

East Providence, Rhode Island

# Pierce Field Police Substation

*Bid No. EP24/25-028*

*October 2025*

**Bidding Requirements, Bond Forms, Contract Agreement,  
Conditions of the Contract and Technical Specifications**

---



[www.BETA-Inc.com](http://www.BETA-Inc.com)

701 George Washington Highway  
Lincoln, Rhode Island 02865  
401.333.2382

## TABLE OF CONTENTS

| <b><u>Section Number</u></b>                | <b><u>Title</u></b>                            | <b><u>Page No.</u></b> |
|---------------------------------------------|------------------------------------------------|------------------------|
| <b>Division 0</b>                           |                                                |                        |
| 00100                                       | Advertisement                                  | 00100-1 to 00100-1     |
| 00200                                       | Information for Bidders                        | 00200-1 to 00200-6     |
| 00300                                       | Bid Form                                       | 00300-1 to 00300-3     |
| 00400                                       | Bid Bond                                       | 00400-1 to 00400-2     |
| 00500                                       | Contract Agreement                             | 00500-1 to 00500-22    |
| 00600                                       | Contract Bonds                                 | 00600-1 to 00600-8     |
| 00700                                       | General Conditions                             | 00700-1 to 00700-8     |
| 00800                                       | Supplementary Conditions                       | 00800-1 to 00800-6     |
| <b>Division 1      General Requirements</b> |                                                |                        |
| 01010                                       | Summary of Work                                | 01010-1 to 01010-3     |
| 01020                                       | Allowances                                     | 01020-1 to 01020-2     |
| 01025                                       | Measurement and Payment                        | 01025-1 to 01025-8     |
| 01035                                       | Modification Procedures                        | 01035-1 to 01035-2     |
| 01040                                       | Coordination                                   | 01040-1 to 01040-2     |
| 01045                                       | Cutting, Coring and Patching                   | 01045-1 to 01045-4     |
| 01050                                       | Field Engineering                              | 01050-1 to 01050-2     |
| 01060                                       | Regulatory Requirements                        | 01060-1 to 01060-2     |
| 01067                                       | State of Rhode Island and Federal Requirements | 01067-1 to 01067-4     |
| 01090                                       | Reference Standards                            | 01090-1 to 01090-5     |
| 01300                                       | Submittals                                     | 01300-1 to 01300-3     |
| 01400                                       | Quality Control                                | 01400-1 to 01400-2     |
| 01410                                       | Testing Laboratory Services                    | 01410-1 to 01410-4     |
| 01560                                       | Temporary Controls                             | 01560-1 to 01560-4     |
| 01570                                       | Traffic Regulations                            | 01570-1 to 01570-3     |
| 01600                                       | Materials and Equipment                        | 01600-1 to 01600-2     |
| 01700                                       | Contract Close-out                             | 01700-1 to 01700-3     |
| 01740                                       | Warranties                                     | 01740-1 to 01740-2     |
| 01800                                       | Maintenance                                    | 01800-1 to 01800-2     |
| <b>Division 2      Site Work</b>            |                                                |                        |
| 02140                                       | Dewatering                                     | 02140-1 to 02140-5     |
| 02149                                       | Maintaining Existing Sewage Flow               | 02149-1 to 02149-5     |
| 02160                                       | Excavation Support                             | 02160-1 to 02160-7     |
| 02200                                       | Earth Excavation, Backfill, Fill and Grading   | 02200-1 to 02200-12    |
| 02210                                       | Rock Excavation                                | 02210-1 to 02210-3     |
| 02215                                       | Aggregate Materials                            | 02215-1 to 02215-3     |
| 024119                                      | Selective Demolition                           | 024119-1 to 024119-4   |
| 02500                                       | Paving                                         | 02500-1 to 02500-6     |

|                   |                                                     |                       |
|-------------------|-----------------------------------------------------|-----------------------|
| 02530             | Restoration of Curb, Sidewalks, and Vegetated Areas | 02530-1 to 02530-5    |
| 02607             | Precast Concrete Manholes                           | 02607-1 to 02607-8    |
| 02615             | Pavement Markings, Thermoplastic & Epoxy Resin      | 02615-1 to 02615-9    |
| 02622             | PVC Gravity Sewer Pipe                              | 02622-1 to 02622-8    |
| 02930             | Loaming and Seeding                                 | 02930-1 to 02930-3    |
| <b>Division 3</b> | <b>Concrete</b>                                     |                       |
| 033100            | Cast-in-Place Concrete                              | 033100-1 to 033100-10 |
| <b>Division 4</b> | <b>Masonry</b>                                      |                       |
| 042223            | Reinforced Masonry                                  | 042223-1 to 042223-10 |
| <b>Division 5</b> | <b>Metals</b>                                       |                       |
| 055000            | Miscellaneous Metal Work                            | 055000-1 to 055000-8  |
| <b>Division 6</b> | <b>Wood and Plastics</b>                            |                       |
| 061653            | Air & Moisture Resistant Sheathing                  | 061653-1 to 061653-5  |
| 062010            | Carpentry and Millwork                              | 062010-1 to 062010-8  |
| 066510            | Cellular (PVC) Fabrications                         | 066510-1 to 066510-5  |
| <b>Division 7</b> | <b>Moisture Protection</b>                          |                       |
| 072116            | Fiberglass Blanket Insulation                       | 072116-1 to 072116-3  |
| 072616            | Under-Slab Vapor Barrier                            | 072616-1 to 072616-4  |
| 073113            | Fiberglass Architectural Roof Shingles              | 073113-1 to 073113-8  |
| 074633            | Vinyl Siding                                        | 074633-1 to 074633-5  |
| 076211            | Sheet Metal Flashing                                | 076211-1 to 076211-5  |
| 077123            | Gutters and Downspouts                              | 077123-1 to 077123-4  |
| 078413            | Firestopping                                        | 078413-1 to 078413-8  |
| 079213            | Joint Sealants                                      | 079213-1 to 079213-7  |
| <b>Division 8</b> | <b>Doors and Windows</b>                            |                       |
| 081213            | Steel Door Frames                                   | 081213-1 to 081213-3  |
| 081313            | Steel Doors                                         | 081313-1 to 081313-4  |
| 081333            | Stile and Rail Wood Doors                           | 081333-1 to 081333-5  |
| 085216            | Clad Wood Windows                                   | 085216-1 to 085216-7  |
| 087100            | Door Hardware                                       | 087100-1 to 087100-13 |
| 087150            | Weatherstripping                                    | 087150-1 to 087150-3  |
| 088100            | Glass and Glazing                                   | 088100-1 to 088100-4  |

**Division 9     Finishes**

|        |                              |                      |
|--------|------------------------------|----------------------|
| 092116 | Steel Framed Drywall Systems | 092116-1 to 092116-6 |
| 095123 | Acoustical Ceiling Systems   | 095123-1 to 095123-5 |
| 096500 | Resilient Flooring           | 096500-1 to 096500-5 |
| 096814 | Entrance Carpet Tile         | 096814-1 to 096814-4 |
| 098116 | Sound Attenuation Insulation | 098116-1 to 098116-3 |
| 099100 | Painting                     | 099100-1 to 099100-9 |

**Division 10     Specialties**

|        |                               |                      |
|--------|-------------------------------|----------------------|
| 101116 | Marker Boards                 | 101116-1 to 101116-4 |
| 101123 | Tackboards                    | 101123-1 to 101123-3 |
| 101400 | Signage                       | 101400-1 to 101400-4 |
| 102813 | Toilet Room Accessories       | 102813-1 to 102813-4 |
| 104413 | Fire Extinguishers & Cabinets | 104413-1 to 104413-1 |

**Division 11     Equipment**

|        |                                    |                      |
|--------|------------------------------------|----------------------|
| 110600 | Miscellaneous Equipment & Products | 110600-1 to 110600-3 |
|--------|------------------------------------|----------------------|

**Division 12     Furnishings**

|        |                           |                      |
|--------|---------------------------|----------------------|
| 122413 | Roll-Up Window Shades     | 122413-1 to 122413-4 |
| 123216 | Plastic Laminate Casework | 123216-1 to 123216-8 |

**Division 22     Plumbing**

|        |          |                       |
|--------|----------|-----------------------|
| 220000 | Plumbing | 220000-1 to 220000-29 |
|--------|----------|-----------------------|

**Division 23     Mechanical**

|        |            |                       |
|--------|------------|-----------------------|
| 230000 | Mechanical | 230000-1 to 230000-26 |
|--------|------------|-----------------------|

**Division 26     Electrical**

|        |            |                       |
|--------|------------|-----------------------|
| 260000 | Electrical | 260000-1 to 260000-49 |
|--------|------------|-----------------------|

## **DIVISION 0**



**CITY OF EAST PROVIDENCE  
PIERCE FIELD POLICE SUBSTATION  
ADVERTISEMENT  
REQUEST FOR PROPOSAL  
RFP EP24/25-028  
BID OPENING TUESDAY NOVEMBER 18, 2025 AT 11:00AM**

The City of East Providence is soliciting proposals from experienced vendor for construction of the Pierce Field Police Substation. Specifications may be downloaded from the City's website <https://eastprovidenceri.gov/rfp>.

(1) original, Two (2) copies of proposals and (1) one thumb drive shall be submitted in one (1) sealed envelope to East Providence City Hall, Controllers Office, Room 103, Attn: Kimberly Brown, Controller, 145 Taunton Ave., East Providence, RI 02914 no later than **Tuesday, November 18, 2025 at 11:00 AM**. The bids will be publicly recorded. Bids received with a time of 11:01 AM or later will be rejected. The outside envelope needs to be marked **RFP EP24/25-028**.

The City reserves the right to reject any/or all companies, to waive any informality in the proposal statement and to accept the proposal of any company based on what the City deems to be in its best interest.

Any questions regarding the RFP may be directed in writing to Erik Skadberg, City Engineer at [eskadberg@eastprovidenceri.gov](mailto:eskadberg@eastprovidenceri.gov) and Kimberly Brown, Controller at [kbrown@eastprovidenceri.gov](mailto:kbrown@eastprovidenceri.gov) no later than **Thursday, November 6, 2025 AT 4:00 PM**.

Equal Opportunity/Affirmative Action Employer

Kimberly Brown  
[kbrown@eastprovidenceri.gov](mailto:kbrown@eastprovidenceri.gov)

## SECTION 00200

### INFORMATION FOR BIDDERS

#### **1.0 RECEIPT AND OPENING OF BIDS**

Sealed proposals will be received and date stamped East Providence City Hall, Controllers Office, Room 103, Attn: Procurement Specialist 145 Taunton Avenue, East Providence, Rhode Island 02914, until the time and date indicated on the Request for Proposals. No proposal received after that time will be considered. Mark outside bid envelope with item being proposed, and time and date of proposal due date.

#### **2.0 FORM OF PROPOSAL:**

Proposals must be submitted on and in accordance with the proposal forms attached hereto, blank places must be filled in as noted, no change shall be made in the phraseology of the proposal form or in the item or items mentioned therein. Additionally, the proposals must contain the name and proper address of the proposing firm, and must be signed by a responsible member of the firm with his signature and official title. Proposals, which are not complete, or contain erasures or alterations, not initiated by the signer, may be rejected. FAXED proposals will not be accepted.

#### **3.0 SUBMISSION OF PROPOSALS:**

- 3.1 Envelopes containing proposals must be sealed and addressed to the East Providence City Hall, Controllers Office, Room 103, Attn: Procurement Specialist 145 Taunton Avenue, East Providence, Rhode Island 02914 and must be marked with the name and address of the proposer, date and time of proposal due date, and name of item being proposed.
- 3.2 The Procurement Specialist will decide when the specified time has arrived to collect the proposals, and no proposal received thereafter will be considered.
- 3.3 Any proposer may withdraw his proposal by written request at any time prior to the advertised time for proposal due date. Telephonic proposals, amendments, or withdrawals will not be accepted. Additionally, FAXED bids will not be accepted.
- 3.4 No proposal may be withdrawn for a period of ninety (90) calendar days from the date and time of proposal due date. The City reserves the right to waive this requirement in order to best serve the interests of the City.
- 3.5 Negligence on the part of the proposer in preparing the proposal confers no rights for the withdrawal of the proposal after it has been opened.

- 3.6 Proposals received prior to the time of the due date will be securely kept unopened. No responsibility will attach to an officer or person of the City for the premature opening of a proposal not properly addressed and identified as a proposal.

#### **4.0 ADDENDA:**

Copies of all Addenda will be posted to the City's Website. It is the Vendor's responsibility to check and download any and all addenda from the City's Website.

- 4.1 No Addenda will be posted later than four (4) working days prior to the date for receipt of bids except an Addendum, if necessary, postponing the date for receipt of bids or withdrawing the request for bids. Each bidder shall ascertain prior to submitting their bid that they have received all Addenda issued, and shall acknowledge their receipt in his bid.

#### **5.0 QUALIFICATION OF PROPOSER:**

The City may make such investigations as it deems necessary to determine the ability of the proposer to perform the work, and the proposer shall furnish to the City all such information and data for this purpose as the City may request. The City reserves the right to reject any proposal if the evidence submitted by, or investigation of such proposer fails to satisfy the City that such proposer is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

#### **6.0 CONTRACT SECURITY:**

Only when a Contract Security is required in the Request for Proposal, the Contractor shall furnish a Bid Bond in the amount of Five Percent (5%) and a Surety Bond/Performance Bond in an amount equal to at least One Hundred Percent (100%) of the contract price as security for the faithful performance of the contract and for the payment of all persons performing labor on the project under the contract and furnishing materials, equipment and all other incidentals in connection with the contract. The surety on such bonds shall be a duly authorized surety company licensed to bond in the State of Rhode Island, and the cost of same will be paid by the Contractor. Before final acceptance, the bonds must be approved by the City.

The bonding company providing surety must be listed in the Federal Register as issued by the Department of Treasury, Department Circular 570, latest edition, as well as being licensed in the State of Rhode Island to provide surety.

