame Corner Construction:
  1. Welded frame with panels assembled with bolted or riveted corner fittings and 5/16-inch- (7.9-mm-) diameter, adjustable truss rods for panels 5 feet (1.52 m) wide or wider.
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches (300 mm) as required to attach barbed wire assemblies.
- E. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.
- F. Roller Guards: As required per ASTM F 1184 for Type II, Class 1 gates.
- G. Hardware: Latches permitting operation from both sides of gate, locking devices, hangers roller assemblies and stops fabricated from galvanized steel. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

## 2.5 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post and Line Caps: Provide for each post.
  1. Line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
  1. Top Rail Sleeves: Pressed-steel or round-steel tubing, not less than 6 inches (152 mm) long.

2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.
- E. Tension and Brace Bands: Pressed steel.
  - F. Tension Bars: Steel, length not less than 2 inches (50 mm) shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
  - G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.
  - H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
    1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
      - a. Hot-Dip Galvanized Steel: galvanized coating thickness matching coating thickness of chain-link fence fabric.
  - I. Finish:
    1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. (366 g /sq. m) zinc.
    2. Aluminum: Mill finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for other conditions affecting performance.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.

### 3.3 CHAIN-LINK FENCE INSTALLATION

- A. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- B. Line Posts: Space line posts uniformly at 8 feet (3 m) o.c.

- C. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.
  - 1. Locate horizontal braces at midheight of fabric 6 feet (1.83 m) or higher, on fences with top rail and at 2/3 fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- D. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- (3.05-mm-) diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches (610 mm) o.c. Install tension wire in locations indicated before stretching fabric.
  - 1. Top Tension Wire: Install tension wire through post cap loops.
  - 2. Bottom Tension Wire: Install tension wire within 6 inches (150 mm) of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- E. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch (25.4 mm) between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- F. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches (380 mm) o.c.
- G. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
  - 1. Maximum Spacing: Tie fabric to line posts at 12 inches (300 mm) o.c. and to braces at 24 inches (610 mm) o.c.
- H. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

### 3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

### 3.5 FIELD QUALITY CONTROL

- A. Test gate operator through ten full cycles and adjust for operation without binding, scraping or uneven motion. Test limit switches for proper "at rest" gate position.

### 3.6 ADJUSTING

- A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 10 28 13

### TOILET ACCESSORIES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Accessories for toilet rooms.
- B. Accessories for shower rooms.
- C. Accessories for janitor closets.
- D. Grab bars.

##### 1.02 RELATED WORK

- A. Rough Carpentry - Division 6.

##### 1.03 REFERENCES

- A. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1997a.
- B. ASTM A 269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 1998.
- C. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 1999.

##### 1.04 SUBMITTALS

- A. Product Data: Provide data on accessories describing quantity, size, finish, details of function, attachment methods.

##### 1.05 COORDINATION

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Bobrick Washroom Equipment: [www.bobrick.com](http://www.bobrick.com)

2. American Specialties, Inc: [www.americanspecialties.com](http://www.americanspecialties.com).
3. Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).

## 2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  1. Grind welded joints smooth.
  2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Stainless Steel Sheet: ASTM A 666, Type 304.
- C. Stainless Steel Tubing: ASTM A 269, Type 304 or 316.
- D. Adhesive: Two component epoxy type, waterproof.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

## 2.03 FINISHES

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.
- B. Galvanizing for Items other than Sheet: ASTM A 123/A 123M to 1.3 oz/sq yd. Galvanize ferrous metal and fastening devices.

## 2.04 TOILET ROOM ACCESSORIES

- A. Combination Paper Towel Dispenser/Waste Receptacle: Wall mounted, semi-recessed, Touch-free, roll towel dispenser with pull towel mechanism to dispense one 12-inch (300mm) length of towel per pull. Waste receptacle with hemmed edges, internal hooks and trash liner for hanging vinyl bags (bags by Owner), 12-gallon capacity.
  1. Model B-3961 Convertible Paper Towel Dispenser/Waste Receptacle by Bobrick, or equal.
  2. Model 3944-134 LinerMate trash liner by Bobrick, or equal.
- B. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip, peened grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar. Must meet ADA accessibility guidelines.
  1. Length and configuration: As indicated on drawings.
  2. Model B-5806-99 Series by Bobrick, or equal.



- C. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing cover with full-length stainless steel piano-type hinge.
  - 1. Model B-270 by Bobrick Contura Series, or equal.
- D. Toilet Paper Dispenser in stalls: Double roll – surface mounted.
  - 1. Model B-274 by Bobrick, or equal.
- E. Towel Hook in shower stalls: – surface mounted.
  - 1. Model B-677 by Bobrick, or equal.
- F. Shelf: Wall surface mounted.
  - 1. Model B-295 x 16-inches by Bobrick, or equal.
- G. Mirror above lavatories: – surface mounted.
  - 1. Model B-290-2436 by Bobrick, or equal.
- H. Soap Dispenser: Liquid soap dispenser, wall surface mounted.
  - 1. Model B-40 by Bobrick, or equal.

## 2.05 JANITOR CLOSET ACCESSORIES

- A. Utility Shelf: Stainless steel, surface-mounted, with mop/broom holders and rag hooks 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
  - 1. Model: B-239 x 34 by Bobrick, or equal.
  - 2. Mount top of shelf at 70 inches above finished floor.
  - 3. Drying rod: Stainless steel, 1/4 inch diameter.
  - 4. Hooks: 3, 0.06 inch stainless steel rag hooks at shelf front.
  - 5. Mop/broom holders: 4 spring-loaded rubber cam holders at shelf front.
  - 6. Length: Manufacturer's standard length for number of holders/hooks.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.

- C. See Section 06 10 00 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

### 3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Coordinate with Owner-installed accessories prior to substantial completion.

### 3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations, or as indicated on drawings.

### 3.04 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

## SECTION 10 44 00

### FIRE PROTECTION SPECIALTIES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Fire Extinguishers on hanging brackets

##### 1.02 REFERENCES

- A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 2010.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

##### 1.03 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

##### 1.04 SUBMITTALS

- A. Shop Drawings: Indicate cabinet physical dimensions.
- B. Product Data: Provide extinguisher operational features.

##### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Fire Extinguishers, Cabinets and Accessories:
  - 1. JL Industries, Inc; [www.jlindustries.com](http://www.jlindustries.com).
  - 2. Larsen's Manufacturing Co. [www/larsensmfg.com](http://www/larsensmfg.com).
  - 3. Potter-Roemer; [www.potterroemer.com](http://www.potterroemer.com).

##### 2.02 FIRE EXTINGUISHERS

- A. Multi-Purpose Type: Cast steel tank, with pressure gage.
  - 1. Class A, B, C.

2. UL Rating: 3A; 40B:C.
3. Capacity: 5 lb.
4. Finish: Baked enamel, Red color.

B. Hanging Bracket:

1. Design Standard: J. L. Industries # MB818A Bracket.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install fire extinguishers on hanging brackets 48 inches from finished floor to handle, if not otherwise indicated.
- C. Secure rigidly in place.
- D. Provide keys to Owner.

#### 3.03 CLEANING

- A. Coordinate cleaning program with General Contractor.

#### 3.04 SCHEDULE

- A. See drawings for locations of fire extinguishers .
- B. Provide and install a total quantity of (4) four units.

END OF SECTION

## SECTION 10 51 13

### LOCKERS AND BENCHES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes:
  - 1. Metal single tier lockers.
  - 2. Bench in locker room.
- B. Work Not Included:
  - 1. Padlocks for lockers: Provided by the Owner.
  - 2. Concrete bases under all lockers: Refer to Division 3.

##### 1.02 DESCRIPTIONS

- B. General: Welded Metal Lockers with end user reconfigurable interior providing the flexibility of on-site, end-user reconfiguring.

##### 1.03 REFERENCES

- A. American National Standards Institute (ANSI) Standards:
  - 1. Applicable standards for fasteners used for assembly.
- B. American Society for Testing and Materials (ASTM) Standards:
  - 1. Applicable standards for steel sheet materials used for fabrication.
  - 2. Applicable standards for the testing of electrostatically applied Powder Coat Paint.
- C. American Institute of Steel Construction (AISC) Standards:
  - 1. Applicable standards for steel materials used for fabrication.
- D. ADAAG - Americans with Disabilities Act, Accessibility Guidelines.

##### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage an experienced manufacturer who is ISO 9001 certified for the design, production, installation and service of welded metal lockers. Furnish certification attesting ISO 9001 quality system registration.
- B. Installer Qualifications: Engage an experienced installer who is a manufacturer's authorized representative for the specified products for installing welded metal lockers.

- C. Minimum Qualifications: 1-year experience installing welded metal lockers of comparable size and complexity to specified project requirements.

#### 1.05 SUBMITTALS

- A. Product Data: Manufacturer's data and installation instructions.
- B. Shop Drawings: Show layouts, dimensions, trim, fillers, and accessories.
  - 1. Indicate installation and anchoring methods.
  - 2. Show verified field measurements.
  - 3. Show locker numbering scheme.
  - 4. Show accessible locker.
- C. Samples for Color Selection: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and finishes.

#### 1.06 WARRANTY

- A. Provide a written warranty, executed by Contractor, Installer, and Manufacturer, agreeing to repair or replace units, which fail in materials or workmanship within the established warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have under other provisions of the Contract Documents.
- B. Limited Lifetime Warranty: Subject to the terms in the written warranty, warrant the original purchaser exclusively that the locker frames manufactured by it will be free from defects in materials and workmanship for the lifetime of the locker.

#### 1.07 PROJECT CONDITIONS

- A. Fit lockers neatly to actual construction; take field measurements before fabrication.
- B. Seismic Performance: Provide Welded Metal Lockers capable of withstanding the effects of earthquake movement when required by applicable building codes.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver lockers until spaces to receive lockers are clean and dry.
- B. Protect lockers from damage.

### PART 2 - PRODUCTS

#### 2.01 METAL LOCKERS

- A. Manufacturers: Provide all metal lockers and accessories by one manufacturer.

1. Design Standard: All-Welded GEN2 Locker manufactured by Penco Products, Inc. Greenville, NC 27858; Tel: 800-562-1000; Fax: 800-248-1555; Email: General@PencoProducts.com; Web: www.pencoproducts.com
  2. Other Manufacturers: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    - a. Lyon Metal Products, Inc.
    - b. Republic Storage Systems Company, Inc.
    - c. MFG All-Welded.
- B. Configuration: Provide locker configuration as follows:
1. Heavy duty, all-welded, fully ventilated.
  2. Single tier with hinged, single door.
  3. Height: 72 inches, exclusive of base/legs.
  4. Width: 18 inches
  5. Depth: 24 inches
  6. Doors: Diamond perforated.
  7. Sides: Solid.
  8. Top: Continuous sloped.
  9. Coat Rod: 1 inch diameter chromed steel rod, full width of each locker unit.
  10. Top Shelf: Solid, full width.
  11. Two wall hooks in each compartment.
- C. Components:
1. Frame: 16 gage steel channels or 13 gage steel angles, minimum.
  2. Tops: 16 gage steel sheet, minimum.
  3. Bottoms: 16 gage steel sheet, minimum.
  4. Shelf: 16 gage steel sheet, minimum.
  5. Horizontal dividers: 24 gage steel sheet, minimum.
  6. Sides : 24 gage steel sheet, minimum.
  7. Exposed ends: 16 gage steel sheet, minimum; Finished end panel without exposed holes or fasteners.
  8. Backs: 18 gage steel sheet, minimum.
  9. Doors: 14 gage steel sheet, minimum.
  10. Finished End Panels: Minimum 16-gauge steel formed to match locker depth

and height, 1-inch (25 mm) edge dimension; finish to match lockers and install with concealed fasteners.

11. Continuous Flat Tops: 16 gage steel sheet, minimum.
12. Vents: Manufacturer's standard diamond style promoting cross-ventilation.
13. Door handles: Standard recessed, multi-point latch type, suitable for pad-lock.
14. Latching mechanism: Concealed in door, designed so that door can be closed while locked, with spring-loaded latches engaging beveled strikes on frame.
  - a. Doors between 18 and 36 inches high: Two-point latching, minimum.
15. Miscellaneous Components and Trim: 18 gage steel sheet, minimum.
16. Provide matching filler panels as needed for each type of locker.
17. Zee Bases for lockers without legs: 4-inches, 14-gauge, steel flanged outward at top for support of lockers, flanged inward at bottom for anchoring to floor. (not recommended without adding extra support in between grouping and in rear of

D. Materials: Steel Sheet: Cold-rolled, leveled mild steel.

1. Fasteners: Zinc-, cadmium-, or nickel-plated steel or stainless steel.
  - a. Exposed bolt heads: Tamperproof type.
  - b. For fastening moving components: Use lock washers or self-locking nuts.
2. Hinges: 16 – gage full length, piano-style hinge.
  - a. Hinges to be welded to door frame with spot welds not to exceed 6 inch (152.4 mm) separation.
3. Standard Door Handles: Die-cast zinc alloy or chrome-plated steel latch lifter and padlock hasp, designed so that door can be closed while locked; pry-resistant.
4. Interior Fittings: Cadmium- or zinc-plated steel or cast aluminum, except shelves.
5. Number Plates: Aluminum, zinc alloy, or stainless steel; raised or recessed numerals at least 3/8 inch high.
6. Number lockers as directed by the Architect.
7. Fasten to doors, centered near the top, using 2 fasteners.
8. Silencers: Neoprene silencers on each door.

E. Fabrication: Weld all joints between frame members.

1. Weld hinges to frame and fasten to door with at least 2 fasteners which are either



- tamperproof or concealed when door is closed.
- 2. All frame components shall be joined using resistance welding. Riveting of structural members will not be permitted.
- 3. Make lockers square with rigid joints, without dents or warped surfaces.
  - 1. Exposed metal edges: Smooth off sharp edges and corners.
  - 2. Exposed welds: Grind flush.
- 4. Door and frame fronts: No exposed bolts or rivet heads.
- 5. Where exposed holes for built-in locks are not used, cover holes neatly using permanent materials.
- 6. Doors: Fabricate with flanged edges, reinforced if required for stiffness, and designed to open and close without springing.
  - a. Fabricate sheet steel doors of one piece.
  - b. Provide extra stiffeners for doors more than 15 inches wide.
- 7. ADA-Compliant Lockers:
  - a. Where locker units are identified on drawings as being handicapped accessible, locate top shelf and coat hooks at 48 inches above finished floor.
  - b. Locker Compartment Bottom: Minimum of 15-inches (230 mm) off the floor, or an extra shelf placed 15-inches (381 mm) off the floor for unobstructed forward and side reach.
  - c. Handicapped symbol attached to door.
  - d. Hooks and rods as specified for other lockers
- F. Miscellaneous Components: Provide all parts, filler panels, closures, clips, and fasteners required for a complete installation.
- G. Finishing: Pretreat and finish all surfaces, including tops and end panels, both exposed and concealed, except stainless steel, chrome, and aluminum.
  - 1. Factory-finish all accessory components to match.
  - 2. Pretreatment: Remove scale, rust, and contaminants; chemically degrease and phosphatize.
  - 3. Finish on Fabricated Metal Components and Assemblies:
    - a. All components to be painted with an electro-statically applied Powder Coat enamel paint that can meet or exceed test requirements set out by ASTM standard D3451-06 Standard Guide for Testing Coating Powders and Powder Coating.
    - b. Finished coating thickness: 2 mil minimum.
  - 4. Color: as selected from manufacturer's standard range.

- a. See Section 09 06 00 Schedule For Finishes

## 2.02 BENCHES FOR LOCKER AND SHOWER ROOMS

- A. Benches: Locker manufacturer's standard products for heavy-duty use.
  - 1. Tops: Hardwood, solid or glued-laminated, finished with clear varnish.
  - 2. Provide bench section that is between 42 and 48 inches long with a seat between 20 and 24 inches wide, an 18 inch high back, and a seat height between 17 and 19 inches above the floor to comply with Americans with Disabilities Act Accessibility Guidelines (ADAAG).
  - 3. Pedestals: Approximately 16 inches tall heavy-duty steel tube welded to top and bottom flanges. Provide baked enamel finish as selected by Architect from manufacturer's standard colors. Install at feet on center, maximum.
  - 4. Anchor pedestals to benches and to floor.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine floors and bases; report surfaces that are not satisfactory for installation.

### 3.02 PREPARATION

- A. Clean debris from under and behind lockers before installation.

### 3.03 INSTALLATION

- A. Verify that concrete bases have been installed properly and are suitable to accommodate lockers.
- B. Install lockers plumb and level.
- C. Anchor lockers securely to substrates in manner recommended by manufacturer.
  - 1. Use reinforcing plates and spacers as required to prevent metal distortion.
  - 2. Provide anchors at not more than 48 inches on center.
  - 3. Conceal fasteners wherever possible.
- D. Install accessory components with flush, tight joints using concealed fasteners.
- E. Anchor benches to floor.

### 3.04 ADJUSTING

- A. Adjust doors and latches for smooth operation.

### 3.05 CLEANING

- A. Clean and touch up finishes; if finish cannot be restored to original appearance, replace locker.
- B. Use only cleaning and touch-up materials recommended by manufacturer.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 10 73 16

### ALUMINUM AWNINGS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This section includes:
  - 1. Exterior aluminum awnings, bracket and rod supported.
  - 2. Engineering of awning support framing, components and connections.

##### 1.02 RELATED SECTIONS

- A. Section 13 34 19 – Metal Building Systems.

##### 1.03 DESCRIPTION OF WORK

- A. Work in this section includes furnishing and installation of roll-formed aluminum overhead hanger rod style.
- B. Related Items and Considerations:
  - 1. Flashing of various designs may be required.
  - 2. Determine wall construction, makeup and thickness.
  - 3. Consider water drainage away from awnings where necessary.
  - 4. Coordinate in-wall support with Metal Building Supplier and wall-framing components supplied by canopy manufacturer for grouting by installer.

##### 1.04 QUALITY ASSURANCE

- A. Single source responsibility: Provide all components of the awning systems manufactured by the same company to ensure compatibility of color, texture and physical properties.
- B. Awning manufacturer shall have at least five years experience in the manufacturing of similar canopies.
- C. The erector shall provide evidence of experience completing at least five prior projects of similar scope in the past three years.

##### 1.05 FIELD MEASUREMENT

- A. Confirm dimensions prior to preparation of shop drawings when possible.
- B. If requested, supply manufacturer's standard literature and specifications for canopies.
- C. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

##### 1.06 PERFORMANCE REQUIREMENTS

- A. Awning must conform to local building codes.
- B. Awning structure shall be designed by a qualified, professional engineer registered in the state in which the project is located.
- C. Deflection Rating: Minimum L/180.

#### 1.07 SUBMITTALS

- A. Furnish shop drawings bearing the seal of a state registered structural engineer to indicate proper construction in compliance with all local codes including, but not limited to, wind ratings, load bearing, footings required, spacing of posts in accordance with fire codes for entrance and egress, and drainage of precipitation.
- B. Submit signed Certification by a state registered structural engineer that design complies with latest building code applicable to location and applicable ANSI/ASCE requirements.
- C. Submit detailed product data on all components including part numbers and characteristics.
- D. Furnish samples of the color and finish.

#### 1.08 DELIVER, STORAGE, HANDLING

- A. Deliver and store all awning components in protected areas.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURER

- A. Awning Design Standard: Lumishade by Mapes Architectural Canopies. Lincoln, Nebraska, Phone: 888-273-1132. [www.mapescanopies.com](http://www.mapescanopies.com).
- B. Other acceptable manufacturers if their products and services meet the performance criteria and profiles of the design standard.
  - a. Rusco Custom Canopies. Knoxville, TN Phone: 865 938-4717. [www.ruscocanopies.com](http://www.ruscocanopies.com)
  - b. Peachtree Protective Covers. Atlanta, GA Phone: 800-341-3325. [www.peachtreecovers.com](http://www.peachtreecovers.com)
  - c. Dittmer Architectural Aluminum. Winter Springs, Florida, Phone: 800-822-1775. [www.dittdeck.com](http://www.dittdeck.com)

#### 2.02 MATERIALS

- A. Awning Decking shall consist of an interlocking roll-formed 2 1/2 W style pan, minimum .032 aluminum thickness.
- B. Decking, Fascia, and Intermediate Frame members shall be extruded aluminum, alloy 6063-T6 meeting properties specified in ASTM B 221.

- C. Hanger rods and attachment hardware shall be galvanized/zinc plated and powder coated to match canopy.
- D. Hanger rods shall be round, 1 inch in diameter.
- E. Awning Fascia shall be 8 inch wide, in a minimum thickness of 0.125 inch aluminum.

## 2.03 FINISHES

- A. Two-coat Kynar 500 fluoropolymer paint finish meeting AAMA 2605 performance specifications.
- B. Total dry film thickness to be 1.25 mil.
- C. Color to be selected from manufacturer's full range of standard colors.

## 2.04 FABRICATION

- A. Awning shall be shipped in preassembled sections for ease of installation.
- B. All connections shall be mechanically assembled utilizing 3/16" fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.
- C. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and directed to the front gutter for ground level discharge thru scuppers equipped with deflectors.
- G. Decking shall be designed with interlocking extruded aluminum members with mechanical fasteners field applied to provide structural integrity for the completed assembly.

# PART 3 - EXECUTION

## 3.01 INSPECTION

- A. Confirm that surrounding area is ready for the installation.
- B. Coordinate awning wall-support design and installation requirements have been followed.
- C. Confirm that awning support structure requirements have been followed.
- D. Installer shall confirm dimensions and elevations to be as shown the approved shop drawings.
- E. Erection shall be performed by an approved installer.

## 3.02 INSTALLATION

- A. Installation shall be in strict accordance with approved shop drawings.
- B. Particular attention should be given to protecting the finish during handling and erection.
- C. After installation, entire system shall be left in a clean condition.

END OF SECTION



## SECTION 11 31 00

### APPLIANCES

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Commercial ice maker and storage bin.

##### 1.02 REFERENCE STANDARDS

- A. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

##### 1.03 SUBMITTALS

- A. See Section 01 34 00 - Submittals, for submittal procedures.
- B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

##### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years of documented experience.
- B. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

##### 1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.

#### PART 2 - PRODUCTS

##### 2.01 APPLIANCES

- A. All Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Ice Machine with Water Filtration: Free-standing, frost-free, air-cooled Nugget ice.
  - 1. Capacity: Total minimum storage of 370 lbs of ice storage; minimum ice cube making capacity of 420 lbs in 24 hours.

2. Water Filtration System: Provide Model SSM1-P Single System by Everpure, or equal.
3. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by DOE.
4. Features: Include stainless steel ice cutter, automatic defrost, removable air filter, large rigid ice scoop located on inner door panel.
5. Finish: Stainless steel.
6. Warranty: 3 year parts and labor manufacturer's warranty.
7. Manufacturers:
  - a. Scotsman Ice Systems; Product N0422A with Bin B322S:  
[www.scotsman-icemachines.com](http://www.scotsman-icemachines.com)
  - b. Hoshizaki America: [www.hoshizaki.com](http://www.hoshizaki.com).
  - c. Substitutions: See Section 01 60 00 - Product Requirements.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Verify utility rough-ins are present and correctly located.

#### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.

#### 3.03 ADJUSTING

- A. Adjust operating equipment to efficient operation.

#### 3.04 CLEANING

- A. Remove packing materials from equipment.
- B. Wash and clean equipment.

END OF SECTION

## SECTION 12 21 13

### HORIZONTAL LOUVER BLINDS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Horizontal slat louver mini-blinds.
- B. Operating hardware.

##### 1.02 SUBMITTALS

- A. Product Data: Provide data indicating physical and dimensional characteristics and operating features.
- B. Color chart.
- C. Schedule or plan illustrating specific spaces and openings to receive blinds.

##### 1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years experience.
- B. Warranty: Lifetime warranty against defects in materials or workmanship.

##### 1.04 PROJECT CONDITIONS

- A. Coordinate the work with window installation and placement of concealed blocking to support blinds.
- B. Take field measurements to determine sizes required.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Horizontal Louver Blinds:
  - 1. Hunter Douglas Architectural: [www.hunterdouglas.com](http://www.hunterdouglas.com).
  - 2. Levolor Home Fashions: [www.levolor.com](http://www.levolor.com).
  - 3. Springs Window Fashions: [www.springswindowfashions.com](http://www.springswindowfashions.com)
- B. Design Standard: Hunter Douglas "CE80 1".

##### 2.02 BLINDS AND BLIND COMPONENTS

- A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.

- B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
  - 1. Width:
    - a. 1 inch at exterior windows and storefront.
  - 2. Thickness: 0.008 inch prior to coating.
  - 3. Color: "Alabaster" in matte finish as selected from manufacturer's standard range.
- C. Slat Support: Woven polypropylene cord, ladder configuration.
  - 1. Mini-Blinds Ladders Spacing: 21.5 mm maximum.
- D. Head Rail: Pre-finished, formed steel U-shaped channel, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats
  - 1. Height: +/-1 inches.
  - 2. Width: +/- 1 ½ inches.
  - 3. Thickness: 0.25 inches.
  - 4. Color: Same as slats.
- E. Bottom Rail: Pre-finished, formed, fully-enclosed steel box with top side shaped to match slat curvature; with end caps. Color: Same as headrail.
- F. Lift Cord: Braided polypropylene; continuous loop. Length of window opening height less 1/2 inches.
- G. Control Wand: Extruded hollow plastic; round shape.
  - 1. Removable type.
  - 2. Length of window opening height less 1/2 inches.
- H. Headrail Attachment: Ceiling brackets.
- I. Accessory Hardware: Type recommended by blind manufacturer.

## 2.03 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.
- B. Fabricate blinds to fit completely inside frames of windows having multiple sections divided by intermediate mullions.
- C. At openings exceeding 60 inches in width and having intermediate mullions, separate blinds into multiple units not exceeding 60 inches in width.
- D. At openings requiring multiple blind units, provide separate blind assemblies with space of 1/4 inch between blinds, located at window mullion centers.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed.

### 3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with concealed fasteners.

### 3.03 INSTALLATION TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

### 3.04 ADJUSTING

- A. Adjust blinds for smooth operation.

### 3.05 CLEANING

- A. Clean blind surfaces just prior to occupancy.
- B. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

### 3.06 SCHEDULE

- A. Provide 1" mini-blinds at all windows within the following locations:
  - 1. At all exterior windows.
- B. Do not install blinds at active door leaves, unless noted otherwise.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 13 24 19

### METAL BUILDING SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Extent of pre-engineered building work is shown on drawings and generally includes, but is not necessarily limited to, the work of furnishing and installing the following:
  - 1. Structural-steel framing.
  - 2. Metal roof panels.
  - 3. Metal wall panels.
  - 4. Metal gutters, downspouts and trim.
  - 5. Wall and Roof insulation.
  - 6. Accessories.
- B. The work includes, but is not necessarily limited to, provision of structural frames (bents, end wall columns, intermediate columns, portal columns/frames), secondary framing (roof purlins, wall girts, framing for all roof and wall openings), bracing, anchor bolts, metal roofing, metal siding, roof and wall blanket insulation, gutters and downspouts, flashing and trim, roof curbs and accessories, flashing and structural support at roof penetrations, closure strips, and sealants associated with metal building erection.
- C. Building Type: The pre-engineered building shown is a single story, rigid frame type metal building of the length, width, and eave height indicated. Roof pitch shall be as indicated.
  - 1. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements. Otherwise, non-standard, custom components shall be provided.

##### 1.02 SUBMITTALS

- A. Comply with Section 01 34 00 – Submittals.
- B. Dealer Certification: Submit certification that the metal building system supplier or metal roof system supplier is a manufacturer's authorized and franchised dealer of the system to be furnished. Certification shall state date on which authorization was granted.
- C. Installer Certification: Submit certification that the metal building system or roof system installer has been regularly engaged in the installation of building systems of the same or equal construction to the system specified.