#### **7.0 BID PRICES:**

Bidders shall state the proposed price/s in the manner as designated in the Bid Proposal Form. If there is a discrepancy between the unit prices and the extended totals, the unit prices shall govern. In the event there is a discrepancy between the price written in words and in figures, the price written in words shall govern.



## **8.0 TERMS:**

Cash Discounts offered will be considered in determining awards. However, discounts for a period less than twenty (20) days will not be considered. The discount period shall be computed from date of delivery or from date the correct invoice is received by the City Controller, whichever date is later. The date of delivery shall be construed to mean the date on which the bid item is determined to meet the specifications and is therefore acceptable.

## **9.0 RHODE ISLAND SALES TAX:**

The City of East Providence is exempt from the Rhode Island Sales or Use Tax under the 1956 General Laws of the State of Rhode Island, Section 44-18-30, Para. 1, as amended.

## **10.0 "OR EQUAL" BIDDING:**

When the name of a manufacturer, a brand name, or manufacturer's catalogue number is issued as the bid standard in describing an item followed by "Or Approved Equal", this description is used to indicate quality, performance and other essential characteristics of the item required. If bidding on other than the make, model, brand or sample specified, but equal thereto, bidder must so state by giving the manufacturer's name, catalogue number and any other information necessary to prove that his intended substitution of a commodity is equal in all essential respects to the bid standard. Bidder must prove to the satisfaction of the City Manager, or by person or persons designated by him, that the bidders designated substitute is equal to the bid standard; otherwise, his bid will be rejected.

## **11.0 AWARD AND CONTRACT:**

- 11.1 Unless otherwise specified, the City reserves the right to make award by item, or items, or by total, as may be in the best interest of the City.
- 11.2 A written award (or acceptance of bid) mailed (or otherwise furnished) to the successful bidder followed by a City Purchase Order, shall be deemed to result in a binding contract without further action by either party.
- 11.3 It is the intent of the City to award a contract to the lowest responsible bidder in accordance with City Ordinances, Article V. Purchasing, Sec. 2- 243, and provided that the bid has been submitted in accordance with the requirements of the Bidding Documents, is judged to be reasonable, and does not exceed the funds available.

## **12.0 CONSIDERATION OF PROPOSALS REJECTION OF PROPOSALS:**

- 12.1 The City reserves the right to reject the proposal of any proposer who has previously failed to perform properly or complete on time, contracts of a similar nature, or who is not in a position to perform the contract, or who has habitually and without just cause, neglected the payment of bills or disregarded its obligations to sub-contractors, material, or employees.

- 12.2 The City reserves the right to reject any or all proposals and in particular to reject a proposal not accompanied by any data required by the Bidding Documents or a proposal in any way incomplete or irregular, and to waive any informality in the proposals received, and to accept the proposal or parts thereof deemed to be most favorable to the best interest of the City.
- 12.3 The City shall have the right to waive any informality or irregularity in any proposal received.
- 12.4 It is the intent of the City, if it accepts any Alternates, to accept them in the order in which they are listed in the proposal form, but the City shall have the right to accept Alternates in any order or combination and to determine the low bidder on the basis of the sum of the Base Bid and the Alternates accepted.

**13.0 DELIVERY:**

All prices bid must be on the basis of F.O.B. Delivery Point, East Providence, Rhode Island. Therefore, shipping costs are to be included within the prices quoted. Deliveries must consist only of new merchandise or equipment and shall be made between 8:00 A.M. and 4:00 P.M. Prevailing Time, Monday through Friday.

No delivery shall become due or be acceptable without a written Purchase Order, issued by the Procurement Specialist.

**14.0 AFFIRMATIVE ACTION REQUIREMENTS MBE/WBE PARTICIPATION:**

Any firm or Contractor providing services to or doing business with the City shall adhere to the City's Affirmative Action Plan for MBE/WBE Participation. Said plan is on file with the City's Affirmative Action Officer.

**14.1 All bidders are required to submit the MBE/WBE Participation Affidavit.**

**15.0 INSURANCE REQUIREMENTS:**

The Contractor shall carry the following insurance coverages at his own expense:

(a) General: All insurance for this contract shall be written by a company (or companies) acceptable to the city and all policies or certificates shall be submitted to the City for examination prior to commencement of operations by the contractor. In the event any policy or certificate, the amount of the insurance, or the company writing same are not satisfactory to the City, the contractor shall secure other policies or certificates in form and amount with a company satisfactory to the City. The contractor shall not permit policies to be changed, cancelled, or to lapse and all policies shall include a clause to the effect that the policy shall not be subject to cancellation or a reduction in the limits of liability or amounts of insurance until notice has been sent by mail to the city stating when, (not less than 30 days thereafter) such cancellation or reduction shall be effective. All certificates of insurance shall be delivered to the City and contain true transcripts from the policy or policies authenticated by the proper officer of the

insurer evidencing in particular those insured, the extent of the insurance, the location and operations to which the insurance applies, the expiration date and the above mentioned notice as to the location and operations involved.

If any part of the work is sublet, similar insurance shall be provided by or in behalf of the subcontractors to cover their operations. The contractor shall be charged with the responsibility for insurance protection for all his subcontract operations and should the contractor's policy not cover each and every subcontractor, certificates of insurance acceptable to the City covering each and every subcontractor shall be filed with said City prior to the commencement of subcontract operations.

Statutory Workman's Compensation Insurance: shall be provided by the contractor for all labor employed on the project who may come within the protection of such laws, and Employer's General Liability Insurance shall be provided for the benefit of employees not protected by compensation laws. The contractor will be charged with the responsibility for proper and adequate workman's compensation for all subcontract operations.

Contractors Comprehensive General Liability and Property Damage Insurance INCLUDING Owner's Protective: the contractor shall carry the above insurance for a minimum limit of not less than \$1,000,000.00 for all damages arising out of injury to or death of one person and subject to that limit for each person, a total limit of not less than \$1,000,000.00 for all damages arising out of injury to, or death of two or more persons in any one occurrence and Property Damage Liability Insurance providing for a limit of not less than \$1,000,000.00 for all damages arising out of injury to or destruction of property (including loss of use) in any occurrence and subject to that limit per occurrence total limit of \$1,000,000.00 all damages arising out of injury to or destruction of property during the policy period.

Contractor's Liability Insurance: Shall also include all major divisions of coverage and be on a comprehensive general liability basis including:

Premises - Operations

Independent Contractor's protective

Products and completed operations

Blanket Contractual

Owned, non-owned and hired motor vehicles

Broad form coverage for property damage (including explosion, Collapse and underground).

Comprehensive Automobile Liability and Property Damage Insurance: The Contractor shall carry the above insurance covering all owned, hired or non-owned vehicles in the amount of \$300,000.00 for all damages arising out of bodily injuries to death of one person and subject to that limit for each person, a total of \$500,000.00 for all damages arising out of bodily injuries to

or death of two or more persons in any one accident and Property Damage coverage in the amount of \$300,000.00 for all damages arising out of injury to or destruction of property.

**16.0 OSHA SAFETY AWARENESS PROGRAM:**

In accordance with R.I.G.L. 28-20-35, all contractors bidding on construction projects of the City with a total project cost of one hundred thousand dollars (\$100,000.) or more, are required to have an OSHA "ten hour construction safety program", for their on-site employees. The training program shall utilize instructors trained by the Occupational Safety and Health Administration, using an OSHA approved curriculum.



**CITY OF EAST PROVIDENCE  
PIERCE FIELD POLICE SUBSTATION  
ADVERTISEMENT  
BID FORM**

**RFP EP25/25-028**

**BID OPENING TUESDAY NOVEMBER 18, 2025 AT 11:00AM**

The undersigned bidder, being familiar with local conditions affecting the cost of the work, hereby proposes to provide all necessary labor, materials, equipment and incidental items necessary to do all the work called for in the Specifications and in accordance with the Contract Documents.

A pre-bid conference will be held on **Tuesday, November 4, 2025, at the Pierce Field Site (201 Mercer Street) at 10:00 AM**. Questions on the bid are due by **Thursday, November 6, 2025, at 4:00 PM**.

The undersigned further understands that the quantities of work as shown are approximate only and are subject to increase or decrease and offers to do the work whether the quantities are increased or decreased, at the unit prices stated. Davis–Bacon wages apply to this proposal.

All prices must be written in words and figures. In case of discrepancy, the amount shown in words will govern.

Bidder acknowledges receipt of the following addendum:

---

---

---

At the time of the opening of bids, the bidder shall have inspected the sites of the work to familiarize himself with the conditions relating to the work under the contract.

No Bidder may withdraw their Bid within sixty (60) days following the closing time for receipt of Bids.

Bidder hereby agrees to begin work within ten (10) days after the date of the NOTICE TO PROCEED, unless otherwise specified or permitted by the CITY, and shall complete the work under the provisions of the Contract within 60 calendar days.

The undersigned bidder submits herewith Bid Security in the form of a Bid Bond or a Certified Check, in favor of the City of East Providence, in the amount not less than five (5) percent of the total amount bid in dollars, and agrees and consents that, if he is the successful bidder, the Bid Security shall be forfeited to the City of East Providence as liquidated damages, if the required Contract and Surety Bond are not executed within ten (10) days from the date of the NOTICE OF AWARD.

LIQUIDATED DAMAGES will be assessed at the rate of \$500.00 per day for each day beyond the contract length herein stipulated.

The undersigned bidder further agrees to pay the premiums for the Surety Bond (Performance, Labor and Materials Payment Bonds) for which said premiums are to be included in the Bid Price.

BIDDING FIRM: \_\_\_\_\_  
NUMBER & STREET: \_\_\_\_\_  
CITY/STATE/ZIP: \_\_\_\_\_  
SIGNATURE: \_\_\_\_\_  
TITLE: \_\_\_\_\_  
DATE: \_\_\_\_\_  
TELEPHONE NO.: \_\_\_\_\_

Being a Corporation, incorporated under  
the laws of the State of

\_\_\_\_\_  
(Partnership)  
(Individual)

Composed of officers, partners  
or owner as follows:

\_\_\_\_\_  
(President, Owner, Partner)

(Corporate Seal)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

| Item No.                   | Estimated Quantity | Brief description;<br>Bid Price in both words and figures                     | Total Figure   |
|----------------------------|--------------------|-------------------------------------------------------------------------------|----------------|
| 1                          | 1<br>LUMP<br>SUM   | SITE PREPARATION<br><br>_____Dollars<br>and_____cents (\$_____)               | <br><br><br>\$ |
| 2                          | 1<br>LUMP<br>SUM   | PIERCE FIELD POLICE SUBSTATION<br><br>_____Dollars<br>and_____cents (\$_____) | <br><br><br>\$ |
| 3                          | 1<br>LUMP<br>SUM   | ELECTRICAL SERVICE CONNECTION<br><br>_____Dollars<br>and_____cents (\$_____)  | <br><br><br>\$ |
| 4                          | 1<br>LUMP<br>SUM   | WATER SERVICE CONNECTION<br><br>_____Dollars<br>and_____cents (\$_____)       | <br><br><br>\$ |
| 5                          | 1<br>LUMP<br>SUM   | SEWER SERVICE CONNECTION<br><br>_____Dollars<br>and_____cents (\$_____)       | <br><br><br>\$ |
| 6                          | 1<br>LUMP<br>SUM   | TELECOM SERVICE CONNECTION<br><br>_____Dollars<br>and_____cents (\$_____)     | <br><br><br>\$ |
| Total Bid Price in Words   |                    |                                                                               |                |
| Total Bid Price in Figures |                    |                                                                               |                |

SECTION 00400

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned (Insert Name of Bidder)  
\_\_\_\_\_, as Principal, and (Insert Name of Surety)  
\_\_\_\_\_, as Surety, are hereby held  
and firmly bound and obligated unto the City of East Providence, Rhode Island , as Owner, in the  
sum  
of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_),  
as liquidated damages for payment of which, well and truly to be made, we hereby jointly and  
severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the City  
of East Providence, Rhode Island a certain Bid attached hereto and hereby made a part hereof, to  
enter into a contract in writing, hereinafter referred to as the "AGREEMENT" and/or "Contract",  
for **Pierce Field Police Substation, Bid No. EP24/25-028**.

NOW THEREFORE,

- (a) If said BID shall be rejected or withdrawn as provided in the INFORMATION FOR  
BIDDERS attached hereto or, in the alternative,
- (b) If said BID shall be accepted and the Principal shall duly execute and deliver the form of  
AGREEMENT attached hereto and shall furnish the specified bonds for the faithful  
performance of the AGREEMENT and/or Contract and for the payment for labor and  
materials furnished for the performance of the AGREEMENT and/or Contract,

then this obligation shall be void, otherwise it shall remain in full force and effect; it being  
expressly understood and agreed that the liability of the Surety for any and all claims hereunder  
in no event shall exceed the amount of this obligation.

The Surety, for value received, hereby agrees that the obligations of said Surety and its bond  
shall in no way be impaired or affected by any extensions of the time with which such BID may  
be accepted, and said Surety does hereby waive notice of any such extensions.



IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, have duly executed this bond on the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

(SEAL)

\_\_\_\_\_  
(Name of Principal) L.S.

BY: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Name of Surety (Seal)

BY: \_\_\_\_\_  
(Signature and Title)

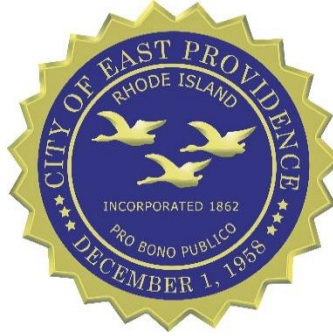
BY: \_\_\_\_\_  
Attorney-In-Fact

Sealed and delivered in  
the presence of:

\_\_\_\_\_  
  
\_\_\_\_\_

IMPORTANT: Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

If the Bond is signed on behalf of the Surety by an Attorney-In-Fact, there should be attached, a duly certified copy of his power of attorney showing his authority to sign such Bond.