- D. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories.
- E. Submittals shall be independent and stand-alone for each of the pre-engineered metal buildings within the project.
- C. Shop Drawings: Submit complete erection drawings showing anchor bolt sizes, lengths, and settings; sidewall; endwall and roof framing; transverse cross sections; covering and trim details; and accessory installation details to clearly indicate proper assembly of metal building components. "Standard details" or catalog cuts will not be considered sufficient. Reproductions of Contract Drawings shall not be used as shop drawings. Shop drawings shall clearly indicate details of interface with the work of other trades.
- E. Templates: Anchor bolt location and forming templates shall be provided for use in foundation construction.
- F. Samples: Submit samples of the following items. Architect's review will be for color and texture only. Compliance with other requirements is the responsibility of the Contractor.
  - 1. 12" long by actual width of roofing and siding panels, with required finishes.
  - 2. Fasteners for application of roofing and siding panels.
  - 3. Sealants and closures.
  - 4. Pre-finished metal flashing.
- G. Certification and Load Tabulations: Submit written "Certificate of design and manufacturing performance" prepared, sealed, and signed by a Professional Engineer, registered to practice in the state within which the project is located, verifying that metal building system design and metal roof system design, including panels, clips, and support system components, meet indicated loading requirements and codes of authorities having jurisdiction.
  - 1. Submit computer load tabulation printouts and other calculations and documentation as required by code enforcement authorities, sealed and signed by the Professional Engineer.
  - 2. Submit calculated foundation loads for all load combinations required by the building code or specified herein. Foundations have been designed based on preliminary building loads. When the actual foundation loads are submitted, it may become necessary to modify the foundation design.
  - 5. Submit certification verifying that the metal roof system has been tested and approved by Underwriter's Laboratory as Class 90.
- H Warranty Documentation: Submit manufacturer's standard warranty.

### 1.03 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC):
  - 1. AISC Specification for Structural Steel Buildings.
  - 2. AISC Serviceability Design Considerations for Low-Rise Buildings.



- B. American Iron and Steel Institute (AISI):
  - 1. AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. American Welding Society (AWS):
  - 1. AWS D1.1 / D1.1M – Structural Welding Code – Steel.
  - 2. AWS D1.3 / D1.3M – Structural Welding Code – Sheet Steel.
- D. Association for Iron & Steel Technology (AISE):
  - 1. AISE 13 – Specifications for Design and Construction of Mill Buildings.
- E. ASTM International (ASTM):
  - 1. ASTM A 325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - 2. ASTM A 653 / A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 3. ASTM A 792 / A 792M – Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - 4. ASTM B 117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
  - 5. ASTM C 518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - 6. ASTM C 1363 – Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
  - 7. ASTM D 522 – Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
  - 8. ASTM D 523 – Standard Test Method for Specular Gloss.
  - 9. ASTM D 968 – Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
  - 10. ASTM D 1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
  - 11. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
  - 12. ASTM D 2247 – Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
  - 13. ASTM D 2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
  - 14. ASTM D 3361 – Standard Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
  - 15. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
  - 16. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 17. ASTM E 96 / E 96M – Standard Test Methods for Water Vapor Transmission of Materials.
  - 18. ASTM E 1592 – Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
  - 19. ASTM G 87 – Standard Practice for Conducting Moist SO<sub>2</sub> Tests.

- F. FM Global:
  - 1. FMRC Standard 4471 – Approval Standard for Class 1 Roofs for Hail Damage Resistance, Combustibility, and Wind Uplift Resistance.
- G. Metal Building Manufacturers Association (MBMA):
  - 1. MBMA Metal Building Systems Manual.
- H. North American Insulation Manufacturers Association (NAIMA):
  - 1. NAIMA 202 – Standard For Flexible Fiber Glass Insulation to be Laminated for Use in Metal Buildings.
- I. The Society for Protective Coatings (SSPC):
  - 1. SSPC-Paint 15 - Primer for Use Over Hand Cleaned Steel performs to SSPC-Paint 15 standards.
  - 2. SSPC-SP2 – Hand Tool Cleaning.
- J. Underwriters Laboratories (UL):
  - 1. UL 580 – Standard for Tests for Uplift Resistance of Roof Assemblies.
  - 2. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

#### 1.04 QUALITY ASSURANCE

- A. All pre-engineered metal buildings within project are to be by a single manufacturer with not less than ten years documented experience in the manufacture and design of similar pre-engineered metal buildings.
- B. Manufacturer's Qualifications:
  - 1. Manufacturer regularly engaged, for past 10 years, in manufacture of metal building systems of similar type to that specified.
  - 2. Accredited based on IAS Accreditation Criteria AC472 and requirements in International Building Code (IBC), Chapter 17.
- C. Installer's Qualifications:
  - 1. Installer regularly engaged, for past 10 years, in installation of metal building systems of similar type to that specified.
  - 2. Employ persons trained for installation of metal building systems.
- D. Design Criteria:
  - 1. Comply with requirements of the Statewide Building Code in effect at the time the project is bid.
  - 2. Structural Framing: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturers Association's (MBMA) "Design Practices Manual".
  - 3. Structural Steel: For design of structural steel members, comply with requirements of the latest edition American Institute of Steel Construction's (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" for design requirements and allowable stresses.

4. Structural Steel Buildings: For design of structural steel buildings, comply with requirements of the latest edition American Institute of Steel Construction's (AISC) "Specifications for Structural Steel for Buildings".
  5. Light Gage Steel: For design of light gage steel members, comply with requirements of the American Iron and Steel Institute's (AISI) "Specification for the Design of Cold Formed Steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses.
  6. Welded Connections: Comply with requirements of the American Welding Society's (AWS) "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.
  7. Possession of certification in Category MB of the AISC certification Program is required by the selected manufacturer to demonstrate that said manufacturer has the personnel, organization, experience, procedures, knowledge, equipment, capability, and commitment to produce fabricated steel of the required quality.
  8. Girts for exterior awnings: PEMB supplier shall design and provide structural steel girts for the lateral support of the suspended metal awnings. Girts shall be located as shown on the drawings and shall be designed to limit lateral deflection to  $L/360$  under a uniform wind load of 23 PSF (positive or negative). Bending stress shall be within allowable limits.
    - a. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 or ASTM E 283 at the following test-pressure difference:
      - 1) Test-Pressure Difference: 1.57 lbf/sq. ft..
    - b. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
      - 1) Test-Pressure Difference: 6.24 lbf/sq. ft..
    - c. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:
      - 1) Test-Pressure Difference: 6.24 lbf/sq. ft..
    - d. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
      - 1) Test-Pressure Difference: 6.24 lbf/sq. ft..
- E. Design metal building components to be entirely self-supporting.

- F. Lateral Stability: Design shall provide for lateral stability of the building structure under all loading conditions required by the applicable code. Such provision shall be by means of rigid portal bracing, wind columns, cross bracing, or other means as may be necessary. Cross bracing shall not be used where it would interfere with doorways, windows, or other building openings or with other elements of the work.
1. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7-10.
- G. Contractor's design shall include diameter size of anchor bolts. See drawings for embedment length and design.
- H. Foundation Design Modifications: After submission of the actual foundation loads the foundation design may be modified, and may include the provision of additional footings and reinforcement, if required, to accommodate structural elements that are not shown on the drawings, but which may be a part of the pre-engineered building system.
- I. Frames are to be designed with pin-support at foundations.
- J. Design Loads: Design each member, including anchor bolts, to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in MBMA's "Design Practices Manual" or in the Statewide Building Code, whichever is more stringent. Roof live load reductions are allowed in accordance with NCBC 2012.
1. Roof Covering: Design according to the requirements of the Statewide Building Code in effect at the time the project is bid, or as indicated on the drawings, whichever is more stringent.
    - a. If more severe than Code requirements, design for 250 pound concentrated (point) load (over 1' x 1' area) located at midpoint of maximum panel span, with most severe condition governing.
  2. Wind Load: Design according to the requirements of the Statewide Building Code in effect at the time the project is bid, or as indicated on the drawings, whichever is more stringent.
  3. Seismic Data: Design according to the requirements of the Statewide Building Code in effect at the time the project is bid, or as indicated on the drawings, whichever is more stringent.
  4. Roof Live Load: Design, with no reduction, according to the requirements of the Statewide Building Code in effect at the time the project is bid, or as indicated on the drawings, whichever is more stringent.
    - a. Design shall account for snow drift loads where applicable.
  5. Roof Dead Load: Weight of structure, roof, and insulation as calculated by pre-engineered building manufacturer, or as indicated on the drawings, whichever is more stringent.
- K. Collateral Loads:
1. Five PSF for ceiling, mechanical, plumbing, fire-protection and electrical systems. This allowance shall be applied as a uniform load at the roof level.

2. Where ceilings are suspended from the supporting structure, allow an additional four psf. This allowance shall be applied as a uniform load at the roof level.
  3. Design framing for actual weight of mechanical equipment where actual weight is a more severe loading condition than the uniform load allowance. See drawings for loads. Weights and locations of mechanical equipment shall be shown on the pre-engineered building shop drawings.
    - a. All Exhaust Fans shown on Mechanical Plans weigh 120 lbs each.
  4. Any miscellaneous loads resulting from items shown on any of the drawings or called for in the specifications shall be accounted for in the design of the pre-engineered structure.
  5. Allow an additional 2 psf load, on the roof support purlin system, within the Workshop and Sign Shop areas of the Shops Building for miscellaneous equipment loads.
- L. Purlin and Roof Deflection: Less than  $L/240$  of span.
- M. Lateral Drift: Lateral drift shall be limited to  $H/100$  for a ten year recurrence wind loading.
- N. **No column flange braces are allowed below suspended ceilings. Design framing steel accordingly.**

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed.
- B. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

#### 1.06 WARRANTY

- A. Roof Structural Warranty: Durability of the roof panels due to rupture, structural failure, or perforation shall be warranted for a period of 20 years by the building manufacturer.
- B. Roof Leakage Warranty on Standing Seam Roof Panels: Durability of the roof panels due to water leakage shall be warranted for a period of **20** years by the building manufacturer.
  1. An independent warranty against leakage shall be provided by the pre-engineered metal building contractor for a period of 2 years.
- C. Roof Panel Finish Warranty: The exterior color finish for the roof panels and trim shall be warranted by the building manufacturer for 20 years against blistering, peeling, cracking, flaking, checking and chipping.

1. Color For a period of 25 years, chalking shall not exceed ASTM D 4214, #8 rating and shall not fade more than 5 color difference units in accordance with ASTM D 2244.
- D. Wall Panel Finish Warranty: The exterior color finish for the wall panels shall be warranted by the building manufacturer for 20 years against blistering, peeling, cracking, flaking, checking and chipping. Color change and chalking shall be warranted for 20 years. Color change shall not exceed 5 N.B.S. units, per ASTM D-2244.64T. Chalking shall not be less than a rating of 8 per ASTM D-659.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Subject to compliance with the requirements of this section, and the capability to match the design characteristics described on the drawings, the pre-engineered metal building systems shall be manufactured by one of the following:
1. Varco Pruden Buildings, Memphis, Tennessee 38187
  2. Star Building Systems, Oklahoma City, Oklahoma 73149.
  3. Ceco Building Systems, Columbus, Mississippi 39703
  4. Chief Buildings, Grand Island, Nebraska 68802.
  5. American Buildings Company, Alabama 36027
  6. A & S Building Systems
  7. ACI Building Systems
  8. Metallic Building Systems
  9. Kirby Building Systems
  10. Other manufacturers meeting all these requirements, as approved in advance by the Architect.

### 2.02 MATERIALS

- A. Metals:
1. Hot-Rolled Structural Shapes: Comply with requirements of ASTM A36 or A529.
  2. Tubing or Pipe: Comply with requirements of ASTM A500, Grade B, ASTM A501, or A53.
  3. Members Fabricated from Plate or Bar Stock: Provide 42,000 psi minimum yield strength. Comply with requirements of ASTM A529, A570, or A572.
  4. Members Fabricated by Cold Forming: Comply with requirements of ASTM A607, Grade 50.

5. 55% Aluminum-zinc alloy coated Steel Sheet in coils and cut lengths. Comply with requirements of ASTM A792. Coating to be by the hot-dipped process.
6. Bolts for Structural Framing: Comply with requirements of ASTM A325 as necessary for design loads and connection details.

B. Thermal Insulation:

1. Provide ASTM C991-16, Type I and II glass fiber blanket insulation of not less than 0.5 lb. per cu. ft. density, with UL flame spread classification of 25 or less, and 2" wide continuous vapor tight edge tabs.
  - a. Vapor Retarder Facing: Fiberglass-scrim-reinforced, White vinyl film; with permeance not greater than 0.02 perm when tested according to ASTM E 96/E 96M, Desiccant Method, with UL flame spread classification of 25 or less.
  - b. Thermal Block: Expanded polystyrene rigid insulation with minimum 25 psi compressive strength and an *effective* R-value of 5.
2. Roof Insulation: Provide one layer of R-19 *effective* thick blanket and one layer of R-11 *effective* thick blanket for a total *effective* R-Value of 30 at roofs of enclosed areas.
3. Wall Insulation: Provide one layer of R-13 *effective*) thick blanket at walls and one layer of R-11 *effective* thick blanket for a total *effective* R-Value of 24 of enclosed areas.
4. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Paint and Coating Materials:

1. Primers:
  - a. Shop Primer for Ferrous Metal: Provide fast-curing, lead-free, "universal" primer, as selected by the manufacturer for resistance to normal atmospheric corrosion and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure of the shop primer.
  - b. Shop Primer for Galvanized Metal Surfaces: Provide zinc dust-zinc oxide primer as selected by the manufacturer for compatibility with substrate. Comply with performance requirements of SSPC-Paint-20.
  - c. Before priming, clean steel of loose rust, loose mill scale, dirt, and other foreign materials.
2. Finish Coats: All finished wall, roof, and trim exterior surfaces shall be pre-finished with a high performance polyvinylidene fluoride resin coating, containing 70% Kynar 500 or Hylar 5000, with a finished paint film thickness of 1 mil, nominal. Interior surfaces of walls and roofs shall be finished with modified alkyd, where exposed, or galvanized mill finish where not exposed, with a finished paint film thickness of 1 mil, nominal.
  - a. Comply with requirements of AAMA 605.2.

- b. Surfaces cleaned and given conversion coating pre-treatment prior to application of 0.3 mil dry film thickness of epoxy or acrylic primer following recommendations of finish coat manufacturer.
- c. Provide in either 2, 3, or 4 coat system as required for color selected.
- d. Color shall be as selected by Architect from the manufacturer's full standard color range.
- e. Acceptable Manufacturers: Fluropon by Valspar Corporation, Nubelar by Glidden Corporation, Duranar by PPG Industries, and Trinar by Akzo Coatings, Inc.

## 2.03 STRUCTURAL FRAMING

- A. Rigid Frames shall be fabricated from hot-rolled structural steel with column bases designed as pinned. Provide built-up "I-beam" shape rigid frames consisting of either tapered or parallel flange beams and tapered columns. Provide frames factory welded and shop painted. Furnish frames complete with attachment plates, bearing plates and splice members. Factory drill frames for bolted field assembly.
  - 1. Provide length of span and spacing of frames indicated. Slight variations in length of span and frame spacing may be acceptable if necessary to meet manufacturer's standard, provided architectural functional and aesthetic requirements are adhered to. Spacing and span shall allow floor plan dimensions to be maintained as indicated on the drawings.
- B. End Wall Columns: Provide factory welded, shop painted endwall columns of built-up "I" shape or sections. Provide end wall columns where required to meet design criteria, in locations that will not interfere with doors, windows, other openings, or that will not interfere with functional requirements.
- C. Wind Bracing:
  - 1. Diagonal Bracing Rods: Provide adjustable wind bracing using not less than 1/2" diameter threaded steel rods; comply with requirements of ASTM A36 or A572, Grade D. Provide interior or end bay bracing only where it will not create a functional interference.
  - 2. Rigid Portal Frames: Where diagonal bracing would be an obstruction to normal building use provide portal (moment resisting frame) bracing fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads. Bracing shall not interfere with other building systems, or required vertical clearances. Bracing in roof plane shall not extend below bottom flange of bents.
- D. Secondary Framing: Provide not less than 16-ga. shop painted cold formed or hot rolled or built-up sections for the following secondary framing members:
  - 1. Girts
  - 2. Purlins
  - 3. Eave struts
  - 4. Endwall beams
  - 5. Flange bracing
  - 6. Sag bracing



7. Base channels
  8. Sill angles
  9. Purlin spacers
- E. Girts: Provide girts as required to meet design criteria.
- F. Purlins:
1. The configuration and spacing of the purlins shall be the building manufacturer's standard. The allowable design capacity of cold-formed purlin members shall be calculated in accordance with the provisions of the AISI Specification for the design of Cold-Formed Steel Structural Members. The manufacturer shall certify that the purlin bracing system provided conforms to Section 5-2 of the AISI Specification, latest edition.
  2. Supporting members for roof systems shall be designed to support all loads imposed upon them without reliance on diaphragm action of the roof panels. Sufficient supplementary lateral support shall be provided to develop the full allowable stresses used in the design of such members. Lateral support members shall provide adequate strength and stiffness, and be properly anchored for this purpose. The manufacturer shall certify and provide design analysis or test data confirming that the roof system will satisfactorily support the specified design loads with an appropriate factor of safety.
- G. Bolts: Provide shop painted bolts, except when structural framing components are in direct contact with roofing and siding panels. Provide zinc-plated or cadmium-plated bolts when structural framing components are in direct contact with roofing and siding panels.
- H. Shop Painting: Clean surfaces to be primed of loose mill scale, rust, dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power tool cleaning, § and SSPC-SP1 for solvent cleaning.
1. Prime structural steel primary and secondary framing members with rust-inhibitive primer.
  2. Prime galvanized members, after phosphoric acid pretreatment with zinc dust-zinc oxide primer.

## 2.04 ROOFING AND SIDING

- A. General: Provide roofing and siding sheets formed to the manufacturer's standard profile or configuration subject to the following requirements.
- B. Roof Panels: Provide roof panels for pre-engineered metal buildings indicated.
1. Roof panels shall be a minimum of 24 gauge steel meeting the loading requirements specified and having 55% Aluminum-zinc alloy coated Steel Sheet conforming to the requirements of ASTM A792.
  2. Roof Panels shall be a structural, standing seam profile, with 16" wide panels with 2" high standing seams and concealed fasteners. Roof panels shall be of

"standing-seam interlocking" design. The standing seams shall have a factory applied, non-hardening sealant, and the seams shall be continuously locked or crimped together by mechanical means during erection.

3. Color shall be **Off White** as selected by the Architect from the manufacturer's full standard color range.
  4. Provide panels of maximum length to eliminate end laps.
  5. Ridge Panels shall be one-piece and factory formed to match roof profile and slope. Ridge panel to roof panel laps shall occur over secondary structural member.
  6. Ridge Assembly: Design ridge assembly to allow roof panels to move lengthwise with expansion and contraction as roof panel temperature changes.
    - a. Factory punch parts for correct field assembly.
    - b. Install panel closures and interior reinforcing straps to seal panel ends at ridge.
    - c. Do not expose attachment fasteners on weather side.
    - d. Use lock seam plug to seal lock seam portion of panel.
    - e. High-Tensile Steel Ridge Cover: Span from panel closure to panel closure and flex as roof system expands and contracts.
- C. Provision for Expansion and Contraction:
1. Provision for Thermal Expansion Movement of Roof Panels: Clips with movable tab.
    - a. Stainless Steel Tabs: Factory centered on roof clip when installed to ensure full movement in either direction.
    - b. Maximum Force of 8 Pounds: Required to initiate tab movement.
    - c. Each Clip: Accommodates a minimum of 1.25-inch movement in either direction.
  2. Roof: Provide for thermal expansion and contraction without detrimental effects on roof panels, with plus or minus 100-degree F temperature difference between interior structural framework of building and of roof panels
- D. Underwriters' Laboratories (UL): Roof covering and supports shall carry an Underwriters' Laboratories Construction (Uplift) listing of not less than Class 90.
- E. FM Global (Factory Mutual): Provide roof system that has been tested in accordance with FMRC Standard 4471 and approved as a Class 1 Panel Roof.
- F. Roof Panel Attachment: Roof panels shall be fastened to the purlins or secondary support members with manufacturer's standard concealed clip system, which shall be of true "floating clip" design such that panel movement due to expansion and contraction is accommodated by the clips themselves, rather than by "purlin roll". Provide purlin spacers or sag angles to minimize purlin roll.
- G. Endwall Trim and Roof Transition Flashings: Allow roof panels to move relative to wall panels and/or parapets as roof expands and contracts with temperature changes.
- H. Thermal Spacers: Provide manufacturer's standard R-5 thermal spacers, sandwiched between roof panels and supporting members, which will compensate for loss of

insulating value where roof insulation is compressed when passing over supporting members.

I. Roof Jacks and Curbs:

1. The pre-engineered building manufacturer shall provide roof openings (with secondary framing), jacks, and curbs to accommodate all roof-mounted or roof-penetrating equipment. Coordinate with other trades responsible for interfacing work for exact sizes, weights, and locations of such equipment and penetration.
2. Openings 8" or smaller may be flashed and sealed to the roof panel by jacks, providing complete structural support and weather tightness are maintained. Material shall be either of metal with a protective metallic coating or of an EPDM material with an aluminum sealing ring base. EPDM materials are to be white or gray in color.
3. Openings larger than 8" round or square shall be framed with a welded metal curb fabricated from 14 gauge (minimum) galvanized steel. The curb and its appurtenances shall be supported by the roof purlins and header framing. The curb shall have a minimum projection of 12" above the weather surface of the roof, and the configuration of the flanges shall match the roof panel. Curbs shall be pre-finished to match roofing color. The flange to panel joint shall be sealed with a non-hardening sealant and fastened in such a manner to provide complete support and weather tightness. Provide metal water diverter strips on upstream side of curbs. Fabricate curbs with height tapered to match roof slope, to result in level installation of tops of units.
4. Hot vents shall be accommodated with curbs or sleeves which will allow roof penetration by pipes or flues in excess of 300 degrees F.

J. Wall Liner Panel System: Provide formed wall liner panel system where indicated. Interior liner panels are to be 28 gauge Grade 33 steel with a zinc coating conforming to the requirements of ASTM A653. Liner panel are to be painted with a white polyester finish on one side and a gray primer coating on the reverse.

K. Wall Panels:

1. Provide wall panels for pre-engineered metal buildings. Wall panels shall be 24 gauge steel (80,000 psi yield) meeting the loading requirements specified and having 55% Aluminum-zinc alloy coated Steel Sheet conforming to the requirements of ASTM A792.
2. Panel width shall be 36 inches with approximately 1 ½ inch deep profile. Panel face shall have manufacturer's standard vertical corrugation profile as required for panel strength.
3. Color shall **Medium to Dark Blue** as selected by Architect from the manufacturer's full standard color range.
4. Vertically applied panels shall be of sufficient length to permit single piece installation on full building height. Panel side laps shall overlap one major corrugation.

5. Profile: Exposed fastening panels system in smooth "PBR" profile using 12-inch on center ribs with intermediate striations.
- L. Wall Panel Attachment: Fasteners may be exposed. Use self tapping screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners as standard with the manufacturer, designed to withstand design loads.
- M. Accessories: Provide the following sheet metal accessories factory formed of the same material and finish as the roofing and siding.
  1. Flashings and trim (finish of wall flashings and trim to match wall panels), 26 gauge, all extruded, unless otherwise indicated, secured with no exposed fasteners.
  2. Closers.
  3. Fillers.
  4. Metal expansion joints.
  5. Ridge covers (finish of ridge covers to match roof panels).
  6. Fascias and rakes (finish of fascias and rakes to match roof panels).
  7. Gutters (finish of gutters to match roof panels).
  8. Downspouts (finish of downspouts to match wall panels).
  9. The top, bottom, and intermediate panel closures; flashings; fascias; gutters; and trim shall be the building manufacturer's standard shapes, compatible with the wall panels.
- N. Flexible Closure Strips: Provide closed-cell, expanded cellular rubber, self-extinguishing flexible closure strips. Cut or premold closure strips to match corrugation configuration of roofing and siding sheets. Provide closure strips where indicated or necessary to ensure weathertight and insect proof construction.
- O. Sealing Tape: Provide pressure sensitive 100 percent solids grey polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, non toxic, non staining tape not less than 1/2" wide and 1/8" thick.
- P. Joint Sealant: Provide one-part elastomeric polyurethane, polysulfide or silicone rubber sealant as recommended by the building manufacturer.
- Q. Bituminous Coating: Cold-applied asphalt mastic, SSPC Paint 12, compounded for 15 mil dry film thickness per coat.

## 2.05 SHEET METAL ACCESSORIES

- A. General: Provide coated steel sheet metal accessories with coated steel roofing and siding panels.
- B. Exposed Gutters: Gutters shall be 24 gage galvanized steel (42,000 psi yield) G90 coating conforming to ASTM Galvanized Specification A525 (latest edition). Form gutters in sections not less than 10 feet in length, complete with end pieces, outlet tubes and other special pieces as may be required. Join sections with riveted and soldered or sealed joints. Provide expansion-type slip joint at center of runs. Furnish gutter supports

spaced at 36" o.c., constructed of same metal as gutters. Provide bronze, copper, or aluminum wire ball strainers at each outlet.

- a. Color shall match Roof color.
- C. Downspouts: Downspouts shall be 24 gage galvanized steel (42,000 psi yield) G90 coating conforming to ASTM Galvanized Specification A525 (latest edition). Form downspouts in sections approximately 10 feet long, complete with elbows and offsets. Join sections with not less than 1-1/2" telescoping joints. Provide fasteners, designed to securely hold downspouts not less than 1" away from walls; locate fasteners at top and bottom and at approximately 5 feet on center in between.
  - a. Color shall match Wall panel color.
- D. Wall Louvers: Specified in Divisions 10 and/or 23. Provide structurally reinforced, flashed, trimmed, and sealed wall openings to accommodate louvers and similar items. Framing members shall be constructed so as to structurally replace the wall and/or framing displaced.

## 2.06 FABRICATION

- A. General: Design prefabricated components and necessary field connections required for erection to permit easy assembly and disassembly. Fabricate components in such a manner that once assembled, they may be disassembled, repackaged and reassembled with a minimum amount of labor.
  - 1. Clearly and legibly mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams and instruction manuals.
- B. Structural Framing: Shop fabricate structural framing components to the indicated size and section complete with base plates, bearing plates and other plates required for erection, welded in place. Provide required holes for anchoring or connections either shop drilled or punched to template dimensions.
  - 1. Shop Connections: Provide power riveted, bolted or welded shop connections.
  - 2. Field Connections: Provide bolted field connections.
- C. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials which are noncompatible or could result in corrosion or deterioration of either material or finishes.

## PART 3 - EXECUTION

### 3.01 ERECTION

- A. Framing: Erect structural framing true to line, level and plumb, rigid and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-

nuted anchor bolts. Use a non-shrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than 7 days after placement.

- B. Purlins and Girts: Provide rake or gable purlins with tight fitting closure channels and fascias. Locate wall girts to suit wall opening arrangements and heights. Space wall girts to brace metal wall panels and to accommodate and brace other building components. Secure girts to structural framing and hold rigidly to a straight line by sag rods. Secure purlins to structural framing and provide sag angles.
- D. Bracing:
  - a. Provide diagonal rod bracing in both roof and sidewalls as required. Provide adequate temporary bracing until permanent bracing is in place.
  - b. Moment resisting frames shall be used in lieu of sidewall rod bracing, where diagonal bracing would create a functional interference.

### 3.02 ROOFING AND SIDING

- A. General: Arrange and nest sidelap joints so that prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.
  - 1. Provide weatherseal under ridge cap. Flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather. Tape caulk between bottom of roof sheet and supporting member.
- B. Standing Seam Roof Panel System: Fasten roof panels to purlins with concealed clip in accordance with the manufacturer's instructions.
  - 1. Install clips at each support using self-drilling fasteners.
  - 2. At end laps of panels install tape caulk between panels.
  - 3. Install factory-caulked cleats at standing seam joints. Machine seam cleats to the panels to provide a weather-tight joint.
  - 4. Install roof flashings and curbs to provide complete weather tightness and to allow the roof system to accommodate thermal expansion and contraction.
- C. Wall Sheets: Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete or other supporting substrate and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up in accordance with the sealant manufacturer's recommendations.
  - 1. Align bottoms of wall panels and fasten panels with self-tapping screws. Provide "L-shaped" flashing with hemmed edges, each leg being longer than the depth of wall panel, and install vertically where metal panels abut adjoining masonry construction. Provide sealant at all such joints. Fasten flashings, trim around openings, and similar elements with self-tapping screws.