SECTION 00500

**CONTRACT AGREEMENT  
CITY OF EAST PROVIDENCE, RHODE ISLAND  
PIERCE FIELD POLICE SUBSTATION**

**BID NO. EP24/25-028**

This Contract (the “Contract”) is made and entered into by and between The City of East Providence, (the “City”) and \_\_\_\_\_ (the “Contractor”). This Contract shall become effective on the date it is executed by the last party to execute it (“the Effective Date”). The City intends on using funding from the

This Contract is for a project identified as **RFP EP24/25-028**

For and in consideration of the mutual promises, covenants and agreements set forth herein, and for other good and valuable consideration, the sufficiency of which is hereby acknowledged, the City and the Contractor agree as follows:

**ARTICLE 1  
THE WORK OF THIS CONTRACT**

The Contractor shall execute the entire work described in the Contract Documents, within twenty-four (24) weeks from date of signed contract except to the extent specifically indicated in the Contract Documents to be the responsibility of others, or as follows:

**ARTICLE 2  
DOCUMENTS INCORPORATED BY REFERENCE**

This Contract includes the plans and specifications for the East Providence Police Substation as identified thereon for the City’s Request for Proposal issued, all of which are hereby incorporated herein by reference and made a part hereof. Change Orders issued hereafter, and any other amendments executed by the City and the Contractor, shall become and be a part of this Contract. Documents not included or expressly contemplated in this Article 2 do not, and shall not, form any part of this Contract.

**ARTICLE 3**  
**REPRESENTATIONS OF THE CONTRACTOR**

In order to induce the City to execute this Contract and recognizing that the City is relying thereon, the Contractor, by executing this Contract, makes the following express representation to the City.

- (A) The Contractor is fully qualified to act as the contractor for the Project and has, and shall maintain, any and all licenses, permits or other authorizations necessary to act as the contractor for, and to construct, the Project;
- (B) The Contractor has become familiar with the Project site and the local conditions under which the Project is to be constructed and operated;
- (C) The Contractor has received, reviewed and carefully examined all the documents which make up this Contract, including, but not limited to, the plans and specifications, and has found them in all respects to be complete, accurate, adequate, consistent, coordinated and sufficient for construction;
- (D) The Contractor is familiar with all Federal, State, municipal, and department laws, ordinances, orders, and regulations which may in any way affect the work of those employed therein, including, but not limited to, any special acts relating to the work or the Project of which it is a part;
- (E) The Contractor is aware of the hazards involved in the work and the danger to life and property both evident and inherent, and that the Contractor will conduct the work in a careful and safe manner without injury to persons or property.

**ARTICLE 4**  
**INTENT AND INTERPRETATION**

With respect to the intent and interpretation of this Contract, the City and the Contractor agree as follows:

- (A) This Contract, together with the Contractor's and Surety's performance in the total amount of the project cost and payment bonds for the Project, constitute the entire and exclusive agreements between the parties with reference to the Project, and said Contract supersedes any and all prior discussions, communications, representations, understandings, negotiations, or agreements. This Contract also supersedes any bid documents not incorporated herein pursuant to Article 2.

- (B) Anything that may be required, implied or inferred by the documents which make up this Contract, or any one or more of them, shall be provided by the Contractor for the Contract Price;
- (C) Nothing contained in this Contract shall create, nor be interpreted to create, privity or any other relationship whatsoever between the City and any person except the Contractor;
- (D) When a word, term, or phrase is used in this Contract, it shall be interpreted or construed first, as defined herein; second, if not defined, according to its generally accepted meaning in the construction industry; and third, if there is no generally accepted meaning in the construction industry, according to its common and customary usage;
- (E) The Contractor shall have a continuing duty to read, examine, review, compare and contrast each of the documents which make up this Contract, shop drawings, and other submittals and shall give written notice to the City of any conflict, ambiguity, error or omission which the Contractor may find with respect to these documents before proceeding with the affected work. The express or implied approval by the City of any shop drawings or other submittals shall not relieve the Contractor of the continuing duties imposed hereby, nor shall any such approval be evidence of the Contractor's compliance with this Contract. HOWEVER, THE CITY MAKES NO REPRESENTATION OR WARRANTY OF ANY NATURE WHATSOEVER TO THE CONTRACTOR CONCERNING SUCH DOCUMENTS. The Contractor again hereby acknowledges and represents that it has received, reviewed and carefully examined such documents, has found them to be complete, accurate, adequate, consistent, coordinated and sufficient for construction, and that the Contractor has not, does not, and will not rely upon any representations or warranties by the City concerning such documents, as no such representations or warranties have been or are hereby made;
- (F) In the event of any conflict, discrepancy, or inconsistency among any of the documents which make up this Contract, the following shall control:
  - (1) As between drawings and specifications, the specifications shall govern;
  - (2) As between figures given on plans and scaled measurements, the figures shall govern;
  - (3) As between this document and the plans or specifications, this document shall govern.

**ARTICLE 5**  
**OWNERSHIP OF DOCUMENTS WHICH MAKE UP THE CONTRACT**

The documents which make up this Contract, and each of them, as well as any other documents furnished by the City, shall remain the property of the City. The City shall provide the Contractor with a sufficient number of copies of the complete Contract as the City determines is

necessary. The Contractor shall have the right to keep the Contractor's executed set; provided, however, that in no event shall the Contractor use, or permit to be used, any portion or all of such Contract on other projects without the City's prior written authorization. All sets in usable condition, with the exception of the Contractor's executed set, shall be returned to the City at the completion or cessation of the work or termination of the Contract.

## **ARTICLE 6**

### **CONTRACTOR'S PERFORMANCE**

The Contractor shall perform all of the work required, implied or reasonably inferable from this Contract including, but not limited to, the following:

- (A) Construction of the Project;
- (B) The furnishing of the required 100% Performance Bond and Certificate of General Liability insurance coverage of \$1,000,000, as well as Workers' Compensation Insurance as required by the State of Rhode Island for itself and any of its employees.
- (C) The provision and furnishing, and prompt payment of labor, supervision, services, materials, supplies, equipment, fixtures, appliances, facilities, tools, transportation, storage, power, fuel, heat, light, cooling, or other utilities, required for construction and all necessary building permits and other permits required for the construction of the Project;
- (D) The creation and submission to the City of detailed and comprehensive as-built drawings depicting all as-built construction. Said as-built drawings shall be submitted to the City upon final completion of the Project and receipt of same by the City shall be a condition precedent to final payment to the Contractor.

## **ARTICLE 7**

### **TIME FOR CONTRACTOR'S PERFORMANCE**

- (A) The Contractor shall commence the performance of this Contract within ten (10) calendar days after the Notice to Proceed and shall diligently continue its performance to and until final completion of the Project (subject to a winter shutdown period if necessary as provided for in Article 8 Paragraph (L)). The Contractor shall accomplish Substantial Completion of the Project on or before the dated established pursuant to Paragraphs (K) and (L) in Article 8.
- (B) The Contractor shall pay the City the sum of \$1,000 Dollars per day for each and every calendar day of unexcused delay in achieving Substantial Completion beyond the date set forth herein for Substantial Completion. Any sums due and payable hereunder by the Contractor shall be payable, not as a penalty, but as liquidated damages representing an estimate of delay damages likely to be sustained by the City, estimated at the time of executing this Contract. When the City reasonably believes that Substantial Completion will be inexcusably delayed, the City shall be entitled, but not required, to withhold from

any amounts otherwise due the Contractor an amount then believed by the City to be adequate to recover liquidated damages applicable to such delays. If and when the Contractor overcomes the delay in achieving Substantial Completion, or any part thereof, for which the City has withheld payment, the City shall promptly release to the Contractor those funds withheld, but no longer applicable, as liquidated damages.

- (C) The term “Substantial Completion”, as used herein, shall mean that point as determined by the City at which the Project is at a level of completion in strict compliance with this Contract such that the City or its designee can enjoy beneficial use or occupancy and can use or operate in all respects, for its intended purpose. Partial use or occupancy of the Project being deemed substantially complete, and such partial use or occupancy shall not be evidence of Substantial Completion.
- (D) All limitations of time set forth herein are material and are of the essence of this Contract.

## **ARTICLE 8**

### **PAYMENTS TO CONTRACTOR**

- (A) The City shall pay, and the Contractor shall accept, as full and complete payment for the Contractor’s timely performance of its obligations hereunder, the Contract Sum of the price set forth in the Bid, and shall constitute the Contract Price, which shall not be modified except by Change Order as provided in this contract.
- (B) The City shall pay the Contract Price to the Contractor in accordance with the procedures set forth in this Article 8. On or before the 15th day of each month after commencement of performance, but no more frequently than one monthly, the Contractor may submit a Payment Request for the period ending the 31st day of preceding the month. Said Payment Request shall be in such format and include whatever supporting information as may be required by the City. Each Payment Request shall be signed by the Contractor and shall constitute the Contractor’s representation that the quantity of work has reached the level for which payment is requested, that the work has been properly installed or performed in strict compliance with this Contract and that the Contractor knows of no reason why payment should not be made as requested. Thereafter, the City shall review the Payment Request and may also review the work at the project site or elsewhere to determine whether the quantity and quality of the work is as represented in the Payment Request and is as required by this Contract. The City shall approve in writing the amount which, in the opinion of the City, is properly owing to the Contractor. The payment of the Contractor’s invoice will be made no later than thirty (30) days after the receipt of the invoice subject to the above. The submission of weekly certified payroll reports on the U.S Department of Labor Payroll form in compliance with the Davis Bacon Act for federally funded contracts are required. No payment will be made until such time that all certified payroll are current for the period covered by the payment request, and the city has verified that the correct wage rate and classification (RI20230001 dated 06/30/2023) was used on the certified payroll. The Contractor shall submit progress invoices dated the last day of the month. These invoices will be submitted on G702 and G703 (AIA approved) documents.

- (C) The City will retain a percentage of the progress or monthly payments claimed, including approved change orders. The retainage shall remain at five percent (5%) until seventy-five percent (75%) of the Contract is complete, as determined by the City. At that time if the City decides the Contractor is making adequate progress, the City may reduce retainage to two and one half percent (2.5%) of the dollar value of all work satisfactorily complete to date, including change orders. Any further reduction in the retainage amount shall be at the City's discretion. The retainage shall be paid by the City to the Contractor within ninety (90) days of the date the work is accepted by the City unless a dispute exists with respect to the work.
- (D) Upon Substantial Completion, the City may reduce the amount of retainage to the final retainage of 1% of the dollar value of all work satisfactorily completed to date, including approved change orders plus an additional retainage based on the City's estimate of the fair value of any punch list items and the cost of completing and/or correcting such incomplete or defective items or work. As these items are completed or corrected, they shall be paid for out of the retainage until Final Completion and Acceptance of Work is declared by the City. The final (1%) retainage shall be paid to the Contractor by the City within ninety (90) days of the date the work is accepted by the City unless a dispute exists with respect to the work.
- (E) Upon Final Completion and Acceptance of the Work, City shall issue a certificate attached to the final payment request stating that the Work has been accepted by the City under the conditions of the Contract Documents. The entire balance to be due the Contractor shall be paid to the Contractor within ninety (90) days of Final Completion and Acceptance of Work.
- (F) When payment is received from the City, the Contractor shall immediately pay all subcontractor, materialmen, laborers and suppliers the amounts they are due for the work covered by such payment. In the event the City becomes informed that the Contractor has not paid a subcontractor, materialman, laborer, or supplier as provided herein, the City shall have the right, but not the duty, to issue future checks and payment to the Contractor of amounts otherwise due hereunder naming the Contractor and any such subcontractor, materialman, laborer, or supplier as joint payees. Such joint check procedure, if employed by the City, shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit the City to repeat the procedure in the future.
- (G) Neither payment to the Contractor, utilization of the Project for any purpose by the City, nor any other act or omission by the City shall be interpreted or construed as an acceptance of any work of the Contractor not strictly in compliance with this Contract.
- (H) The City shall have the right to refuse to make payment and, if necessary, may demand the return of a portion or all of the amount previously paid to the Contractor due to:

- (1) The quality of a portion, or all, of the Contractor's work not being in accordance with the requirements of this Contract;
- (2) The quantity of the Contractor's work not being as represented in the Contractor's Payment Request, or otherwise;
- (3) The Contractor's rate of progress being such that, in the City's opinion, substantial or final completion, or both, may be inexcusably delayed;
- (4) The Contractor's failure to use Contract funds, previously paid the Contractor by the City, to pay Contractor's Project-related obligations including, but not limited to, subcontractors, laborers and material and equipment suppliers;
- (5) Claims made, or likely to be made, against the City or its property;
- (6) Loss caused by the Contractor;
- (7) The Contractor's failure or refusal to perform any of its obligations to the City;

In the event that the City makes a written demand upon the Contractor for amounts previously paid by the City as contemplated in this paragraph, the Contractor shall promptly comply with such demand.

- (I) When Substantial Completion has been achieved, the Contractor shall notify the City in writing and shall furnish to the City a listing of those matters yet to be finished. The City will thereupon conduct an inspection to confirm that the work is in fact substantially complete. Upon its confirmation that the Contractor's work is substantially complete, the City will so notify the Contractor in writing and will therein set forth the date of Substantial Completion. If the City, through its inspection, fails to find that the Contractor's work is substantially complete, and is required to repeat all, or any portion, of its Substantial Completion inspection, the Contractor shall bear the cost of such repeat inspection(s) which cost may be deducted by the City from any payment then or thereafter due to the Contractor.
- (J) When the Project is finally complete and the Contractor is ready for final inspection, it shall notify the City thereof in writing. Thereupon, the City will perform a final inspection of the project. If the City confirms that the project is complete in full accordance with this Contract and the Contractor has performed all of its obligations to the City hereunder, the City will furnish a final Approval for Payment certifying that the project is complete and the Contractor is entitled to the remainder of the unpaid Contract Price, less any amount withheld pursuant to this Contract. If the City is unable to issue its final Approval for Payment and is required to repeat its final inspection of the Project, the Contractor shall bear the cost of such repeat inspection(s), which costs may be deducted by the City from the Contractor's final payment.