2. Install screw fasteners with power tool having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- D. Sheet Metal Accessories: Install gutters, downspouts, and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting. Extend downspouts to ground and terminate with 45 degree outlet, except terminate downspout 2 inches below top of storm drainage boots, supplied by others, where indicated. Provide number of downspouts required to accommodate local rainfall conditions, or as indicated, whichever results in the greater quantity. No section of gutter shall be longer than 50-feet without being furnished with a downspout. Make minor field adjustments to downspout locations as directed by Architect/Engineer.
- E. Thermal Insulation: Install insulation concurrently with installation of roof and wall panels in accordance with manufacturer's published directions. Install blankets straight and true in one-piece lengths with both sets of tabs sealed to provide a complete vapor barrier.
- a. Locate first layer of roof insulation on the underside of roof sheets, extending across the top flange of purlin members and held taut and snug to roofing panels with retainer clips. Install thermal blocks where indicated. Install retainer strips at each longitudinal joint, straight and taut, nesting with roof rib to hold insulation in place.
  - b. Install second layer of roof insulation between and parallel to purlins. Fit snug without compression.
  - c. Install first layer of wall insulation on the inside face of wall panels, extending across outside flange of girt members and held taut and snug to wall panels. Trim around roof penetrations.
  - d. Install second layer of wall insulation between and parallel to purlins. Fit snug without compression.
  - e. Replace torn spots.
- F. Panels shall interlock along long edges and be attached with fasteners. Install panels on back side of purlins and girts and enclose bents and other structural members to eliminate bird roosting ledges.

### 3.03 CLEANING AND PROTECTION

- A. Damaged Units: Replace panels and other components of the work which have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.
- B. Cleaning: Remove temporary protective coverings and strippable films (if any) as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK



## SECTION 21 13 13

### WET-PIPE SPRINKLER SYSTEMS

#### 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. Pipes, fittings, and specialties.
  - 2. Sprinkler piping specialties.
  - 3. Sprinklers.
  - 4. Hose connections.
  - 5. Monitors.
  - 6. Alarm devices.
  - 7. Manual control stations.
  - 8. Control panels.
  - 9. Pressure gages.
  - 10. Fire-department connections.

- B. Related Requirements:

- 1. Section 28 31 00 "Addressable Fire Alarm System"
  - 2. Section 26 05 26 "Grounding and Bonding for Electrical Systems"

##### 1.3 DEFINITIONS

- A. Sprinkler system design shall be approved by authorities having jurisdiction.

- 1. Margin of Safety for Available Water Flow and Pressure: 20 percent, including losses through water-service piping, valves, and backflow preventers.
  - 2. Refer to Drawings for Sprinkler Occupancy Hazard Classifications:
  - 3. Refer to Drawings for Minimum Density for Automatic-Sprinkler Piping Design.
  - 4. Refer to Drawings for Maximum Protection Area per Sprinkler.

- B. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13, NFPA 14 and ASCE/SEI 7.

## 1.4 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - 2. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department connection.
- B. Products with UL Label or Listing in the latest issue of UL "Fire Protection Equipment Directory" and the Supplement current as of the issue date of this specification, products with FM Label or Listing in the current "Factory Mutual Approval Guide" and approved products are mandatory minimum requirements for acceptable materials and equipment.
- C. Shop Drawings: For wet-pipe sprinkler systems.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include diagrams for power, signal, and control wiring.
- D. Prepare and submit shop drawings to the Architect/Engineer and Owner's Insurance Underwriter (if required). Submit to the Architect/Engineer only those shop drawings which have been Underwriter "approved" or "approved as noted."
- E. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Qualification Data: For qualified Installer and professional engineer.
- G. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- H. Fire-hydrant flow test report providing the latest results.
- I. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- J. Field quality-control reports.
- K. Closeout Submittals
- L. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.
  - 1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- a. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

## 1.5 QUALITY ASSURANCE

### A. Requirements of Regulatory Agencies:

1. Provide fire protection work per the mandatory code requirements, standards of NFPA, and the requirements of the Owner's Insurance Underwriter, except where more stringent requirements are indicated, as modified and supplemented by the Contract Documents. The NFPA requirements include the appendices and supplements.
2. The provisions and recommendations of the NFPA constitute mandatory minimum requirements for work specified herein. No payment will be made by the Owner for extra charges for work added in order to comply with NFPA Standards and Owner's Insurance Underwriter requirements.

### B. Contractor Qualifications:

1. Fire protection system work shall be supervised and performed by personnel regularly engaged in the installation of fire protection systems per Underwriter's and NFPA Standards.
2. Where allowed, employ for welding, brazing, soldering and cutting work, "qualified" personnel, as defined by the applicable code and certified by an approved bureau or agency.

### C. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
  - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
  - 1. NFPA 13.
- B. Delegated Design: Engage a qualified Fire Protection professional engineer, as defined in Section 014000 "Quality Requirements," to design dry-pipe sprinkler systems. Base calculations on results of fire-hydrant flow test.
- C. Hydraulic Design Criteria: Sprinkler system design shall be approved by authorities having jurisdiction and shall be designed according to the following:
  - 1. Margin of Safety for Available Water Flow and Pressure: 20 percent, including losses through water-service piping, valves, and backflow preventers.
  - 2. Sprinkler Occupancy Hazard Classifications: Refer to Drawings.
  - 3. Minimum Density for Automatic-Sprinkler Piping Design: Refer to Drawings.
  - 4. Maximum Protection Area per Sprinkler: According to the latest NFPA 13 standard, UL listing and as specified on Drawings.
  - 5. Total Combined Hose-Stream Demand Requirement: According to latest NFPA 13 standard unless otherwise indicated:
    - a. Light-Hazard Occupancies: 100 gpm (6.3 L/s) for 30 minutes
    - b. Include losses through water-service piping, valves, and backflow preventers.
    - c. Extra-Hazard Occupancies: 500 gpm (31.5 L/s) for 90 to 120 minutes.
  - 6. The maximum base of riser pressure demand shall not exceed 90 psig. Provide additional hydraulic calculations to discharge flange of the fire pumps, if required, to verify that the hose and sprinkler systems can be met.
  - 7. Include losses through water-service piping, valves, and backflow preventers.
  - 8. Grid Systems with 0.60 gpm per sq. ft. densities also require additional hydraulic calculations to provide 0.85 gpm/ft<sup>2</sup> over 1,200 ft<sup>2</sup>.
  - 9. Hydraulic calculations shall begin at outlet connection of city water meter or connection into distribution system with pipe friction based on Williams and Hazen coefficients.
    - a. Underground: Cement lined cast ferrous or PVC pipe, C=140.
    - b. Aboveground: Black carbon steel wet pipe and deluge systems, C=120.
    - c. Aboveground: Black carbon steel dry pipe and pre-action systems, C=100.
    - d. Aboveground: Galvanized carbon steel dry pipe and pre-action systems, C=120.
  - 10. Water velocity in the piping system shall not exceed the following:
    - a. Underground mains: 16 ft/sec.
    - b. Aboveground mains: 32 ft/sec.
    - c. Sprinkler branch lines: 20 ft/sec.
  - 11. Gridded branch lines shall be limited to two heads on the outside of the primary and secondary cross mains.

12. Water supply noted on the drawings. If not, Contractor shall make flow test to ascertain water flow.
- D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

## 2.3 STEEL PIPE AND FITTINGS

- A. Refer to 20 11 01 "Above-ground Piping for Mechanical, Plumbing and Fire Suppression" and 20 11 02 "Under-ground Piping for Mechanical, Plumbing and Fire Suppression" for fire suppression piping.

## 2.4 SPRINKLER PIPING SPECIALTIES

### A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Anvil International, Inc.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Or Approved Equal.
2. Standard: UL 213.
3. Pressure Rating: 175-psig (1200-kPa) minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-tee and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

### B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Reliable Automatic Sprinkler Co., Inc.
  - b. Tyco Fire & Building Products LP.
  - c. Victaulic Company.
  - d. Or Approved Equal.
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig (1200-kPa) minimum.
4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.

6. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Elkhart Brass Mfg. Company, Inc.
  - b. Fire-End & Croker Corporation.
  - c. Potter Roemer.
  - d. Or Approved Equal.
2. Standard: UL 199.
3. Pressure Rating: 175 psig (1200 kPa).
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig (1200-kPa) minimum 300 psig (2070 kPa).
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. CECA, LLC.
  - b. Corcoran Piping System Co.
  - c. Merit Manufacturing; a division of Anvil International, Inc.
  - d. Or Approved Equal.

F. Flexible Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Fivalco Inc.
  - b. FlexHead Industries, Inc.
  - c. Gateway Tubing, Inc.

- d. Or Approved Equal.
  - 2. Standard: UL 1474.
  - 3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
  - 4. Pressure Rating: 175-psig (1200-kPa) minimum.
  - 5. Size: Same as connected piping, for sprinkler.
- G. Backflow Preventer: See Section 22 10 16 "Plumbing Piping Specialties"
- H. Automatic (Ball Drip) Drain Valves:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Tyco Fire
    - b. Reliable Fire
    - c. Or Approved Equal
  - 2. Standard: UL 1726
  - 3. Pressure Rating: Match system pressure rating
  - 4. Type: Automatic draining, ball check.
  - 5. End Connections: Threaded.

## 2.5 SPRINKLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Reliable Automatic Sprinkler Co., Inc.
  - 2. Tyco Fire & Building Products LP.
  - 3. Victaulic Company.
  - 4. Viking Corporation.
  - 5. Or Approved Equal.
- B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- C. Pressure Rating for Residential Sprinklers: 175-psig (1200-kPa) maximum.
- D. Pressure Rating for Automatic Sprinklers: 175-psig (1200-kPa) minimum.
- E. Automatic Sprinklers with Heat-Responsive Element:
- 1. Early-Suppression, Fast-Response Applications: UL 1767.
  - 2. Nonresidential Applications: UL 199.
  - 3. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

- F. Open Sprinklers with Heat-Responsive Element Removed: UL 199.
  - 1. Nominal Orifice: 1/2 inch (12.7 mm), with discharge coefficient K between 5.3 and 5.8.
  - 2. Nominal Orifice: 17/32 inch (13.5 mm) with discharge coefficient K between 7.4 and 8.2.
- G. Sprinkler Finishes: Chrome plated.
- H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
  - 1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
  - 2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- I. Sprinkler Guards:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Reliable Automatic Sprinkler Co., Inc.
    - b. Tyco Fire & Building Products LP.
    - c. Victaulic Company.
    - d. Viking Corporation.
    - e. Or Approved Equal.
  - 2. Standard: UL 199.
  - 3. Type: Wire cage with fastening device for attaching to sprinkler.

## 2.6 MONITORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Elkart Brass
  - 2. Guardian Fire
  - 3. Potter Roemer
  - 4. Or Approved Equal
- B. Type: Stationary.
- C. Nozzle: UL 401, NPS 2-1/2 (DN 65), brass, adjustable from fog spray to straight stream to shutoff.
- D. Horizontal Rotation: 360 degrees with locking device.
- E. Vertical Rotation: 80-degree elevation and 60-degree depression with locking device.
- F. Waterway: Double brass or stainless-steel tube.



- G. Waterway Size: NPS 2-1/2 (DN 65) minimum.
- H. Water Stream Flow: 250 gpm [**16 L/s**]
- I. Operation: Wheel.
- J. Base Inlet Size: NPS 2-1/2 (DN 65).
- K. Finish: Red-painted body with brass trim.

## 2.7 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Motor-Operated Alarm:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Globe Fire Sprinkler Corporation.
    - b. Tyco Fire & Building Products LP.
    - c. Victaulic Company.
    - d. Viking Corporation.
    - e. Or Approved Equal.
  - 2. Standard: UL 753.
  - 3. Type: Mechanically operated, with Pelton wheel.
  - 4. Alarm Gong: Cast aluminum with red-enamel factory finish.
  - 5. Size: 8-1/2-inches (216-mm) diameter.
  - 6. Components: Shaft length, bearings, and sleeve to suit wall construction.
  - 7. Inlet: NPS 3/4 (DN 20).
  - 8. Outlet: NPS 1 (DN 25) drain connection.
- C. Electrically Operated Alarm Bell:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Fire-Lite Alarms, Inc.; a Honeywell company.
    - b. Notifier; a Honeywell company.
    - c. Potter Electric Signal Company.
    - d. Or Approved Equal.
  - 2. Standard: UL 464.
  - 3. Type: Vibrating, metal alarm bell.
  - 4. Size: 8-inch (200-mm) minimum- diameter.
  - 5. Finish: Red-enamel factory finish, suitable for outdoor use.
  - 6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

D. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Potter Electric Signal Company.
  - b. System Sensor; a Honeywell company.
  - c. Viking Corporation.
  - d. Watts Industries (Canada) Inc.
  - e. Or Approved Equal.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig (1725 kPa).
7. Design Installation: Horizontal or vertical.

E. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Detroit Switch, Inc.
  - b. Potter Electric Signal Company.
  - c. Tyco Fire & Building Products LP.
  - d. Viking Corporation.
  - e. Or Approved Equal.
2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

F. Low Pressure Alarm Switch: Two sets of adjustable, SPDT contacts. One set shall close on pressure decrease, the second set shall close on further pressure decrease.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Central Sprinkler Corp.
  - b. Grinnell Corp.
  - c. Potter Electric Signal Co.
  - d. United Electric Controls Co.
  - e. Viking Corp.
  - f. Or Approved Equal

G. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Fire-Lite Alarms, Inc.; a Honeywell company.
  - b. Kennedy Valve; a division of McWane, Inc.
  - c. Potter Electric Signal Company.
  - d. System Sensor; a Honeywell company.
  - e. Or Approved Equal.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

2.8 CONTROL PANELS

- A. Description: Single-area, two-area, or single-area cross-zoned control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves.
  1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors and Class A detector circuit wiring.
  2. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
  3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application
- B. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION," with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- C. Manual Control Stations: Hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION," with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- D. Panels Components:
  1. Power supply.
  2. Battery charger.
  3. Standby batteries.
  4. Field-wiring terminal strip.
  5. Electrically supervised solenoid valves and polarized fire-alarm bell.
  6. Lamp test facility.
  7. Single-pole, double-throw auxiliary alarm contacts.
  8. Set of Dry Contacts for BMS communication
  9. Rectifier.

## 2.9 BUILDING FIRE ALARM INTERFACE

- A. Each zone control assembly shall provide an alarm signal output to the Building Fire Alarm System (wiring by Division 28) whenever there is a waterflow in the zone.
- B. Each valve which controls the flow of sprinkler system water shall be monitored by the Building Fire Alarm System (wiring by Division 28).

## 2.10 PRESSURE GAGES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AMETEK; U.S. Gauge Division.
  - 2. Ashcroft, Inc.
  - 3. Brecco Corporation.
  - 4. WIKA Instrument Corporation.
  - 5. Or Approved Equal.
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
- D. Pressure Gage Range: 0- to 250-psig (0- to 1725-kPa) minimum.
- E. Label: Include "WATER" label on dial face.

## 2.11 SUPPORTING ELEMENTS

- A. Supporting Elements: provide UL/FM components per NFPA 13, ANSI B 31.1 and MSS SP-58 and SP-69 except that "C" clamps or any modification thereof are unacceptable.
- B. Furnish necessary piping and equipment supporting elements including; building structure attachments; supplementary steel; hanger rods, stanchions and fixtures; vertical pipe attachments; horizontal pipe attachments; anchors; guides.
- C. Center Loading Beam Clamps: For attachments to building structure as approved except piping supported from top of steel.
- D. Piping 2-1/2" and smaller supported from top of steel shall be supported by MSS SP-69 Type 25 supports, piping 3" and larger requires two supports, one on each side of beam for balance to maintain concentric loading.
- E. "C" clamps: With set screw, locknut and restraining strap are acceptable for piping up to 2-1/2".

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13, NFPA 14, NFPA 291 and Owners Insurance Underwriter, if applicable. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

### 3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Refer to sections 20 11 01 "Above-ground Piping" and 20 11 02 "Under-ground Piping" for fire suppression piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping. Comply with requirements for backflow preventers in Section 21 11 00 "Facility Fire-Suppression Water-Service Piping."
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

### 3.3 WATER-SUPPLY CONNECTIONS

- A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 22 11 16 "Domestic Water Piping."
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Section 22 11 19 "Domestic Water Piping Specialties."
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

### 3.4 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
  - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
  - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

- C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- K. Install alarm devices in piping systems.
- L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to Section 200548 "Noise, Vibration and Seismic Controls for Mechanical, Plumbing and Fire Suppression Piping and Equipment."
- M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.
- N. Pressurize and check preaction sprinkler system piping and air-pressure maintenance devices and air compressors where installed.
- O. Fill sprinkler system piping with water.
- P. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Section 20 05 33 "Heat Tracing for Mechanical, Plumbing and Fire-Suppression" and for piping insulation in Section 20 07 00 "Thermal Insulation for Mechanical, Plumbing and Fire Suppression."
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 20 05 17 "Sleeves, Seals and Escutcheons for Mechanical, Plumbing and Fire Suppression."

- R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 20 05 17 "Sleeves, Seals and Escutcheons for Mechanical, Plumbing and Fire Suppression."
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 20 05 17 "Sleeves, Seals and Escutcheons for Mechanical, Plumbing and Fire Suppression."

### 3.5 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

### 3.6 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
  - 1. Install valves in vertical position for proper direction of flow, in main supply to system.
  - 2. Install alarm valves with bypass check valve and retarding chamber drain-line connection.
  - 3. Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

### 3.7 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.
- D. Space heads per lighting, building equipment layout and NFPA 13. Because sprinkler heads may be installed before lighting, ducts, piping and equipment are installed, thoroughly coordinated shop drawings must be prepared by all trades to prevent conflicts. Equipment location shall have priority over sprinkler head and piping location. No sprinkler pipe shall pass through air ducts.
- E. Aesthetically locate sprinkler heads in finished administrative function spaces with respect to ceiling patterns, tile patterns, masonry bonds and similar construction lines.
- F. Upon completion of installation and prior to any painting work, protect heads as necessary so they are completely protected from paint application. Remove protection once painting is complete. Any heads that accidentally receive any paint must be replaced.

### 3.8 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13, NFPA 14 and Owners Insurance Underwriter.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."



### 3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
  - 4. Energize circuits to electrical equipment and devices.
  - 5. Coordinate with fire-alarm tests. Operate as required.
  - 6. Coordinate with fire-pump tests. Operate as required.
  - 7. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.10 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

### 3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves and pressure-maintenance pumps.

### 3.12 PIPING SCHEDULE

- A. Refer to Sections 20 11 01 "Above-ground Piping" and 20 11 02 "Under-ground Piping".

### 3.13 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:
  - 1. Rooms without Ceilings: Upright sprinklers.
  - 2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers as indicated.
  - 3. Wall Mounting: Sidewall sprinklers.
  - 4. Spaces Subject to Freezing: Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated.

5. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers where indicated.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Flush Sprinklers: Bright chrome, with painted white escutcheon.
2. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
3. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

### 3.14 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire hydrants.
- B. Examine roughing-in for facility fire-suppression water-service piping to verify actual locations of piping connections before installation.
- C. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire-department connections.
- D. Examine roughing-in for fire-suppression standpipe system to verify actual locations of piping connections before fire-department connection installation.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.15 INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Wet-Barrel Fire Hydrants: Install with valve below the frost line. Provide for drainage.
- C. AWWA Fire Hydrants: Comply with AWWA M17.
- D. UL-Listed or FM Global-Approved Fire Hydrants: Comply with NFPA 24.
- E. Install wall-type fire-department connections.
- F. Install yard-type fire-department connections in concrete slab support. Comply with requirements for concrete in Section 03 30 00 "Cast-in-Place Concrete."
- G. Install protective pipe bollards around each fire-department connection, refer to Fire Protection and/or Architectural Drawings for quantity and exact location. Comply with requirements for bollards in Section 05 50 00 "Metal Fabrications."

- H. Install automatic (ball-drip) drain valve at each check valve for fire-department connection.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 22 05 53

### IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section Includes:
  - 1. Equipment labels.
  - 2. Pipe labels.
  - 3. Valve tags.

##### 1.03 ACTION SUBMITTALS

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

##### 1.04 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

#### PART 2 - PRODUCTS

##### 2.01 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
  - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick.
  - 2. Letter Color: White.
  - 3. Background Color: Black.
  - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
  - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules).
  - C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## 2.02 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
  2. Lettering Size: At least 1-1/2 inches.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.03 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- B. Pipe Label Color Schedule:
  - 1. Cold Water Piping:
    - a. Background Color: Green.
    - b. Letter Color: White.
  - 2. Hot Water Piping:
    - a. Background Color: Green.
    - b. Letter Color: White.

### 3.04 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
  - 1. Valve-Tag Size and Shape:
    - a. Cold Water: 1-1/2 inches, round.
    - b. Hot Water: 1-1/2 inches, round
  - 2. Valve-Tag Color:
    - a. Cold Water: Natural.
    - b. Hot Water: Natural
  - 3. Letter Color:
    - a. Cold Water: Black.

b. Hot Water: Black

END OF SECTION



## SECTION 22 07 19

### PLUMBING PIPING INSULATION

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section includes insulating the following plumbing piping services:
  - 1. Domestic cold-water piping.
  - 2. Domestic hot-water piping.
  - 3. Domestic recirculating hot-water piping.

##### 1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).
- B. Shop Drawings:
  - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
  - 3. Detail removable insulation at piping specialties, equipment connections, and access panels.
  - 4. Detail application of field-applied jackets.

##### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - C. Comply with the following applicable standards and other requirements specified for miscellaneous components:
    1. Supply and Drain Protective Shielding Guards: ICC A117.1.
- 1.05 DELIVERY, STORAGE, AND HANDLING
  - A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.
- 1.06 COORDINATION
  - A. Coordinate sizes and locations of supports, hangers, and insulation shields.
  - B. Coordinate clearance requirements with piping Installer for piping insulation application. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- 1.07 SCHEDULING
  - A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
  - B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

### 2.01 INSULATION MATERIALS

- A. If retaining more than one type of insulation in this article, indicate where each type applies in insulation system schedules.
- B. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- C. See "Product Characteristics" Article in Evaluations for comparisons and temperature ranges for insulation material properties.
- D. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- E. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

- F. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- G. Mineral-Fiber, Preformed Pipe Insulation:
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. Johns Manville; Micro-Lok.
    - b. Knauf Insulation; 1000-Degree Pipe Insulation.
    - c. Owens Corning; Fiberglas Pipe Insulation.
    - d. Or approved equal.
  2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- H. PVC Jacket Adhesive: Compatible with PVC jacket.
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. Dow Corning Corporation; 739, Dow Silicone.
    - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    - c. P.I.C. Plastics, Inc.; Welding Adhesive.
    - d. Speedline Corporation; Polyco VP Adhesive.
    - e. Or approved equal.

## 2.02 SEALANTS

- A. ASJ Jacket, and PVC Jacket Flashing Sealants:
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. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    - b. Or approved equal.
  2. Materials shall be compatible with insulation materials, jackets, and substrates.
  3. Fire- and water-resistant, flexible, elastomeric sealant.
  4. Service Temperature Range: Minus 40 to plus 250 deg F.
  5. Color: White.

## 2.03 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

## 2.04 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
  - 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. Johns Manville; Zeston.
    - b. P.I.C. Plastics, Inc.; FG Series.
    - c. Proto Corporation; LoSmoke.
    - d. Speedline Corporation; SmokeSafe.
    - e. Or approved equal.
  - 2. Adhesive: As recommended by jacket material manufacturer.
  - 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

## 2.05 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
  - 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. ABI, Ideal Tape Division; 428 AWF ASJ.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
    - c. Compac Corporation; 104 and 105.
    - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
    - e. Or approved equal.
  - 2. Width: 3 inches.
  - 3. Thickness: 11.5 mils.
  - 4. Adhesion: 90 ounces force/inch in width.
  - 5. Elongation: 2 percent.
  - 6. Tensile Strength: 40 lbf/inch in width.
  - 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
  - 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. ABI, Ideal Tape Division; 370 White PVC tape.
  - b. Compac Corporation; 130.
  - c. Venture Tape; 1506 CW NS.
  - d. Or approved equal.
- 2. Width: 2 inches.
- 3. Thickness: 6 mils.
- 4. Adhesion: 64 ounces force/inch in width.
- 5. Elongation: 500 percent.
- 6. Tensile Strength: 18 lbf/inch in width.

## 2.06 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Piping Enclosures. :
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Truebro; a brand of IPS Corporation.
    - b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
    - c. Or approved equal.
  - 2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
  - 1. Verify that systems to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

### 3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Tape seams and joints with products recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier sealant.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

3. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. For above-ambient services, do not install insulation to the following:
  1. Vibration-control devices.
  2. Testing agency labels and stamps.
  3. Nameplates and data plates.
  4. Cleanouts.

#### 3.04 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

#### 3.05 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
  1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
  3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
  6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
  7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
  8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
  9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

### 3.06 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure preformed pipe insulation to pipe with self-sealing strips and tape without deforming insulation materials.
  2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier tape or sealant.
  3. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier flashing sealant.



- B. Insulation Installation on Pipe Fittings and Elbows:
  - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
  - 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Cover insulation materials with preformed PVC jacket.
- C. Insulation Installation on Valves and Pipe Specialties:
  - 1. Install preformed sections of same material as straight segments of pipe insulation when available.
  - 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
  - 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  - 4. Install insulation to flanges as specified for flange insulation application.

### 3.07 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.
  - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

### 3.08 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
  - 1. Drainage piping located in crawl spaces.
  - 2. Underground piping.
  - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

### 3.09 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
  - 1. All sizes: Insulation shall be the following:
    - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Domestic Hot Water:
  - 1. NPS 1-1/4 and Smaller: Insulation shall be the following:

- a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- 2. NPS 1-1/2 and Larger: Insulation shall be the following:
  - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 thick.

END OF SECTION

## SECTION 22 11 16

### DOMESTIC WATER PIPING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section Includes:
  - 1. Aboveground domestic water pipes, tubes, and fittings inside buildings.

##### 1.03 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

##### 1.04 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Owner no fewer than seven days in advance of proposed interruption of water service.
  - 2. Do not interrupt water service without Owner's written permission.

#### PART 2 - PRODUCTS

##### 2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61.

##### 2.02 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

- B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- D. Copper Unions:
  - 1. MSS SP-123.
  - 2. Cast-copper-alloy, hexagonal-stock body.
  - 3. Ball-and-socket, metal-to-metal seating surfaces.
  - 4. Solder-joint.

## 2.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
  - 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
  - 2. Full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys.
- D. Flux: ASTM B 813, water flushable.
- E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

## PART 3 - EXECUTION

### 3.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install isolation valves on both hot and cold water pipes supplying each restroom.
- C. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- G. Install piping to permit valve servicing.
- H. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- L. Install sleeve seals for piping penetrations of concrete walls and slabs.
- M. Install escutcheons for piping penetrations of walls, ceilings, and floors.

### 3.02 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- F. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

### 3.03 HANGER AND SUPPORT INSTALLATION

- A. Support vertical piping and tubing at base and at each floor.

- B. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- C. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
- D. Install supports for vertical copper tubing every 10 feet.
- E. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

### 3.04 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  - 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
  - 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

### 3.05 IDENTIFICATION

- A. Identify system components using pipe markers on pipe runs, and plastic tags for equipment, and specialties.

### 3.06 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Piping Inspections:
    - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

- b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
    - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
    - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
  - 2. Piping Tests:
    - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
    - c. Chemically disinfect all new piping per University standards.
    - d. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
    - e. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
    - f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
    - g. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports, and submit to Owner.

### 3.07 ADJUSTING

- A. Perform the following adjustments before operation:
  - 1. Close drain valves, hydrants, and hose bibbs.
  - 2. Open shutoff valves to fully open position.
  - 3. Open throttling valves to proper setting.
  - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

- a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
  - b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

### 3.08 CLEANING

#### A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
  - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  - b. Fill and isolate system according to either of the following:
    - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
    - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
  - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
  - d. Repeat procedures if biological examination shows contamination.
  - e. Submit water samples in sterile bottles to authorities having jurisdiction.