- (K) The Contractor is to begin work within ten (10) days after the date of the Notice to Proceed and shall complete the work within 90 consecutive days of notification of each assignment. If the Contractor fails to complete the work as set forth in this paragraph 8(L), the Contractor shall pay the City the sum of one thousand (\$1,000) per day for each and every calendar day of unexcused delay in completing the work. Any sums due and payable hereunder by the Contractor shall be payable, not as a penalty, but as liquidated damages representing an estimate of delay damages likely to be sustained by the City, estimated at or before the time of executing this Contract. When the City reasonably believes that the date of completion will be inexcusably delayed, the City shall be entitled, but not required, to withhold from any amounts otherwise due the Contractor an amount then believed by the City to be adequate to recover liquidated damages applicable to such delays. If and when the Contractor overcomes the delay in achieving completion of the work, or any part thereof, for which the City has withheld payment, the City shall promptly release the Contractor those funds withheld, but no longer applicable, as liquidated damages.
- (L) The time for completion noted above has been developed upon the assumption that the work may be suspended during winter shutdown if necessary. Winter shutdown shall be determined by the Director of Public Works for the City of East Providence. The time period specified for completion of the work in Paragraph (K) above shall be suspended during such winter shutdown. The contractor shall plan on winter shutdown period based upon these dates unless otherwise directed by the City. The winter shutdown dates are subject to change depending upon weather conditions. The City shall notify the Contractor in writing if there is a change in the winter shutdown period due to weather, environmental or other conditions which preclude the work from being executed in accordance with these documents.
- (M) Prior to being entitled to receive final payment, and as a condition precedent thereto, the Contract shall furnish to the City, in the form and manner required by the City:
- (1) An affidavit that all of the Contractor's obligations to subcontractors, laborers, equipment or material suppliers, or other third parties in connection with the Project, have been paid or otherwise satisfied;
  - (2) If required by the City, separate releases of lien or lien waivers from each subcontractor, lower tier subcontractor, laborer, supplier or other person or entity who has, or might have a claim against the City or the City's property;
  - (3) If applicable, consent(s) of surety to final payment;
  - (4) All product warranties, operating manuals, instruction manuals and other record documents, drawings and things customarily required of the Contractor, or expressly required herein, as a part of or prior to Project closeout.

**ARTICLE 9**  
**MUNICIPAL POLICE TRAFFIC CONTROL**

The cost of municipal police traffic control shall be paid in accordance with RIGL §37-12-10. The Contractor shall be responsible for scheduling municipal police officers for traffic control purposes through the police department. If traffic control assignments are cancelled without twenty-four (24) hours notice, the Contractor is responsible to pay the City of East Providence for the hours police officers would have worked it if had not been for the untimely cancellation of the assignment. The City at its sole discretion may require such scheduling to be pre-approved by the Public Works Department. The Contractor is responsible for all highway safety equipment for traffic control purposes including but not limited to proper signage and traffic cones.

**ARTICLE 10**  
**CEASE AND DESIST ORDER**

In the event the Contractor fails or refuses to perform the work as required herein, the City may instruct the Contractor to cease and desist from performing further work in whole or in part. Upon receipt of such instruction, the Contractor shall immediately cease and desist as instructed by the City and shall not proceed further until the cause for the City's instruction has been corrected, no longer exists, or the City instructs that the work resume. In the event the City issues instructions to cease and desist, and in the further event that the Contractor fails and refuses within seven (7) calendar days of receipt of same to provide adequate assurance to the City that the cause of such instructions will be eliminated or corrected, then the City shall have the right, but not the obligation, to carry out the work with its own forces, or with the forces of another contractor, and the Contractor shall be fully responsible and liable for the costs of performing such work by the City. The rights set forth herein are in addition to, and without prejudice to, any other rights or remedies the City may have against the Contractor.

**ARTICLE 11**  
**DUTIES, OBLIGATIONS AND RESPONSIBILITIES OF THE CONTRACTOR**

In addition to any and all other duties, obligations and responsibilities of the Contractor set forth in this Contract, the Contractor shall have and perform the following duties, obligations and responsibilities to the City:

- (A) The Contractor is again reminded of its continuing duties set forth in Subparagraph 4(E) which are by reference hereby incorporated in this Subparagraph 10(A). The Contractor shall not perform work without adequate plans and specifications, or, as appropriate, approved shop drawings, or other submittals. If the Contractor performs work knowing or believing it involves an error, inconsistency or omission in the Contract without first providing written notice to the City and the Architect, the Contractor shall be responsible for such work and pay the cost of correcting same;

- (B) All work shall strictly conform to the requirements of this Contract;
- (C) The work shall be strictly supervised, the Contractor bearing full responsibility for any and all acts or omissions of those engaged in the work on behalf of the Contractor;
- (D) The Contractor hereby warrants that all labor furnished under this Contract shall be competent to perform the tasks undertaken, that the product of such labor shall yield only first-class results, that all materials and equipment provided shall be new and of high quality, that the completed work will be complete, of high quality, without defects, and that all work strictly complies with the requirements of this Contract. Any work not strictly complying with the requirements of this Subparagraph shall constitute a breach of the Contractor's warranty;
- (E) The Contractor shall obtain and pay for all required permits, fees and licenses customarily obtained by the Contractor. The Contractor shall comply with all legal requirements applicable to the work;
- (F) The Contractor shall employ and maintain at the Project site only competent supervisory personnel.
- (G) The Contractor shall keep an updated copy of this Contract at the Project site. Additionally, the Contractor shall keep a copy of approved shop drawings and other submittals. All of these items shall be available to the City at all regular business hours. Upon final completion of the work, all of these items shall be finally updated and provided to the City and shall become the property of the City.
- (H) The Contractor shall maintain the Project site in a reasonably clean condition during performance of the work. Upon final completion, the Contractor shall thoroughly clean the Project site of all debris, trash and excess materials or equipment.
- (I) At all times relevant to this Contract, the Contractor shall permit the City to enter upon the Project site and to review or inspect the work without formality or other procedure.

## **ARTICLE 12**

### **DUTIES, OBLIGATIONS AND RESPONSIBILITIES OF THE CITY**

- (A) Except for permit fees which are the responsibility of the Contractor, the City shall secure and pay for necessary approvals, easements, assessments and charges required for the construction, and services performed pursuant to the Contract.
- (B) If the Contractor fails to correct work which is not in accordance with the requirements of the contract, and persistently fails to carry out the work in accordance with the Contract, the City, by a written letter, may order the contractor to stop all work, or any portion thereof, until the cause of such order has been eliminated; however, the right of the City to stop the work shall not give rise to a duty on the part of the city to exercise this right for the benefit of the Contractor or any other person or entity.

- (C) Upon completion and acceptance of the work, the City shall issue a certificate attached to the final payment request that the work has been accepted by the City under the conditions of the Contract.

**ARTICLE 13**  
**“OR EQUAL” CLAUSE**

- (A) Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design may be considered equal and satisfactory providing the material or article so proposed is of equal substance and function in the City’s opinion. It shall not be purchased or installed without the City’s written approval. In all cases new material shall be used in the project.
- (B) If more than one brand, make of material, device, or piece of equipment is shown or specified, each should be regarded as the equal of the other. Any other brand, make of material, device, or equipment, which in the opinion of the City or its Authorized Representative, is the recognized equal of that specified (considering quality, workmanship and economy of operation), and is suitable for the purpose intended, may be accepted.

**ARTICLE 14**  
**INDEMNITY**

The Contractor shall indemnify and hold the City harmless from any and all claims, liability, damages, loss, cost and expense of every type whatsoever including, without limitation, attorney’s fees and expenses, in connection with the Contractor’s performance of this Contract, provided that such claims, liability, damage, loss, cost or expense is due to sickness, personal injury, disease or death, or loss or destruction of tangible property (other than the work itself), including loss of use resulting therefrom, to the extent caused by the Contractor, or anyone for whose acts the Contractor may be liable, regardless of whether such liability, claim, damage, loss, cost or expense is caused in part by the City.

**ARTICLE 15**  
**CLAIMS BY THE CONTRACTOR**

Claims by the Contractor against the City are subject to the following terms and conditions:

- (A) All Contractor claims against the City shall be initiated by a written claim submitted to the City. Such claim shall be received by the City no later than seven (7) calendar days after the event, or the first appearance of the circumstances, causing the claim, and the same shall set forth in detail all known facts and circumstances supporting the claim;
- (B) The Contractor and City shall continue their performance hereunder regardless of the existence of any claims submitted by the Contractor.

- (C) In the event the Contractor discovers previously concealed and unknown site conditions which are materially at variance from those typically and ordinarily encountered in the general geographical location of the Project, the Contract Price shall be modified, either upward or downward, upon the written claim made by either party within seven (7) calendar days after the first appearance to such party of the circumstances. As a condition precedent to the City having any liability to the Contractor due to concealed and unknown conditions, the Contractor must give the City written notice of, and an opportunity to observe, such condition prior to disturbing it. The failure by the Contractor to give written notice and make the claim as provided by this Subparagraph 15(c) shall constitute a waiver by the Contractor of any rights arising out of or relating to such concealed and unknown condition.
- (D) In the event the Contractor seeks to make a claim for an increase in the Contract Price, as a condition precedent to any liability of the City therefor, the Contractor shall strictly comply with the requirements of Subparagraph 15(A) above and such claim shall be made by the Contractor before proceeding to execute any additional or change work. Failure of the condition precedent to occur shall constitute a waiver by the Contractor of any claim for additional compensation.
- (E) In connection with any claim by the Contractor against the City for compensation in excess of the Contract Price, any liability of the City for the Contractor's cost shall be strictly limited to direct cost incurred by the Contractor and shall in no event include indirect cost or consequential damages of the Contractor. The City shall not be liable to the Contractor for claims of third-parties including subcontractors, unless and until liability of the Contractor has been established therefor in a court of competent jurisdiction.
- (F) In the event the Contractor shall be delayed in performing any task which at the time of the delay is then critical, or which during the delay becomes critical, as the sole result of any act or omission by the City or someone acting in the City's behalf, or by City-authorized Change Orders, unusually bad weather not reasonably anticipatable, fire or other Acts of God, the date for achieving Substantial Completion, or, as applicable, final completion, shall be appropriately adjusted by the City upon the written claim of the Contractor to the City. A task is critical within the meaning of this Subparagraph 15(A) if, and only if, said task is on the critical path of the Project schedule so that delay in performing such task will delay the ultimate completion of the Project. Any claim for an extension of time by the Contractor shall strictly comply with the requirements of Subparagraph 15(A) above. If the Contractor fails to make such claim as required in this Subparagraph 15(F), any claim for an extension of time shall be waived.

## **ARTICLE 16**

### **SUBCONTRACTORS**

Upon execution of this Contract, the Contractor shall identify to the City, in writing, those parties intended as subcontractors on the Project. The City shall, in writing, state any objections the City may have to one or more of such subcontractors. The Contractor shall not enter into a

subcontract with an intended subcontractor with reference to whom the City objects. The Contractor shall not award work to a subcontractor(s) in excess of fifty (50) percent of the Contract Price, without prior written approval of the City. All subcontracts shall afford the Contractor rights against the subcontractor which correspond to those rights afforded to the City against the Contractor herein. Nothing contained in this Contract shall create any contractual relation between any subcontractor and the City.

## **ARTICLE 17**

### **WAGE RATES**

- (A) There shall be paid to each laborer or mechanic of the Contractor or subcontractor engaged in the work on the Project under this Contract in the trade or occupation, an hourly wage rate pursuant to §37-13-7 of the General Laws of the State of Rhode Island regardless of any contractual relationship which may be alleged to exist between the Contractor or any subcontractor and such laborers and mechanics. The City may delay and/or withhold payment if the contractor is not in compliance with the wage rates required by the Davis Bacon Act. The contractor and any sub-contracted firms must submit to the city the US Department of Labor Certified Weekly Payroll forms listing employees' compensation employed on the project on a weekly basis for the preceding week. "General Decision Number: RI20230001 dated 06/30/2023 governs the wages to be used and required by the contractor and all subcontracts for compliance with the Davis Bacon Act.
- (B) If, after the award of the Contract, it becomes necessary to employ any person in a trade or occupation not classified in the Contract, such person shall be paid at not less than a rate to be determined by the same authority which established the other wage rates for this Contract. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. The Contractor shall notify the City of his intention to employ persons in trades or occupations not classified in sufficient time for the City to obtain approved rates for such trades or occupations.
- (C) The foregoing specified wage rates are minimum rates only, and the City will not consider any claims for additional compensation made by the Contractor because of payment by the Contractor of any wage rate in excess of the applicable rate contained in this Contract. All disputes in regard to the payment of wages in excess of those specified in this Contract, shall be adjusted by the Contractor.
- (D) Except as may otherwise be required by law, all claims and disputes pertaining to the classification of labor employed on the Project under this Contract, shall be decided by the City's governing body or other duly designated official.

**ARTICLE 18**  
**CHANGE ORDERS**

One or more changes to the work within the general scope of this Contract, may be ordered by Change Order. The Contractor shall proceed with any such changes, and the same shall be accomplished in strict accordance with the following terms and conditions:

- (A) Change Order shall mean a written order to the Contractor executed by the City after execution of this Contract, directing a change in the work and may include a change in the Contract Price or the time for the Contractor's performance, or any combination thereof. Said change orders must be approved by the City Manager on behalf of the City;
- (B) Any change in the Contract Price resulting from a Change Order shall be determined as follows:
  - (1) By mutual agreement between the City and the Contractor as evidenced by (a) the change in the Contract Price being set forth in the Change Order, (b) such change in the Contract Price, together with any conditions or requirements relating thereto, being initialed by both parties and (c) the Contractor's execution of the Change Order; or,
  - (2) If no mutual agreement occurs between the City and the Contractor, the change in the Contract Price, if any, shall be derived by determining the reasonable actual costs incurred or savings achieved, resulting from revisions in the work. Any such costs or savings shall be documented in the format, and with such content and detail as the City requires.
- (C) The execution of a Change Order by the Contractor shall constitute conclusive evidence of the Contractor's agreement to the ordered changes in the work, this Contract as thus amended, the Contract Price and the time for performance by the Contractor. The Contractor, by executing the Change Order, waives and forever releases any claim against the City for additional time or compensation for matters relating to or arising out of or resulting from the work included within or affected by the executed Change Order.
- (D) The Contractor shall notify and obtain the consent and approval of the Contractor's surety with reference to all Change Orders if such notice, consent or approval are required by the City, the Contractor's surety or law. The Contractor's execution of the Change Order shall constitute the Contractor's warranty to the City that the surety has been notified of, and consents to, such Change Order and the surety shall be conclusively deemed to have been notified of such Change Order and to have expressly consented thereto.

## **ARTICLE 19**

### **DISCOVERING AND CORRECTING DEFECTIVE OR INCOMPLETE WORK**

- (A) In the event that the Contractor covers, conceals or obscures its work in violation of this Contract or in violation of a directive from the City, such work shall be uncovered and displayed for the City's inspection upon request, and shall be reworked at no cost in time or money to the City;
- (B) If any of the work is covered, concealed or obscured in a manner not covered by Subparagraph 19(A) above, it shall, if directed by the City, be uncovered and displayed for the City's inspection. If the uncovered work conforms strictly with this Contract, the costs incurred by the Contractor to uncover and subsequently, replace such work shall be borne by the City. Otherwise, such costs shall be borne by the Contractor;
- (C) The Contractor shall, at no cost in time or money to the City, correct work rejected by the City as defective or failing to conform to this Contract. Additionally, the Contractor shall reimburse the City for all testing, inspections and other expenses incurred as a result thereof;
- (D) In addition to its warranty obligations set forth elsewhere herein, the Contractor shall be specifically obligated to correct any and all defective or nonconforming work for a period of twelve (12) months following final completion upon written direction from the City.
- (E) The City may, but in no event be required to, choose to accept defective or nonconforming work. In such event, the Contract Price shall be reduced by the greater of (1) the reasonable costs of removing and correcting the defective or nonconforming work, and (2) the difference between the fair market value of the Project as constructed and the fair market value of the project had it not been constructed in a manner as to include defective or nonconforming work. If the remaining portion of the unpaid Contract Price, if any, is insufficient to compensate the City for the acceptance of defective or nonconforming work, the Contractor shall, upon written demand from the City, pay the City such remaining compensation for accepting defective or nonconforming work.

## **ARTICLE 20**

### **TERMINATION BY THE CONTRACTOR**

If the City repeatedly fails to perform its material obligations to the Contractor for a period of thirty (30) days after receiving written notice from the Contractor of its intent to terminate hereunder, the Contractor may terminate performance of this Contract by written notice to the City. In such event, the Contractor shall be entitled to recover from the City as though the City had terminated the Contractor's performance under this Contract for convenience pursuant to Subparagraph 22(A) hereunder.



**ARTICLE 21**  
**CITY'S RIGHT TO SUSPEND CONTRACTOR'S PERFORMANCE**

- (A) The City shall have the right at any time to direct the Contractor to suspend its performance, or any designated part thereof, for any reason whatsoever, or without reason, for a cumulative period of up to thirty (30) calendar days. If any such suspension is directed by the City, the Contractor shall immediately comply with same;
- (B) In the event the City directs a suspension of performance under this Paragraph 21, through no fault of the Contractor, the City shall pay the Contractor as full compensation for such suspension the Contractor's reasonable costs, actually incurred and paid, of:
- (1) demobilization and remobilization, including such costs paid to subcontractors;
  - (2) preserving and protecting work in place;
  - (3) storage of materials or equipment purchased for the Project, including insurance thereon;
  - (4) performing in a later, or during a longer, time frame than that contemplated by this Contract.

**ARTICLE 22**  
**TERMINATION BY THE CITY**

The City may terminate this Contract in accordance with the following terms and conditions:

- (A) The City may, for any reason whatsoever, terminate performance under this Contract by the Contractor for convenience. The City shall give written notice of such termination to the Contractor specifying when termination becomes effective. The Contractor shall incur no further obligations in connection with the work and the Contractor shall stop work when such termination becomes effective. The Contractor shall also terminate outstanding orders and subcontracts. The Contractor shall settle the liabilities and claims arising out of the termination of subcontracts and orders. The City may direct the Contractor to assign the Contractor's right, title and interest under termination orders or subcontracts to the City or designee. The Contractor shall transfer title and deliver to the City such completed or partially completed work and materials, equipment, parts, fixtures, information and Contract rights as the Contractor has. When terminated for convenience, the contractor shall be compensated as follows:
- (1) The Contractor shall submit a termination claim to the City specifying the amounts due because of termination for convenience together with costs, pricing or other data required by the City. If the Contractor fails to file a termination claim within one (1) year from the effective date of termination, the City shall pay the Contractor, an amount derived in accordance with Subparagraph (3) below;

- (2) The City and the Contractor may agree to the compensation, if any, due to the Contractor hereunder;
- (3) Absent agreement to the amount due to the Contractor, the City shall pay the Contractor the following amounts:
  - a) Contract prices for labor, materials, equipment and other services accepted under this contract;
  - b) Reasonable costs incurred in preparing to perform and in performing the terminated portion of the work, and in terminating the Contractor's performance, plus a fair and reasonable allowance for jobsite overhead and profit thereon (such profit shall not include anticipated profit or consequential damages); provided however, that if it appears that the Contractor would not have profited or would have sustained a loss if the entire Contract would have been completed, no profit shall be allowed or included and the amount of compensation shall be reduced to reflect the anticipated rate of loss, if any;
  - c) Reasonable costs of settling and paying claims arising out of the termination of subcontracts or orders pursuant to Subparagraph 18(A) of this Paragraph. These costs shall not include amounts paid in accordance with other provisions hereof.

The total sum to be paid the Contractor under this Subparagraph 18(A) shall not exceed the total Contract Price, as properly adjusted, reduced by the amount of payments otherwise made, and shall in no event include duplication of payment.

- (B) If the Contractor does not perform the work, or any part thereof, in a timely manner, supply adequate labor, supervisory personnel or proper equipment or materials, or if it fails to timely discharge its obligations for labor, equipment, and materials, or proceeds to disobey applicable law, or otherwise commits a violation of a material provision of this Contract, then the City, in addition to any rights it may have against the Contractor or others, may terminate the performance of the Contractor and assume possession of the Project site and of all materials and equipment at the site and may complete the work. In such case, the Contractor shall not be paid further until the work is complete. After final completion has been achieved, if any portion of the Contract Price, as it may be modified hereunder, remains after the cost to the City of completing the work, including all costs and expenses of every nature incurred, has been deducted by the City, such remainder shall belong to the Contractor. Otherwise, the Contractor shall pay and make whole the City for such cost. This obligation for payment shall survive the termination of the Contract. In the event the employment of the Contractor is terminated by the City for cause pursuant to this Subparagraph 22(B) and is subsequently determined by a Court of competent jurisdiction that such termination was without cause, such termination shall thereupon be deemed a Termination for Convenience under Subparagraph 2(A) and the provision of Subparagraph 22(A) shall apply.

## **ARTICLE 23**

### **INSURANCE**

The Contractor shall carry and maintain the following insurance coverage at his own expense and add the City of East Providence as an additionally insured

- (A) All insurance for this Contract shall be written by a company (or companies) acceptable to the City and all policies or certificates shall be submitted to the City for examination prior to commencement of operations by the Contractor. In the event any policy or certificate, the amount of the insurance, or the company writing same are not satisfactory to the City, the Contractor shall secure other policies or certificates in form and amount with a company satisfactory to the City. The Contractor shall not permit policies to be changed, cancelled, or to lapse and all policies shall include a clause to the effect that the policy shall not be subject to cancellation or a reduction in the limits of liability or amounts of insurance until notice has been sent by mail to the City stating when, (not less than thirty days thereafter) such cancellation or reduction shall be effective. All certificates of insurance shall be delivered to the City and contain true transcripts from the policy or policies authenticated by the proper officer of the insurer evidencing in particular those insured, the extent of the insurance, the location and operations to which the insurance applies, the expiration date and the above mentioned notice as to the location and operations involved.

If any part of the work is sublet, similar insurance shall be provided by or in behalf of the subcontractors to cover their operations. The Contractor shall be charged with the responsibility for insurance protection for all his subcontract operations and should the Contractor's policy not cover each and every subcontractor, certificates of insurance acceptable to the City covering each and every subcontractor shall be filed with said City prior to the commencement of subcontract operations.

- (B) Contractor's Liability Insurance.  
Liability insurance shall include all major divisions of coverage and be on a comprehensive general liability basis including:  
Premises - Operations (including X-C-U)  
Independent Contractor's protective  
Products & completed operations  
Blanket Contractual  
Owned, non-owned and hired motor vehicles  
Broad form coverage for property damage (including explosion, collapse and underground).
- (C) The insurance required by this Subparagraph (b) shall be written for not less than the following, or greater if required by Law:
- (1) Workers' Compensation:  
a. State of Rhode Island - Statutory  
b. Employer's Liability

- (2) Comprehensive General Liability (including Premises Operations; Independent Contractor's Protective; Products & Completed Operations; Broad Form Property Damage):

(a) Bodily Injury:

\$1,000,000 - Each Occurrence

\$1,000,000 - Annual Aggregate

(b) Property Damage:

\$1,000,000 - Each Occurrence

\$1,000,000 - Annual Aggregate

(c) Products & Completed Operations to be maintained for one (1) year after final payment.

(d) Property Damage Liability Insurance will provide X, C, or U coverage as applicable.

- (3) Contractor's Liability:

(a) Bodily Injury:

\$1,000,000 - Each Occurrence

(b) Property Damage:

\$1,000,000 - Each Occurrence

\$1,000,000 - Annual Aggregate

- (4) Personal injury, with Employment Exclusion deleted:

\$1,000,000 Annual Aggregate

- (5) Comprehensive Automobile Liability:

(a) Bodily Injury:

\$ 500,000 - Each Person

\$1,000,000 - Each Occurrence

(b) Property Damage:

\$1,000,000 - Each Occurrence

- (6) Property Insurance:

The Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. This insurance shall include the interests of the City, the Contractor, Subcontractors and Subcontractors in the Work shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief.

(D) Insurance Covering Special Hazards:

Special hazards shall be covered by rider or riders to the Public Liability and Property Damage Insurance policy or policies herein above required to be furnished by the Contractor or by separate policies of insurance in the amounts stated in Paragraph 5(C).

- (1) Property Damage Liability arising out of the collapse of or injury to any building or structure due to excavation (including burrowing, filling or backfilling in connection therewith), tunneling, pile driving, cofferdam work, or caisson work; or moving, shoring, underpinning, razing or demolition of any building or structure, or removal or rebuilding of any structural support thereof.
- (2) Property Damage Liability for injury to or destruction of property arising directly or indirectly from blasting or explosions, however caused, other than explosions of air or steam vessels, piping under pressure, prime movers, machinery, or power transmitting equipment.
- (3) Property Damage Liability for injury to or destruction of wires, conduits, pipes, mains, sewers, or other similar property, or any apparatus in connection therewith below the surface of the ground arising from and during the use of mechanical equipment for the purpose of excavating or drilling within project limits; injury to or destruction of property at any time resulting there from.
- (4) The Contractor shall require similar insurance in such amounts to be taken out and maintained by each subcontractor.

(E) “ALL RISK” Insurance:

The Contractor shall acquire and maintain “All Risk” type Builder’s Insurance. This insurance shall be in an amount equal to 100% of the insurable portion of the Project, and shall be for the benefit of the City, the Contractor, and each subcontractor as their interest may respectively appear.

**ARTICLE 24**  
**SURETY BONDS**

The Contractor shall be licensed to do business in the State of Rhode Island and shall furnish separate performance and payment bonds to the City. Each bond shall set forth a penal sum in an amount of not less than the Contract Price. Each bond furnished by the Contractor shall incorporate by reference the terms of this Contract as fully as though they were set forth verbatim in such bonds. In the event the Contract Price is adjusted by Change Order executed by the Contractor, the penal sum of both the performance bond and the payment bond shall be deemed increased by like amount. The performance and payment bonds furnished by the Contractor shall be in form suitable to the City and shall be executed by a surety, or sureties, reasonably acceptable to the City.

**ARTICLE 25**  
**PATENTS**

The Contractor shall pay all applicable royalties and license fees. The Contractor shall defend all suits or claims for infringement of any patent rights, and save the City harmless from loss on account thereof, except that the City shall be responsible for any such loss on when a particular process, design, or product of a manufacturer(s) is specified. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, the Contractor shall be responsible for such loss unless the Contractor promptly gives such information to the City.

**ARTICLE 26**  
**APPRENTICES**

Apprentices shall be permitted to work only under a bona fide apprenticeship program registered with a State Apprenticeship Council which is recognized by the Federal Committee of Apprenticeship, United States Department of Labor; or if no such Council exists in a State, under a program registered with the Bureau of Apprenticeship, United States Department of Labor.

**ARTICLE 27**  
**ASSIGNMENTS**

The Contractor shall not assign the whole or any part of this Contract, or any monies due or to become due hereunder, without the written consent of the City. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms or corporations for services rendered or materials supplied for the performance of the work called for in this Contract.

**ARTICLE 28**  
**APPLICABLE LAW**

The law is hereby agreed to be the law of the State of Rhode Island.

**ARTICLE 29**  
**SUCCESSORS AND ASSIGNS**

Each party binds itself, its successors, assigns, executors, administrators or other representatives to the other party hereto and to successors, assigns, executors, administrators or other representatives of such party in connection with all terms and conditions of this Contract.