#### B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
  - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
  - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.



- C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

### 3.09 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Aboveground domestic water piping, NPS 1-1/4 and larger, shall be the following:
  - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
- E. Aboveground domestic water piping, NPS 1 and smaller, shall be the following:
  - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 22 11 19

### DOMESTIC WATER PIPING SPECIALTIES

#### 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. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Strainers.
7. Hose stations.
8. Hose bibbs.
9. Wall hydrants.
10. Drain valves.
11. Water-hammer arresters.
12. Air vents.
13. Trap-seal primer valves.
14. Trap-seal primer systems.
15. Flexible connectors.
16. Water meters.

###### B. Related Requirements:

1. Section 220519 "Meters and Gauges for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 221116 "Domestic Water Piping" for water meters.
3. Section 223200 "Domestic Water Filtration Equipment" for water filters in domestic water piping.
4. Section 224300 "Medical Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
5. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.
6. Section 224713 "Drinking Fountains" for water filters for water coolers.
7. Section 224716 "Pressure Water Coolers" for water filters for water coolers.

8. Section 224723 "Remote Water Coolers" for water filters for water coolers.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For domestic water piping specialties.
  - 1. Include diagrams for power, signal, and control wiring.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61 and NSF 14.
- B. Comply with NSF 372 for low lead.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

### 2.3 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. FEBCO; A WATTS Brand.
    - d. WATTS.

- e. Zurn Industries, LLC.
  - 2. Standard: ASSE 1001.
  - 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
  - 4. Body: Bronze.
  - 5. Inlet and Outlet Connections: Threaded.
  - 6. Finish: Rough bronze Chrome plated.
- B. Hose-Connection Vacuum Breakers:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. Cash Acme, A Division of Reliance Worldwide Corporation.
    - c. Champion - Arrowhead.
    - d. Legend Valve & Fitting, Inc.
    - e. MIFAB, Inc.
    - f. WATTS.
    - g. Woodford Manufacturing Company.
    - h. Zurn Industries, LLC.
  - 2. Standard: ASSE 1011.
  - 3. Body: Bronze, nonremovable, with manual drain.
  - 4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
  - 5. Finish: Chrome or nickel plated Rough bronze.
- C. Pressure Vacuum Breakers:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Apollo Flow Controls; Conbraco Industries, Inc.
    - b. FEBCO; A WATTS Brand.
    - c. WATTS.
    - d. Zurn Industries, LLC.
  - 2. Standard: ASSE 1020.
  - 3. Operation: Continuous-pressure applications.
  - 4. Pressure Loss: 5 psig maximum, through middle third of flow range.
    - a. Valves: Ball type, on inlet and outlet.

## 2.4 BACKFLOW PREVENTERS

### A. Intermediate Atmospheric-Vent Backflow Preventers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the

following:

- a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Cash Acme, A Division of Reliance Worldwide Corporation.
  - c. Legend Valve & Fitting, Inc.
  - d. WATTS.
  - e. Zurn Industries, LLC.
2. Standard: ASSE 1012.
  3. Operation: Continuous-pressure applications.
  4. Size: NPS 1/2 NPS 3/4.
  5. Body: Bronze.
  6. End Connections: Union, solder Solder joint.
  7. Finish: Chrome plated Rough bronze.

B. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Ames Fire & Waterworks; A WATTS Brand.
  - b. Apollo Flow Controls; Conbraco Industries, Inc.
  - c. FEBCO; A WATTS Brand.
  - d. WATTS.
  - e. Zurn Industries, LLC.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle third of flow range.
5. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:
  - a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
  - b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
  - c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

C. Hose-Connection Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. WATTS.
  - c. Woodford Manufacturing Company.

- d. Zurn Industries, LLC.
- 2. Standard: ASSE 1052.
- 3. Operation: Up to 10-foot head of water back pressure.
- 4. Inlet Size: NPS 1/2 or NPS 3/4.
- 5. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
- 6. Capacity: At least 3-gpm flow.

## 2.5 WATER PRESSURE-REDUCING VALVES

### A. Water Regulators:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Cash Acme, A Division of Reliance Worldwide Corporation.
  - c. WATTS.
  - d. Zurn Industries, LLC.
- 2. Standard: ASSE 1003.
- 3. Pressure Rating: Initial working pressure of 150 psig.
- 4. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
- 5. Valves for Booster Heater Water Supply: Include integral bypass.
- 6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

### B. Water-Control Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. CLA-VAL.
  - c. Flomatic Valves.
  - d. OCV Control Valves.
  - e. WATTS.
  - f. Zurn Industries, LLC.
- 2. Description: Pilot-operated, diaphragm-type, single-seated, main water-control valve.
- 3. Pressure Rating: Initial working pressure of 150 psig minimum with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot-control valve, restrictor device, specialty fittings, and sensor piping.
- 4. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.

## 2.6 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Bell & Gossett; a Xylem brand.
  - b. IMI Hydronic Engineering Inc.
  - c. Nexus Valve, Inc.
  - d. NIBCO INC.
  - e. WATTS.
2. Type: Ball or Y-pattern globe valve with two readout ports and memory-setting indicator.
3. Body: Brass or bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

B. Cast-Iron Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong International, Inc.
  - b. Flo Fab Inc.
  - c. ITT Corporation.
  - d. NIBCO INC.
  - e. Schneider Electric USA, Inc.
  - f. WATTS.
2. Type: Adjustable with Y-pattern globe valve, two readout ports, and memory-setting indicator.
3. Size: Same as connected piping, but not smaller than NPS 2-1/2.

C. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

D. Memory-Stop Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Flow Controls; Conbraco Industries, Inc.
  - b. Crane; a Crane brand.
  - c. Hammond Valve.
  - d. Jenkins Valves; a Crane brand.
  - e. Milwaukee Valve Company.
  - f. NIBCO INC.
  - g. Red-White Valve Corp.
  - h. Stockham; a Crane brand.



2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
3. Pressure Rating: 400-psig minimum CWP.
4. Size: NPS 2 or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass.
8. Seats and Seals: Replaceable.
9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

## 2.7 TEMPERATURE-ACTUATED, WATER MIXING VALVES

### A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Acorn Engineering Company; a Division of Morris Group International.
  - b. Apollo Flow Controls; Conbraco Industries, Inc.
  - c. Cash Acme, A Division of Reliance Worldwide Corporation.
  - d. Leonard Valve Company.
  - e. POWERS; A WATTS Brand.
  - f. Symmons Industries, Inc.
  - g. TACO Comfort Solutions, Inc.
  - h. WATTS.
  - i. Zurn Industries, LLC.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.

### B. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Acorn Engineering Company; a Division of Morris Group International.
  - b. Apollo Flow Controls; Conbraco Industries, Inc.
  - c. Cash Acme, A Division of Reliance Worldwide Corporation.
  - d. Lawler Manufacturing Company, Inc.
  - e. Leonard Valve Company.
  - f. POWERS; A WATTS Brand.
  - g. Symmons Industries, Inc.
  - h. Zurn Industries, LLC.

2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.

C. Individual-Fixture, Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Acorn Engineering Company; a Division of Morris Group International.
  - b. Lawler Manufacturing Company, Inc.
  - c. Leonard Valve Company.
  - d. POWERS; A WATTS Brand.
  - e. Zurn Industries, LLC.
2. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Body: Bronze body with corrosion-resistant interior components.
5. Temperature Control: Adjustable.
6. Inlets and Outlet: Threaded.
7. Finish: Rough or chrome-plated bronze.

## 2.8 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
  - a. Strainers NPS 2 and Smaller: 0.020 inch.
  - b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
  - c. Strainers NPS 5 and Larger: 0.10 inch.
6. Drain: Factory-installed, hose-end drain valve.

## 2.9 HOSE BIBBS

A. Hose Bibbs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg Co; a division of Morris Group International.
  - b. MIFAB, Inc.
  - c. Prier Products, Inc.
  - d. Woodford Manufacturing Company.
  - e. Zurn Industries, LLC.
2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
10. Finish for Service Areas: Rough bronze Chrome or nickel plated.
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation for Equipment Rooms: Wheel handle or operating key.
13. Operation for Service Areas: Operating key.
14. Operation for Finished Rooms: Operating key.
15. Include operating key with each operating-key hose bibb.
16. Include integral wall flange with each chrome- or nickel-plated hose bibb.

## 2.10 DRAIN VALVES

### A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

## 2.11 WATER-HAMMER ARRESTERS

### A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. AMTROL, Inc.
  - b. Jay R. Smith Mfg Co; a division of Morris Group International.
  - c. Josam Company.
  - d. MIFAB, Inc.
  - e. Precision Plumbing Products.
  - f. Sioux Chief Manufacturing Company, Inc.
  - g. WATTS.
  - h. Zurn Industries, LLC.
- 2. Standard: ASSE 1010 or PDI-WH 201.
  - 3. Type: Metal bellows Copper tube with piston.
  - 4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

## 2.12 AIR VENTS

### A. Bolted-Construction Automatic Air Vents:

- 1. Body: Bronze.
- 2. Pressure Rating and Temperature: 125-psig minimum pressure rating at 140 deg F.
- 3. Float: Replaceable, corrosion-resistant metal.
- 4. Mechanism and Seat: Stainless steel.
- 5. Size: NPS 1/2 minimum inlet.
- 6. Inlet and Vent Outlet End Connections: Threaded.

### B. Welded-Construction Automatic Air Vents:

- 1. Body: Stainless steel.
- 2. Pressure Rating: 150-psig minimum pressure rating.
- 3. Float: Replaceable, corrosion-resistant metal.
- 4. Mechanism and Seat: Stainless steel.
- 5. Size: NPS 3/8 minimum inlet.
- 6. Inlet and Vent Outlet End Connections: Threaded.

## 2.13 TRAP-SEAL PRIMER DEVICE

### A. Supply-Type, Trap-Seal Primer Device:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg Co; a division of Morris Group International.
  - b. Josam Company.
  - c. MIFAB, Inc.
  - d. Precision Plumbing Products.
  - e. Sioux Chief Manufacturing Company, Inc.
  - f. WATTS.

- g. Zurn Industries, LLC.
  - 2. Standard: ASSE 1018.
  - 3. Pressure Rating: 125 psig minimum.
  - 4. Body: Bronze.
  - 5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
  - 6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
  - 7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
- B. Drainage-Type, Trap-Seal Primer Device:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Jay R. Smith Mfg Co; a division of Morris Group International.
    - b. MIFAB, Inc.
    - c. Precision Plumbing Products.
    - d. Zurn Industries, LLC.
  - 2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
  - 3. Size: NPS 1-1/4 minimum.
  - 4. Material: Chrome-plated, cast brass.

## 2.14 TRAP-SEAL PRIMER SYSTEMS

### A. Trap-Seal Primer Systems:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Precision Plumbing Products.
  - b. Sioux Chief Manufacturing Company, Inc.
  - c. Zurn Industries, LLC.
- 2. Standard: ASSE 1044.
- 3. Piping: NPS 3/4, ASTM B88, Type L; copper, water tubing.
- 4. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
  - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 5. Vacuum Breaker: ASSE 1001.
- 6. Size Outlets: NPS 1/2.

## 2.15 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Flex-Hose Co., Inc.
  - 2. Mason Industries, Inc.
  - 3. Metraflex Company (The).
- B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
  - 1. Working-Pressure Rating: Minimum 200 psig.
  - 2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
  - 3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
  - 1. Working-Pressure Rating: Minimum 200 psig.
  - 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
  - 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

## 2.16 WATER METERS

- A. Displacement-Type Water Meters:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Aaliant; a brand of Niagara Meters.
    - b. Badger Meter, Inc.
    - c. Carlon Meter.
    - d. Master Meter, Inc.
    - e. Neptune Technology Group Inc.
  - 2. Standard: AWWA C700.
  - 3. Pressure Rating: 150-psig working pressure.
  - 4. Body Design: Nutating disc; totalization meter.
  - 5. Registration: In gallons or cubic feet as required by utility company.
  - 6. Case: Bronze.
  - 7. End Connections: Threaded.
- B. Turbine-Type Water Meters:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Aaliant; a brand of Niagara Meters.

- b. Badger Meter, Inc.
  - c. Neptune Technology Group Inc.
2. Standard: AWWA C701.
  3. Pressure Rating: 150 psig working pressure.
  4. Body Design: Turbine; totalization meter.
  5. Registration: In gallons or cubic feet as required by utility company.
  6. Case: Bronze.
  7. End Connections for Meters NPS 2 and Smaller: Threaded.
  8. End Connections for Meters NPS 2-1/2 and Larger: Flanged.
- C. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Backflow Preventers: Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
1. Locate backflow preventers in same room as connected equipment or system.
  2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
  3. Do not install bypass piping around backflow preventers.
- B. Water Regulators: Install with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.
- C. Water Control Valves: Install with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.
- D. Automatic Water Shutoff Valves: Test for signal strength before valve installation. Install automatic shutoff valve downstream from main domestic water shutoff valve and downstream from fire sprinkler system supply. Install valve controller in an accessible location with sensors in areas where water is likely to accumulate.
- E. Balancing Valves: Install in locations where they can easily be adjusted.
- F. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.
1. Install cabinet-type units recessed in or surface mounted on wall as specified.

- G. Y-Pattern Strainers: For water, install on supply side of each control valve water pressure-reducing valve solenoid valve and pump.
- H. Water-Hammer Arresters: Install in water piping according to PDI-WH 201.
- I. Air Vents: Install vents at high points of water piping. Install drain piping and discharge onto floor drain.
- J. Supply-Type, Trap-Seal Primer Device: Install with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
- K. Drainage-Type, Trap-Seal Primer Device: Install as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.
- L. Trap-Seal Primer Systems: Install with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

### 3.2 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.
- C. Comply with requirements for grounding equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

### 3.3 IDENTIFICATION

- A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Test each pressure vacuum breaker reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.



- C. Prepare test and inspection reports.

### 3.5 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow set points of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 22 13 16

### SANITARY WASTE AND VENT PIPING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section Includes:
  - 1. Pipe, tube, and fittings.