**CITY**

The City of East Providence  
East Providence, RI 02914

By:

\_\_\_\_\_  
(Signature)

ROBERTO L. DASILVA, MAYOR  
(Printed Name and Title)

\_\_\_\_\_  
(Date of Execution)

**CONTRACTOR**

By:

\_\_\_\_\_  
(Signature)

(Printed Name and Title)

\_\_\_\_\_  
(Date of Execution)

SECTION 00600

CONTRACT BONDS

PERFORMANCE BOND

(NOTE: This Bond is issued simultaneously with the attached Labor and Materials Bond in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, \_\_\_\_\_  
(an individual, a partnership, a corporation)

duly organized under the Laws of the State (or Commonwealth) of \_\_\_\_\_,

and having a usual place of business at \_\_\_\_\_,

\_\_\_\_\_

as Principal, and \_\_\_\_\_, a corporation duly organized

under the Laws of the State (or Commonwealth) of \_\_\_\_\_,

and duly authorized to do business in the State (or Commonwealth) of Rhode Island,

and having a usual place of business at \_\_\_\_\_

as Surety, are holden and stand firmly bound and obligated unto City of East Providence, Rhode Island, as obligee, in the sum of

\_\_\_\_\_ lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated \_\_\_\_\_, has entered into a contract with the said obligee for **Pierce Field Police Substation, Bid No. EP24/25-028** in the **City of East Providence, Rhode Island**, a copy of which agreement is attached hereto and by references made a part hereof.

NOW THEREFORE, THE CONDITION of this obligation is such that if the Principal shall well and truly keep and fully and faithfully perform all of the terms and conditions of said AGREEMENT and of the "Contract Documents" referred to in said AGREEMENT (which collectively are hereinafter and in said AGREEMENT sometimes referred to as the "Contract") and all modifications thereof on the Principal's part to be performed, this obligation shall be void; otherwise it shall remain in full force and effect.



Whenever the said Principal shall be, and declared by the Owner to be, in default under the said Contract, the Owner having performed the Owner's obligations thereunder Surety, for value received, shall promptly remedy the default, or, at the option of the Owner, shall promptly.

- (a) Complete the said AGREEMENT and/or Contract in accordance with its terms and conditions, or
- (b) Obtain a bid or bids for submission to and the approval of the Owner for completing the said AGREEMENT and/or Contract and any modifications thereof in accordance with the terms and conditions thereof, and upon determination by the Owner and the Surety of the lowest responsible and acceptable bidder, arrange for a contract between such bidder and the Owner, and make available to the Owner as the work progresses (even though there should be default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less a sum that shall be equal to the difference between the Contract price as fixed and provided in said AGREEMENT and/or Contract or any modifications thereof to be paid thereunder to the Principal and the amount previously paid by the Owner to and/or for the account of and/or chargeable against the Principal, but not exceeding (including other costs and damages for which the Surety may be liable hereunder) the amount set forth in the first paragraph hereof.

The Surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way effect the Surety's obligations on this bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

No right of action shall accrue on this Bond to or for the use of any persons other than the Owner named herein or the heirs, executors, administrators, successors and assigns of the Owner.

IN WITNESS WHEREOF, we have hereunto set our hands and seals to \_\_\_\_\_  
\_\_\_\_\_ counterparts of this bond, this \_\_\_\_\_ day of \_\_\_\_\_,  
in the year Two Thousand and \_\_\_\_\_.

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

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

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

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

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

**NOTE:**

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an appropriate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of Contract.

**Important**

Surety Companies executing BONDS must appear on the U.S. Treasury Department's most current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Performance Bond is Directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

## LABOR AND MATERIALS BOND

(NOTE: This Bond is issued simultaneously with the attached Performance Bonds in favor of the Owner.)

KNOW ALL MEN BY THESE PRESENTS:

That we, \_\_\_\_\_  
(an individual, a partnership, a corporation)

duly organized under the Laws of the State (or Commonwealth) of \_\_\_\_\_,

having a usual place of business at \_\_\_\_\_,

\_\_\_\_\_

as Principal, and \_\_\_\_\_ a corporation duly organized

under the Laws of the State (or Commonwealth) of \_\_\_\_\_,

and duly authorized to do business in the State(or Commonwealth) of \_\_\_\_\_,

and having a usual place of business at \_\_\_\_\_,

as Surety, are holden and stand firmly bound and obligated unto the **City of East Providence, Rhode Island**, as obligee, in the sum of

\_\_\_\_\_ lawful money of the United States of America, to and for the true payment whereof we bind ourselves and, each of us, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal, be means of a written AGREEMENT (which together with the Contract Documents in said AGREEMENT referred to are collectively sometimes referred to as the "Contract") dated \_\_\_\_\_, has entered into a contract with the said Obligee for **Pierce Field Police Substation, Bid No. EP24/25-028** in the **City of East Providence, Rhode Island**, a copy of which agreement is attached hereto and by references made a part hereof.

NOW, THEREFORE, THE CONDITION of this obligation is such, that if the Principal shall promptly make payments to all claimants as hereinafter defined, for all labor performed or furnished and for all materials and equipment furnished for or used in or in connection with the Work called for by said AGREEMENT and/or Contract and any modifications thereof, including lumber used but not incorporated in said Work, and for the rental or hire of vehicles, tools and other appliances and equipment furnished for or used in connection with said Work, this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

- (a) A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, materials and/or equipment used or reasonably required for use in the performance of the said Work, labor and materials being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental or equipment directly applicable to the said AGREEMENT and/or Contract and any modifications thereof.
- (b) The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials or equipment were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.
- (c) No suit or action shall be commenced hereunder by any claimant.

Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: the Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials or equipment for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials or equipment were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the said Work is located, save that such service need not be made by a public officer;

After the expiration of one (1) year following the date on which the Principal ceased work on said AGREEMENT and/or Contract and any modifications thereof, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the State in which the said Work, or any part thereof, is situated, or in the United States District Court for the district in which the said Work, or any part thereof, is situated, and not elsewhere.

- (d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said AGREEMENT and/Contract or said Work, whether or not claim for the amount of such lien be presented under and against this bond.

The surety, for value received, agrees further that no changes in, omissions from, or alterations, modifications or additions to the terms and provisions of said AGREEMENT and/or Contract or the Work to be performed thereunder, and that no extensions of time given or changes made in the manner or time of making payments thereunder, shall in any way affect the Surety's obligations on this Bond, and the Surety hereby waives notice of any such changes, omissions, alterations, modifications, additions or extensions.

IN WITNESS WHEREOF, we have hereunto set our hands and seals to \_\_\_\_\_  
counterparts of this Bond, this \_\_\_\_\_ day of \_\_\_\_\_, in  
the year Two Thousand and \_\_\_\_\_.

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

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

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

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

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

**NOTE:**

If the Principal (Contractor) is a partnership, the Bond should be signed by each of the partners.

If the Principal (Contractor) is a corporation, the Bond should be signed in its correct corporate name by its duly authorized officer or officers.

If this Bond is signed on behalf of the Surety by an attorney-in-fact, there should be attached to it a duly certified copy of his power of attorney showing his authority to sign such Bonds.

There should be executed an approximate number of counterparts of the Bond corresponding to the number of counterparts of the AGREEMENT.

Date of Bond must not be prior to the date of Contract.

**Important**

Surety Companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

The attention of the Surety Companies and Principal executing this Labor and Materials Bond is directed to the fact that said Bond shall remain in full effect throughout the life of any guaranty or warranty periods stipulated in the Contract Documents and/or Agreement.

CERTIFICATE OF ACKNOWLEDGMENT OF CONTRACTOR IF A CORPORATION  
For CONTRACT BONDS

State of \_\_\_\_\_ )

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

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, before  
me personally came \_\_\_\_\_ to me known, who being by me duly  
sworn, did depose and say as follows:

That he resides at \_\_\_\_\_

and is the \_\_\_\_\_

of \_\_\_\_\_

the corporation described in and which executed the foregoing instrument; that he knows the corporate seal of said corporation; that the seal affixed to the foregoing instrument is such corporate seal and it was so affixed by order of the Board of Directors of said corporation; and that by the like order he signed thereto his name and official designation.

\_\_\_\_\_  
Notary Public (Seal)

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

## SECTION 00700

### GENERAL CONDITIONS

- 1.01 General Provisions
- 1.02 Definitions
- 1.03 Materials and Equipment
  - A. General
  - B. Handling
  - C. Storage of Excavated Material
  - D. Inspection
  - E. Inspection Away from Site
  - F. Samples
  - G. Shop testing
- 1.04 Contractor's Shop and Working Drawings
- 1.05 Occupying Private Land
- 1.06 Interference with and Protection of Streets
- 1.07 Safety
- 1.08 Existing Facilities
  - A. Dimensions of Existing Structures
  - B. Proposed Pipe Location
  - C. Interference with Existing Works
  - D. Existing Utilities or Connections
  - E. Failure to Repair
  - F. Disturbance of Bounds
- 1.09 Work to Conform
- 1.10 Planning and Progress Schedules
- 1.11 Precautions During Adverse Weather
- 1.12 Temporary Heat
- 1.13 Electrical Energy
- 1.14 Certificates of Conformance
- 1.15 Patents
- 1.16 "Or Equal" Clause
- 1.17 Additional or Substitute Bonds
- 1.18 Separate Contracts
- 1.19 Payrolls of Contractor and Subcontractors
- 1.20 Payments by Contractor
- 1.21 "Dig Safe" Law
- 1.22 Fire Prevention and Protection
- 1.23 Dust Control
- 1.24 Disposal of Debris
- 1.25 Night, Saturday, Sunday and Holiday Work
- 1.26 Length of Work Day
- 1.27 Hurricane Protection
- 1.28 Reduction in Scope of Work

#### 1.01 GENERAL PROVISIONS

A. The duties and obligations imposed by these General Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

B. Sections of Division 1, General Requirements govern the execution of the Work of all sections of the specifications.

C. The Specifications are written in imperative and streamlined form. This imperative language is directed to the Contractor, unless stated otherwise.

#### 1.02 DEFINITIONS

A. Wherever the words as listed in subsection 1.01 of the AGREEMENT or pronouns used in their stead occur in the Contract Documents, they shall have the meanings as given in the AGREEMENT.

#### 1.03 MATERIALS AND EQUIPMENT

##### A. General

1. Unless otherwise provided in the Contract Documents, only new materials and equipment shall be incorporated in the Work.

2. As soon as possible after execution of the AGREEMENT, submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment proposed to be incorporated into the Work.

3. When shop and working drawings are required as specified below, submit, prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications.

4. Submit data relating to the materials and equipment proposed to be incorporated into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

##### B. Handling

1. Handle, haul, and distribute materials and all surplus materials on the different portions of the Work, required to complete the Work in accordance with the Contract Documents.



2. Provide suitable storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished under this Contract, until the final completion and acceptance of the Work.

3. Pay all storage and demurrage charges by transportation companies and vendors.

#### C. Storage of Excavated Material

1. Place excavated materials and equipment to be incorporated in the Work so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

2. Materials shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

#### D. Inspection

1. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer.

2. No material shall be processed or fabricated for the Work or delivered to the work site without prior concurrence of the Engineer.

3. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor.

4. Defective materials and equipment shall be removed immediately from the site of the Work.

#### E. Inspection away from Site

1. If work to be done, away from the construction site, is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time, as determined solely by the Engineer, so that the necessary arrangements for the inspection can be made.

#### F. Samples

1. Submit samples of materials for tests, as the Engineer deems necessary to demonstrate conformance with the Specifications. Such samples,

including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed by the Engineer.

2. Furnish suitable molds for making concrete test cylinders. Except as otherwise expressly specified, the Owner shall make arrangements for, and pay for, the tests.

3. Pack samples so as to reach their destination in good condition, and label to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, notify the Engineer by letter that the samples have been shipped and properly describe the samples in the letter. Send letter of notification separate from the samples.

4. Submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences for failure to do so shall be the Contractor's sole responsibility.

5. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., provide such samples of workmanship of wall, floor, finish, etc., as may be required.

6. After review of the samples, data, etc. the materials and equipment used for the Work shall in all respects conform therewith.

#### G. Shop Testing

1. When required, furnish to the Engineer in triplicate, sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

#### 1.04 CONTRACTOR'S SHOP AND WORKING DRAWINGS

A. Submit shop drawings to the Engineer for review and approval.

B. All submittals will be identified as the Engineer may require and in the number of copies also as required by the Engineer.

C. The data shown on the Shop Drawings will be complete regarding quantities, dimensions, specified performance and design criteria, materials and other

data as particular to the Work that the Contractor proposes to provide.

#### 1.05 OCCUPYING PRIVATE LAND

A. Entering or occupying with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner (except after written consent from the proper parties) will not be permitted. A copy of the written consent shall be given to the Engineer.

#### 1.06 INTERFERENCE WITH AND PROTECTION OF STREETS

A. Obtain permits from the governing authorities prior to obstructing any portion of a street, road, or private way. If any street, road or private way is rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as ordered by the governing authorities.

B. Maintain streets, roads, private ways, and walks not closed in a passable and safe condition,

C. Provide at least 24 hours in advance, notice to the Owner, Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. Cooperate with all Departments in the establishment of alternate routes and provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

#### 1.07 SAFETY

A. Take all precautions and provide safeguards to prevent personal injury and property damage. Provide protection for all persons including but not limited to employees and employees of other contractors and subcontractors; members of the public; and employees, agents and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. Provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

B. Provide and maintain all safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment.

C. Comply with all applicable Federal, State and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

D. Designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

#### 1.08 EXISTING FACILITIES

##### A. Dimensions of Existing Structures

1. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

##### B. Proposed Pipe Location

1. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him for laying and jointing different or additional items where required.

2. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs.

##### C. Interference with Existing Works

1. Conduct operations so as to interfere as little as possible with existing works. Develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the

operation of the existing facilities for the shortest time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Electrical connections should be coordinated with the Owner so as to minimize disruption of normal plant operations. Before starting work which will interfere with the operation of existing facilities, perform preparatory work and see that all tools, materials and equipment are made ready and at hand.

2. Repair utilities damaged by the Contractor's operations during the progress of the work, and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. Contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the work but the entire responsibility and expense shall be with the Contractor.

3. Make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

4. Submit no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage.

#### D. Existing Utilities or Connections

1. The location of existing underground pipes, conduits, and structures, as shown, has been collected from the best available sources. The Owner, together with its agents, does not imply nor guarantee the data and information in connection with underground pipes, conduits, structures and such other parts as to their completeness, nor their locations as indicated. The Contractor shall assume that there are existing water, sewer, gas and other utility connections to each and every building enroute, whether they appear on the drawings or not. An expense and/or delay occasioned by utilities and structures, or damage thereof, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.

2. Above ground utilities may be present in the areas of the proposed Work. Take all necessary actions and/or precautions, including, but not limited to, utility company notification and necessary relocations (both temporary and permanent), to insure proper protection of those aboveground utilities and appurtenances to be affected by his operations. All costs associated with the aboveground utilities shall be paid by the Contractor at no additional expense to the Owner.

3. If and when encountered, existing utilities shall be properly supported and protected during the construction work and the Engineer shall be notified accordingly. The operation of existing utilities shall not be interrupted except with written permission of the operator and owner of such utilities. Allow ample time for all measures as may be required for the continuance of existing utility operations. Take extreme precautions to minimize disruption of utilities. Make prompt and full restitution for repairs by others for all disruptions caused by operations required to perform the Work.

4. Comply with all requirements of utility organizations involved.

#### E. Failure to Repair

1. Any emergency arising from the interruption of electric, telephone, gas, water, or sewer service due to the activities of the Contractor, shall be repaired by the Contractor as quickly as is possible.

2. If and when, in the opinion of the Owner, the Contractor is not initiating repair work as expeditiously as possible upon notification to do so, the Owner, may at his own option, make the necessary repairs using his own forces or those of others. The cost of such repairs shall be subtracted from the payments due to the Contractor.

#### F. Disturbance of Bounds

1. Replace all bounds disturbed during the construction operation, at no additional cost to the Owner. The bounds shall be relocated by a land surveyor approved by the Engineer and registered in the State that the Work is to be done.

### 1.09 WORK TO CONFORM

A. During its progress and on its completion, the Work shall conform to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in strict accordance with the Contract Documents and the directions given from time to time by the Engineer.

B. All work done without instructions having been given therefore by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

#### 1.10 PLANNING AND PROGRESS SCHEDULES

A. Before starting the Work and from time to time during its progress, as the Engineer may request, the Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take.

B. Within 14 calendar days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

#### 1.11 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required by the manufacturer of the material or equipment to be installed, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means that will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

#### 1.12 TEMPORARY HEAT

A. If temporary heat is required for the protection of the Work, provide and install suitable heating apparatus, provide adequate and proper fuel, and shall maintain heat as required.

B. Temporary heating apparatus shall be installed and operated in such manner that finished work will not be damaged.

#### 1.13 ELECTRICAL ENERGY

A. Make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. Provide and pay for all temporary wiring, switches, connections, and meters.

B. Provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

#### 1.14 CERTIFICATES OF CONFORMANCE

A. Furnish to the Engineer, in the manner as directed and prior to actual installation, notarized certificates of conformance for all materials to be furnished under this Contract. The notarized certificates of conformance shall state that the material to be furnished meets or exceeds all requirements specified under the Contract Documents. When so directed, the manufacturer's notarized certificates of conformance, certifying that the materials meet the requirements specified shall accompany each shipment of material. Unless otherwise specifically specified and/or directed by the Engineer, all testing of materials required under this Contract shall be provided by the Contractor at no additional expense to the Owner.

#### 1.15 PATENTS

A. Pay, at no additional expense to the Owner, all applicable royalties and license fees associated with the materials and construction methods to be used under this Contract. Defend all suits or claims for infringements of any patent rights, and save the Owner and Engineer harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer (s) is specifically specified with no option to the Contractor. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner.

B. Refer to Specification Section 00500, 1.07, Patents, regarding the Contractor's responsibilities for any patent rights associated with the materials and construction methods to be used under this Contract.

#### 1.16 "OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product of a particular manufacturer or vendor, any material or article which will perform adequately, in the Engineer's sole judgment and/or opinion, the duties imposed by the general design may be considered equal and satisfactory providing the material or article so proposed is of equal substance. It shall not be purchased or installed without his written approval. In all cases new material shall be used in the project.

B. If more than one brand, name of material, device, or piece of equipment is shown or specified, each should be regarded as the equal of the other. Any other brand, make of material, device or equipment, which in the opinion of the OWNER and/or ENGINEER, is the recognized equal of that specified (considering quality, workmanship, and economy of operation), and is suitable for the purpose intended, may be accepted.

C. ENGINEER will be allowed a reasonable time within which to evaluate submittals for Substitute Items. ENGINEER will be the sole judge of acceptability. No "Or Equal" or Substitute Item will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR and in making changes to the Contract Documents. Whether or not ENGINEER accepts a Substitute Item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed Substitute Item.

#### 1.17 ADDITIONAL OR SUBSTITUTE BONDS

A. If at any time the Owner, for justifiable cause, shall be or become dissatisfied with any Surety or Sureties than upon the performance or payment bonds, the Contractor shall, within five (5) calendar days after notice from the Owner so to do, substitute an acceptable bond (or bonds) in such form and sum and signed by such other Surety or Sureties as may

be acceptable to the Owner. The Contractor shall pay the premiums on such bonds with no additional expense to the Owner. No further payments shall be deemed due nor will be made until the new Surety or Sureties shall have furnished such as acceptable bond to the Owner.

#### 1.18 SEPARATE CONTRACTS

A. The Owner reserves the right to let other contracts in connection with the construction of the contemplated work of this project or contiguous projects of the Owner. The Contractor, therefore, will afford any such other contractors reasonable opportunity for the introductions and storage of their materials and the execution of their work, will properly connect and coordinate his work with theirs, and will not commit or permit any act which will interfere with the performance of their work.

B. Coordinate operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work.

C. It is essential that all parties interested in the project cooperate to the end that the entire project will be brought to a successful conclusion as rapidly as possible, but the Owner cannot guarantee that no interference or delay will be caused thereby. Interference and delay resulting from such cooperation shall not be basis of claims against the Owner.

#### 1.19 PAYROLLS OF CONTRACTOR AND SUBCONTRACTORS

A. The Contractor and each of his Subcontractors shall prepare his payrolls on forms prescribed and in accordance with instructions to be furnished by the Owner. Within seven (7) days after the regular payment date of the payroll, the Contractor shall deliver to the Owner, with copies to the Engineer, a certified legible copy or copies of each payroll. Each such payroll shall contain the statement required by the Federal Regulations issued pursuant to the "Anti-Kickback Statute", (48 Stat. 948; 18 U.S.C. 874; 40 U.S.C. 276C).

B. Carrying any person on his payrolls not employed by him will not be permitted. Carrying employees of a subcontractor on his payrolls will not be permitted, but such employees must be carried on the payrolls of the employing subcontractor.

C. Each Contractor or Subcontractor shall preserve his weekly payroll records for a period of three (3) years from the date of completion of the Contract. The payroll records shall set out accurately and completely the name, occupational classification, and hourly wage rate of each employee, hours worked by him during the payroll period and full weekly wages earned by him, and deductions made from such weekly wages and the actual weekly wages paid to him. Such payroll records shall be made available at all times for inspection by the Owner or his authorized representatives, the Engineer or by agents of the United States Department of Labor.

#### 1.20 PAYMENTS BY CONTRACTOR

A. Pay for all traffic control, safety, transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered. Reimbursable costs for services rendered, as specified in the Contract Documents, shall not be incorporated into partial payment estimates until such time that the Contractor submits to the Engineer actual paid invoices from those in which services were rendered.

#### 1.21 "DIG SAFE" LAW

A. Comply with the Rhode Island General Law, Chapter 39-1.2, "Excavation Near Underground Utility Facilities" which became effective on July 1, 1984.

B. Before commencing with the construction of any work, identify any water main, gas main, telephone duct, electric duct, and/or other utility present which is or could be in conflict with the proposed work.

C. Relocation of the affected utilities shall be done as directed by the Owner and in accordance with the requirements of the utility company.

D. The attention of the Contractor is directed to the fact that certain utility companies may not fall under the provisions of "DIG SAFE". Individual utility company notifications by the Contractor shall be necessary to insure proper notification and protection of all existing utilities affected by this Contract.

#### 1.22 FIRE PREVENTION AND PROTECTION

A. State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all

work and facilities necessary therefore shall be provided and maintained by the Contractor in an approved manner.

B. Provide fire protection equipment such as water tanks, hoses, pumps, extinguishers, and other materials, and apparatus, for the protection of the contract work, and adjacent property. Trained personnel experienced in the operation of all fire protection equipment and apparatus shall be available on the site whenever work is in progress, and at such other times as may be necessary for the safety of the public and the work.

#### 1.23 DUST CONTROL

A. Exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Pavements adjoining pipe trench shall be kept clean of excess materials wherever and whenever directed by the Engineer. Repeated daily dust control treatment shall be provided to satisfactorily prevent the spread of dust until permanent pavement repairs are made and until earth stockpiles have been removed, and all construction operations that might cause dust have been completed. No extra payment will be made for dust control measures, compensation shall be considered to be included in the prices stipulated for the appropriate items as listed in the Bid.

#### 1.24 DISPOSAL OF DEBRIS

A. The materials from the demolition, and those used in the construction of the Work throughout the project, shall be deposited in such a manner so as to not endanger persons or the Work, and so that free access may be had at any time to all hydrants, gates and existing equipment in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel and plant operations. All excavated materials not approved for backfill and fill, all surplus material, and all rock and boulders resulting from the excavations, shall be removed and satisfactorily disposed of off the site by the Contractor, at no additional expense to the Owner.

B. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the public, plant personnel or persons performing the work. Such debris deposits may be of such nature,

high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. Contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed from pipe cleaning methods. All debris shall be removed and satisfactorily disposed of off the work site, at no additional expense to the Owner.

#### 1.25 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night or on Saturdays, or Sundays or holidays without the prior written approval of the Owner and Engineer.

#### 1.26 LENGTH OF WORK DAY

A. The Owner retains the right to restrict the Contractor to an eight-hour workday. Such restrictions shall not be the basis for damages or claims against the Owner.

B. The Contractor's attention is also directed to the fact that should it be deemed necessary to perform various items of work during off-peak flow or traffic hours, early morning or late night hours, then he shall notify the Engineer a minimum of 24 hours in advance as to his intentions and reasons for the change in work hours. The Contractor shall be responsible for properly contacting and informing all involved parties of such a change in work hours. The

Contractor shall not be entitled to any additional compensation from the Owner for any expenses that may be incurred by change of working hours and/or scheduling.

#### 1.27 HURRICANE PROTECTION

A. Should hurricane warnings be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include closing all openings; removing all loose materials, tools and/or equipment from exposed locations; and removing or securing scaffolding and other temporary work.

#### 1.28 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work should the Owner deem it to be in the public interest to do so. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the contract or at any time during the progress of the work. The Owner further reserves the right, at anytime during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

END OF SECTION

## SECTION 00800

### SUPPLEMENTARY CONDITIONS

- 1.01 General
- 1.02 Limits of Normal Excavation
- 1.03 Bolts, Anchor Bolts, and Nuts
- 1.04 Concrete Inserts
- 1.05 Sleeves
- 1.06 Cutting and Patching
- 1.07 Foundations, Installations and Grouting
- 1.08 Services of Manufacturer's Representative
- 1.09 Operating Instructions and Parts List
- 1.10 Lubricants
- 1.11 Special Tools
- 1.12 Equipment Drive Guards
- 1.13 Protection Against Electrolysis
- 1.14 Covering Excavated Trench
- 1.15 Maintaining Trench Excavations
- 1.16 Disruption of Storm Drains
- 1.17 Precaution Against Hydraulic Uplift During Construction
- 1.18 Blasting
- 1.19 Nameplates
- 1.20 Special Safety Precautions
- 1.21 Land, Easements and Rights-of-Way
- 1.22 Cleaning Finished Work

#### 1.01 GENERAL

A. These Supplementary Conditions are requirements which amend or supplement the General Conditions specified elsewhere.

B. The duties and obligations imposed by these Supplementary Conditions will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

C. Assertion of any claim for any additional compensation or damages on account of and/or the fulfillment of these Supplementary Conditions will not be allowed.

#### 1.02 LIMITS OF NORMAL EXCAVATION

A. In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be as described below, unless other limits are indicated in the Contract Documents.

1. For pipes in trenches, less than or equal to a depth of 10.0-feet, the normal width of the trench shall be measured between vertical planes which are a

distance apart equal to the sum of 48 inches plus the nominal inside diameter of the pipe.

2. For pipes in trenches, between a depth greater than 10.0-feet and a depth of 20.0-feet, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 60-inches plus the nominal inside diameter of the pipe.

3. If the width so computed is less than 5.0-feet for trenches up to 10.0 feet deep than a width of 5.0 feet shall be the normal width. If the width so computed is less than 6.0-feet for trenches greater than 10.0-feet up to 20.0-feet than a width of 6.0-feet shall be the normal width.

4. The normal depth shall be measured to a distance of 0.5 feet below the bottom of the pipe in earth and 0.5 feet in rock, unless there be a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The trench width for the cradle shall be assumed to be that specified above for pipes in the trench.

B. Quantities for payment shall be in accordance with the above limits or the actual widths, **whichever is less.**

C. For concrete placed directly against undisturbed earth, the normal width and depth of the excavation for such concrete shall be measured to the neat lines of the concrete as indicated on the Drawings or as ordered.

D. For concrete placed against rock surfaces resulting from rock excavation, the normal width and depth of the excavation shall be measured to 4 inches outside the neat lines of the concrete as indicated on the Drawings or as ordered.

E. For other structures, except manholes as noted below, the normal width shall be measured between vertical planes 1.0 feet outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.

F. No additional width or depth of trenches excavated in earth or rock shall be allowed at standard circular manholes. The pay limit for rock



removed outside proposed manholes shall commence one foot (1.0) outside the widest dimension of the structure or shall be the maximum connecting trench width, whichever is greater.

G. Wherever bell holes are required for jointing pipe, they shall be provided without additional compensation over and above that resulting from measurements as above described.

#### 1.03 BOLTS, ANCHOR BOLTS AND NUTS

A. Furnish bolts, anchor bolts, nuts, washers, plates and bolt sleeves required by equipment to be installed under this Contract in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. Anchor bolts, nuts, washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated or specified.

C. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.

D. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).

E. Bolts, anchor bolts, nuts and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

F. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel unless otherwise indicated or specified.

G. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at

least 4 inches by 4 inches by 3/8 inches or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

#### 1.04 CONCRETE INSERTS

A. Concrete inserts for hangers shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts for hangers shall be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts shall be galvanized.

#### 1.05 SLEEVES

A. Unless otherwise indicated on the Drawings or specified, openings for the passage of pipes through floors and walls shall be formed of sleeves of standard-weight, galvanized steel pipe. The sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves shall be of sufficient length to be flush at the walls and the bottom of slabs and to project 1 inch above the finished floor surface. Threaded nipples shall not be used as sleeves.

B. Sleeves in exterior walls below ground or in walls to have liquids on one or both sides shall have a 2 inch annular fin of 1/8 inch plate welded with a continuous weld completely around the sleeve at about mid-length. Sleeves shall be galvanized after the fins are attached.

C. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

#### 1.06 CUTTING AND PATCHING

A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are at the Work and properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.

B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

C. The Contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.

D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.

E. The Contractor shall not cut or alter the work of any subcontractors or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor, or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the full responsibility of the Contractor.

#### 1.07 FOUNDATIONS, INSTALLATION AND GROUTING

A. Furnish materials and construct suitable concrete foundation for all equipment installed under this Contract, even though such foundations may not be indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

B. Equipment shall be installed by skilled mechanics and in accordance with the instruction of the manufacturer.

C. In setting pumps, motors, and other items of equipment customarily grouted, make an allowance of at least 1-in. for grout under the equipment bases. Shims used to level and adjust the bases shall be

steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable nonshrink grout.

D. Grout shall be mixed and placed in accordance with the recommendations of the manufacturer. Where practicable, the grout shall be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamber around the top edge of the finished foundation.

E. Where such procedure is impracticable, the method of placing grout shall be as permitted by the Engineer. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an approved manner, if necessary, given a burlap-rubbed finish, and painted with at least two coats of an acceptable paint.

#### 1.08 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. Arrange for the services of qualified factory service representatives from the companies manufacturing or supplying equipment and/or materials to be used or installed in the work as specified, to perform the following duties.

B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before others operate it, the representative shall inspect, operate, test, and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:

1. Soundness (without cracked or otherwise damaged parts).

2. Completeness in all details, as specified.

3. Correctness of setting, alignment, and relative arrangement of various parts.

4. Adequacy and correctness of packing, sealing and lubricants.

C. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

D. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result

of his inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a certificate that specifically states "the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void".

E. After the Engineer has reviewed the reports from the manufacturer's representatives, the Contractor shall make all arrangements to have the manufacturer's representatives present when the field acceptance tests are made by the Engineer without additional cost to the Owner.

#### 1.09 OPERATING INSTRUCTIONS AND PARTS LISTS

A. Where reference is made in the Technical Specifications to operating instructions and spare parts lists, furnish, for each piece of equipment, six complete sets giving the information listed below:

1. Clear and concise instructions for the operation, adjustment, and lubrication and other maintenance of the equipment. These instructions shall include a complete lubrication chart.

2. List of all parts for the equipment, with catalog numbers and other data necessary for ordering replacement parts.

B. Such instructions and parts lists shall be annotated to indicate only the specific equipment furnished. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.

C. Such operating instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site.

#### 1.10 LUBRICANTS

A. During testing and prior to acceptance, furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

#### 1.11 SPECIAL TOOLS

A. For each type of equipment furnished provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation,

maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

C. Special tools shall be delivered at the same time as the equipment to which they pertain. Properly store and safeguard such special tools until completion of the work, at which time they shall be formally transmitted and delivered to the Owner.

#### 1.12 EQUIPMENT DRIVE GUARDS

A. All equipment driven by open shafts, belts, chains, or gears shall be provided with acceptable all-metal guards enclosing the drive mechanism. Guards shall be constructed of galvanized sheet steel or galvanized woven wire or expanded metal set in a frame of galvanized steel members. Guards shall be secured in position by steel braces or straps that will permit easy removal for servicing the equipment. The guards shall conform in all respects to all applicable safety codes and regulations.

#### 1.13 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or by other acceptable materials.

#### 1.14 COVERING EXCAVATED TRENCH

A. In addition to the requirements in Section 00700 titled Interference with and Protection of Streets. Cover all open excavations when construction operations are suspended at the end of the day, or in excavated trenches where work is not actually in progress. Cover shall be capable of withstanding AASHTO H20-S16 loading. This cover shall consist of steel plates or some other satisfactory cover of adequate size and strength suitably held in place to keep all traffic out of excavations, all as verified in writing by the Contractor. The cover shall be laid over the excavation until it is backfilled.

#### 1.15 MAINTAINING TRENCH EXCAVATIONS

A. The length of trench opened at any time, from point where ground is being broken to completed backfill, and also the amount of space in streets or public and private lands occupied by equipment, trench, and supplies, shall not exceed the length of space considered reasonably necessary and expedient by the Engineer. In determining the length of open trench or spaces for equipment, materials, supplies and other necessities, the Engineer will consider: the nature of the lands or streets where work is being done; types and methods of construction and equipment being used; inconvenience to the public or to private parties; possible dangers; and other proper matters. All work must be constructed with a minimum inconvenience and danger to the public and all other parties concerned.

B. Whenever any trench obstructs pedestrian and vehicular traffic in or to any public street, private driveway or property entrance, or on private property, take such means as may be necessary to maintain pedestrian and vehicular traffic and access. Until such time as the work may have attained sufficient strength to support backfill, or if for any other reason it is not expedient to backfill the trench immediately, construct and maintain suitable plank crossing and bridges to carry essential traffic in or to the street, driveway or property in question, as specified or directed.

C. Suitable signs, lights, and such items required by Police Authorities to direct traffic, shall be furnished and maintained by the Contractor at his own expense.

D. Keep streets and premises free from unnecessary obstructions, debris and all other materials. The Engineer may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space, promptly removed. Should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Owner may cause any part or all of such materials to be removed by such persons as he may employ, at the Contractor's expense; and may deduct the costs thereof from payments which may be or may become, due to the Contractor under the Contract. In special cases, where public safety urgently demands it, the Owner may cause such materials to be removed at the Contractor's expense without prior notice.

#### 1.16 DISRUPTION OF STORM DRAINS

A. Portions of the Work may be located in areas that are serviced by storm drains. Take extreme precaution to minimize disruption of the drains, and repair and/or make restitution for repairs by others for all disruptions caused by the construction operations.

#### 1.17 PRECAUTION AGAINST HYDRAULIC UPLIFT DURING CONSTRUCTION

A. Protect all structures against hydraulic uplift until such structures have beneficially completed.

#### 1.18 BLASTING AND PRE-CONSTRUCTION BLASTING SURVEY

A. Blasting will not be permitted.

#### 1.19 NAMEPLATES

A. With the exceptions mentioned below, each piece of equipment shall be provided with a substantial nameplate of noncorrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate. Coordinate nameplate text requirements with Engineer prior to fabrication. Nameplates shall be securely mounted in a readily visible location approved by the Engineer. Equipment Specification sections may contain additional information regarding nameplates.

B. This requirement shall not apply to standard manually operated hydrants or to gate, globe, check, and plug valves.

C. Each process valve shall be provided with a substantial tag of noncorrodible metal securely fastened in place and inscribed with an identification number in conformance with the Valve Identification Schedule indicated on the drawings or furnished later by the Engineer.

#### 1.20 SPECIAL SAFETY PRECAUTIONS

A. Contractor to note that the project involves working near bodies of water. Use appropriate equipment and provide adequate safety equipment.

B. Contractor to note that the project involves working within a right-of-way and the presence of overhead utility lines. Use appropriate equipment and provide adequate safety equipment.

C. Contractor shall take all necessary safety precautions in completing the work including coordinating with and complying with emergency procedures and requirements of the Owner, Police Department, Fire Department, and the Rhode Island Department of Environmental Management. The Contractor shall comply with all applicable federal, state and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property. The Contractor shall have all necessary safety apparatus on-site and workers shall be instructed in its use.

#### 1.21 LAND, EASEMENTS, AND RIGHTS-OF-WAY

A. As indicated, a portion of the work may be located within easements and/or rights-of-way, obtained or which will be obtained by the Owner, through private property. On all other lands, the Contractor has no rights unless he obtains them from the proper parties as specified in Section 00700, Occupying Private Land.

B. Prior to issuance of the Notice to Proceed, the Owner shall obtain all land, easements and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed.

C. The Owner shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.

D. The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities or for storage of materials.

E. If however, lands, easements or rights-of-way cannot be obtained before work on the project begins, the Contractor shall begin his work upon such land, easements or rights-of-way as have been previously acquired by the Owner, and no claims for damages whatsoever will be allowed by reason of its inability to procure the lands, easements, or rights-of-way for the said work, the Contractor shall not be entitled to make or assert a claim for damages by reason of the said delay, or to withdraw from the Contract except by consent of the Owner. Time for completion of work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to set forth in writing.

#### 1.22 CLEANING FINISHED WORK

A. After the work is completed, the pipes, manholes and structures shall be carefully cleaned free of debris and dirt, broken masonry, and mortar, and left in first class condition, ready to use. All temporary or excess materials shall be disposed of off-site and the work left broom clean, to the satisfaction of the Engineer.

END OF SECTION

## **DIVISION 1**

## SECTION 01010

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Work covered by the Contract, listing of Owner, Project location, Engineer. Sequence requirements, the Contractor's use of the premises and Owner's occupancy requirements.

##### 1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work includes, but is not necessarily limited to:

Major improvements include:

- Site preparation and removal of existing underground electrical equipment to replace with new pad mounted transformer and service to the building.
- New (approx.) 18'x 30' police substation including: an office space, ADA bathroom, supply closet and storage space.
- New concrete sidewalk and walkway for access, including new parking and ADA van accessible space.
- New site improvements including new water, electric, telecom, and sewer service connections, concrete curbing and sidewalks, and permanent pavement patch of the parking lot.
- All related civil/site, architectural, landscape, structural, heating and ventilation, plumbing, and electrical

All as more particularly indicated, shown or described in the Drawings, Specifications, and other Contract Documents.

- B. All work done under this contract shall be in conformance with the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, edition with all revisions and the State and Federal Special Provisions included in the Contract Documents. Standard details for this project are Rhode Island Standard Details, latest edition, with all revisions or the City of East Providence Standard Details. All traffic control devices and signage to be in accordance with the U.S. Department of Transportation Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD), latest edition at time of Bid.
- C. References within the Standard Specifications to RIDOT, the Department, or the Engineer shall, for the purposes of this Contract, be construed to mean the City of East Providence or its designated representative.

### 1.03 OWNER

- A. City of East Providence, Rhode Island  
145 Taunton Avenue  
East Providence, Rhode Island 02914  
Telephone: 401-435-7703  
Contact: Erik Skadberg, City Engineer

### 1.04 PROJECT LOCATION

- A. 201 Mercer Street East Providence, RI 02914

### 1.05 ENGINEER

- A. BETA Group, Inc.  
701 George Washington Highway  
Lincoln, Rhode Island 02865  
Telephone: 401-333-2382  
Fax: 401-333-9225  
Contact: Jared Linhares, P.E.

### 1.06 WORK SEQUENCE

- A. In order that Work may be conducted with minimum inconvenience to the public and, work under this Contract may be coordinated with other work which may be under construction or contemplated, and that work under the Contract may conform to conditions which it has been undertaken or conditions attached to a right-of-way or particular location for this work, the Engineer may determine the point or points and time or times when portions of work will commence or be carried on and may issue orders pertaining to the work sequence, relative to the rate of progress on several portions of the work.
- B. All trench work shall be covered at the end of the work day with either temporary bituminous patching or steel plates to ensure public safety.

### 1.07 CONTRACTOR USE OF PREMISES

- A. The Contractor's use of premises shall be within the limits shown on the Drawings and as defined in Section 00500 – Contract Agreement, for the performance of the Work.
- B. The Contractor shall assume full responsibility for security of all materials and equipment on the site, including those of his subcontractor's.
- C. If directed by the Owner, the Contractor shall move any stored items that interfere with operations of the Owner.



- D. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

#### 1.08 OWNER OCCUPANCY REQUIREMENTS

- A. Unless otherwise specifically approved, all roadways within the project area must remain in full service at all times throughout the duration of the project unless otherwise approved by the City. Also, access to properties must be maintained.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01020

### ALLOWANCES

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Contingencies and their respective value which have been established in the BID as an estimated lump sum to facilitate comparison of bids only.

###### B. Related Sections

1. Section 00300 - Bid Forms
2. Section 01025 - Measurement and Payment

##### 1.02 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, labor for installation and finishing, less applicable trade discounts; delivery to site, and applicable taxes

B. Costs Not Included in Cash Allowances but included in the Contract Sum: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage, Overhead & Profit, all bonds and permit fees.

###### C. Architect Responsibilities

1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
2. Select products in consultation with Owner and transmit decision to Contractor.
3. Prepare Change Order.