##### 1.03 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

##### 1.04 ACTION SUBMITTALS

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

##### 1.05 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

##### 1.06 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
  - 2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

#### PART 2 - PRODUCTS

##### 2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe

sizes. Schedule 40 PVC piping and fittings for below ground application and Cast-Iron piping and fittings for above ground/Slab application.

## 2.02 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Heavy-Duty, Hubless-Piping Couplings:
  - 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:
    - a. ANACO-Husky.
    - b. Clamp-All Corp.
    - c. Dallas Specialty & Mfg. Co.
    - d. MIFAB, Inc.
    - e. Mission Rubber Company; a division of MCP Industries, Inc.
    - f. Stant.
    - g. Tyler Pipe.
  - 2. Standards: ASTM C 1277 and ASTM C 1540.
  - 3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Cast-Iron, Hubless-Piping Couplings:
  - 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:
    - a. MG Piping Products Company.
  - 2. Standard: ASTM C 1277.
  - 3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

## 2.03 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy classes.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

## 2.04 GALVANIZED-STEEL PIPE AND FITTINGS

- A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Standard Weight class. Include square-cut-grooved or threaded ends matching joining method.

## 2.05 PVC PIPE AND FITTINGS

- A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
- B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- C. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
- D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- E. Adhesive Primer: ASTM F 656.
- F. Solvent Cement: ASTM D 2564.

## PART 3 - EXECUTION

### 3.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back

or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

- K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
  - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
  - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
  - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O. Retain first paragraph below for piping that penetrates an exterior concrete wall or concrete slab.
- P. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.
- R. Install all vertical riser cleanouts at level that is above water closet rim level.

### 3.02 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

### 3.03 SPECIALTY PIPE FITTING INSTALLATION

- A. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

### 3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with the following requirements for pipe hanger and support devices and installation.
  1. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
    - a. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
    - b. NPS 3: 60 inches with 1/2-inch rod.
    - c. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
  2. Install supports for vertical cast-iron soil piping every 15 feet.
  3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- B. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

### 3.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect drainage and vent piping to the following:
  1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
  2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
  3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
  4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
  5. Cleanouts and drains
  6. Equipment: Connect drainage piping as indicated.

### 3.06 TESTING

- A. Pressure test system per University standards.
- B. Document test results to engineer and Owner.

### 3.07 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping.

### 3.08 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.

- B. Protect drains during remainder of construction period 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 and when work stops.

### 3.09 PIPING SCHEDULE

- A. Aboveground waste and vent piping, which is not located in a return air plenum space shall be the following:
  - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty, hubless-piping couplings; and coupled joints.
- B. Aboveground, waste and vent piping, which is to be located in a space that serves as a return air plenum for the air conditioning system shall be the following:
  - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty, hubless-piping couplings; and coupled joints.
- C. Fixture arms shall be the following:
  - 1. Sch. 40 galvanized steel pipe with heavy-duty, hubless-piping couplings; and coupled joints.

END OF SECTION



## SECTION 22 13 19

### SANITARY WASTE PIPING SPECIALTIES

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

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

##### 1.02 SUMMARY

- A. Section Includes:
  - 1. Cleanouts.
  - 2. Floor drains.
  - 3. Air-admittance valves.

##### 1.03 ACTION SUBMITTALS

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

##### 1.04 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

#### PART 2 - PRODUCTS

##### 2.01 CLEANOUTS

- A. Floor Cleanouts:
  - 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:
    - a. Zurn Plumbing Products Group; Light Commercial Operation.
    - b. Josam Company; Josam Div.
    - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    - d. Watts Drainage Products Inc.
    - e. Or approved equal.

2. Size: Same as connected branch.
3. Type: Adjustable housing.
4. Body: Cast iron.
5. Closure Plug: Bronze plug.
6. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.
7. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
8. Frame and Cover Shape: Round

## 2.02 FLOOR DRAINS

### A. Cast-Iron Floor Drains (FD-1 & FD-2):

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:
  - a. MIFAB
  - b. Josam Company; Josam Div.
  - c. Zurn Plumbing Products Group; Light Commercial Operation.
  - d. Or equal.
2. Standard: ASME A112.6.3.
3. Material: Cast iron.
4. Seepage Flange: Required.
5. Clamping Device: Required.
6. Outlet: Bottom.
7. Sediment Bucket: Not required.
8. Top or Strainer Material: Bronze.
9. Top of Body and Strainer Finish: Nickel bronze.
10. Top Shape: Round.
11. Trap Material: Cast iron.
12. Trap Pattern: Standard P-trap.
13. Trap Features: Trap-seal primer valve drain connection.

## 2.03 AIR-ADMITTANCE VALVES

### A. Fixture Air-Admittance Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Ayrlett, LLC.
  - b. Durgo, Inc.

- c. Oatey.
  - d. ProSet Systems Inc.
  - e. RectorSeal.
  - f. Studor, Inc.
  - g. Or approved equal.
- 2. Standard: ASSE 1051, Type A for single fixture or Type B for branch piping.
  - 3. Housing: Plastic.
  - 4. Operation: Mechanical sealing diaphragm.
  - 5. Size: Same as connected fixture or branch vent piping.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
  - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  - 2. Locate at each change in direction of piping greater than 45 degrees.
  - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
  - 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
  - 1. Position floor drains for easy access and maintenance, unless indicated on Architect's plans.
  - 2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
  - 3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

### 3.02 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

### 3.03 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

## SECTION 22 13 23

### OIL WATER SEPARATOR

#### 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.
- B. Section 01 23 00 Alternates: See Bid Alternates and Drawings for impact on OWS Tank sizing.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Oil interceptors.

##### 1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.
- B. PP: Polypropylene plastic.

##### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of metal and plastic interceptor. Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.
- B. Shop Drawings: For each type and size of precast concrete interceptor indicated.
  - 1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.

##### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Piping connections. Include size, location, and elevation of each.
  - 2. Interface with underground structures and utility services.

## 1.6 FIELD CONDITIONS

- A. Interruption of Existing Sewer Services: Do not interrupt services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sewer services according to requirements indicated:
1. Notify Owner no fewer than seven days in advance of proposed interruption of service.
  2. Do not proceed with interruption of sewer services without Owner's written permission.

## PART 2 - PRODUCTS

### 2.1 OIL INTERCEPTORS

- A. Cast-Iron or Steel Oil Interceptors: Factory-fabricated; with removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
  2. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: Hub, hubless, or threaded, unless otherwise indicated.
  3. Extension: Cast-iron or steel shroud, full size of interceptor, extending from top of interceptor to grade.
  4. Cover: Cast iron or steel, with steel reinforcement to provide ASTM C890, A-03, walkway load.
  5. Comply with requirements in Section 231113 "Facility Fuel-Oil Piping" for waste-oil storage tank and piping.
- B. Plastic Oil Interceptors: Removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
  2. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: Hub, hubless, or threaded, unless otherwise indicated.
  3. Extension: Plastic shroud, full size of interceptor, extending from top of interceptor to grade.
  4. Cover: Plastic with steel reinforcement to provide ASTM C890, A-03, walkway load.
  5. Waste-oil storage tank and piping are specified in Section 231113 "Facility Fuel-Oil Piping."
- C. Capacities and Characteristics:
1. Capacity:

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

### 3.2 INSTALLATION

- A. Equipment Mounting:
  - 1. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
- B. Install precast concrete interceptors according to ASTM C891.
- C. Set interceptors level and plumb.
- D. Set metal or plastic interceptors level and plumb.
- E. Set tops of metal interceptor covers flush with finished surface in pavements.
  - 1. Set tops 3 inches above finish surface elsewhere unless otherwise indicated.
- F. Install oil interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Make piping connections between interceptors and piping systems.

### 3.4 PROTECTION

- A. Protect sanitary waste interceptors from damage during construction period.
- B. Repair damage to adjacent materials caused by sanitary waste interceptor installation.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK



## SECTION 22 15 00

### GENERAL-SERVICE COMPRESSED-AIR SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Pipe and Pipe Fittings.
- B. Air compressor with Integral Air Receiver.
- C. Refrigerated air dryer.

##### 1.02 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).
- B. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; 2007 (ANSI/ASME B31.1).
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2010.
- D. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2011.
- E. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2008.
- F. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 1996.
- G. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2009, Revision 1 - 2010.
- H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### 1.03 SUBMITTALS

- A. See Section 01 33 00: Submittal Procedures
- B. Product Data: Provide manufacturers catalog literature with capacity, weight, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate piping system schematic with electrical characteristics and connection requirements.
- D. Manufacturer's Instructions: Indicate manufacturer's installation instructions, hoisting and setting requirements, starting procedures.

- E. Operation Data: Submit for air compressor, air receiver and accessories, after cooler, refrigerated air dryer, and pressure reducing station.
- F. Maintenance Data: Submit for air compressor, air receiver and accessories, after cooler, refrigerated air dryer, and pressure reducing station.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Pressure Vessels: Conform to applicable code for installation of pressure vessels.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept air compressors, refrigerated air dryer on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.
- B. Protect piping and equipment from weather and construction traffic.

#### 1.06 WARRANTY

- A. Provide manufacturer's standard warranty for compressors and air dryers.

### PART 2 - PRODUCTS

#### 2.01 PIPE AND PIPE FITTINGS

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  - 2. Joints: Threaded or welded to ASME B31.1.

#### 2.02 VALVES

- A. Ball Valves:
  - 1. MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded ends with union.
- B. Air Outlets:
  - 1. Quick Connector: 1/4 inch brass, snap on connector with self closing valve, Style A, unless noted otherwise.

## 2.03 UNIONS AND COUPLINGS

- A. Unions:
  - 1. 1Ferrous Pipe: 150 psi malleable iron threaded unions.
- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- C. Flexible Connector: Neoprene with brass threaded connectors.

## 2.04 COMPRESSORS

- A. Manufacturers:
  - 1. Gardner Denver, Inc. (Champion): [www.gardnerdenver.com](http://www.gardnerdenver.com).
  - 2. Ingersoll Rand Compressed Air Solutions: <http://air.ingersollrand.com>.
  - 3. Sullair Corporation: [www.sullair.com](http://www.sullair.com).
  - 4. Quincy: [www.quincycompressor.com](http://www.quincycompressor.com)
- B. Types: Simplex and duplex, packaged air compressor units consisting of air cooled compressor, integral air receiver, aftercooler, motor starters, and controls.
- C. Reciprocating Compressors:
  - 1. Unit: Reciprocating compressor with positive displacement oil pump lubrication system, suction inlet screen, discharge service valves, on cast iron or welded steel base for motor and compressor with provision for V-belt adjustment.
  - 2. Automatic Capacity Reduction Equipment: Suction valve unloader with lifting mechanism operated by oil pressure. Provide for unloaded compressor start.
  - 3. Motor: Constant speed 1800 rpm with electronic overheating protection in each phase, full voltage starting.
  - 4. Controls:
    - a. Duplex: Control panel to be factory mounted, weather-resistant steel construction, containing starters, alternator for automatic compressor alternation, compressor run lights, 115 volt control circuit transformer, digital display, test-auto-off switches, flashing visual alert beacon, and complete power and control wiring for single point power connection.
    - b. Single Units: Starter, power and control wiring, factory wired for single point power connection.
    - c. Safety Controls: Manually reset low oil pressure cutout.
    - d. Pressure Switch: Line voltage contactor to break at 100 psi with minimum differential of 20 psi.
    - e. Electrical Alternation (Duplex): Operate each compressor for 12 hours. If one compressor fails, second shall automatically maintain air pressure.
    - f. Panel Face: Compressor run light, start-stop switch, elapsed time meter.

- D. Air Receivers: Vertical or horizontal as indicated, built to ASME regulations for working pressure of 125 psi. Flange or screw inlet and outlet connections
- E. Capacity: See schedules on drawings
- F. Electrical Characteristics: See schedules on drawings
- G. Motor: Totally enclosed, high efficiency, weather-resistant construction, NEMA MG 1, 4.
- H. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

## 2.05 AIR DRYERS

- A. Manufacturers:
  - 1. Gardner Denver, Inc. (Champion): [www.gardnerdenver.com](http://www.gardnerdenver.com).
  - 2. Ingersoll Rand Compressed Air Solutions: <http://air.ingersollrand.com>.
  - 3. Sullair Corporation: [www.sullair.com](http://www.sullair.com).
- B. Type: Packaged mechanical refrigeration type complete with heat exchanger, refrigeration compressor, automatic controls, moisture removal trap, internal wiring and piping, and full refrigerant charge.
- C. Air Connections: Inlet and outlet connections at same level, factory insulated.
- D. Heat Exchangers: Air to air and refrigerant to air coils. Provide heat exchangers with automatic control system to bypass refrigeration system on low or no load condition.
- E. Moisture Separator: Centrifugal type located at discharge of heat exchanger.
- F. Refrigeration Unit: Hermetically sealed type to operate continuously to maintain 50 degree F outlet pressure dew point. House unit in steel cabinet provided with access door and panel for maintenance and inspection.
- G. Accessories: Air inlet temperature gage, air inlet pressure gage, on/off switch, high temperature light, power on light, refrigerant gage, air outlet temperature gage, air outlet pressure gage.
- H. Capacity: See schedule on drawings.
- I. Electrical Characteristics: See schedule on drawings.
- J. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- K. Disconnect Switch: Factory mount disconnect switch in control panel.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install compressor unit on concrete housekeeping pad.
- C. Make air cock and drain connection on horizontal casing.
- D. Install line size full port ball valve on compressor discharge.
- E. Install replaceable cartridge type filter silencer of adequate capacity for each compressor.
- F. Pipe condensate drains to nearest floor drain, or other suitable location.
- G. Install valved bypass around air dryer. Factory insulate inlet and outlet connections.
- H. Install takeoffs to outlets from top of main, with full port ball valve after takeoff. Slope takeoff piping to outlets.
- I. Install compressed air couplings, female quick connectors, and pressure gages where outlets are indicated.
- J. Identify piping system and components. Install identification labels that read "Compressed Air" with flow direction indication arrows throughout systems.

### 3.02 FIELD QUALITY CONTROL

- A. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.1.
- B. Repair or replace compressed air piping as required to eliminate leaks, and retest to demonstrate compliance.
- C. Cap and seal ends of piping when not connected to mechanical equipment.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK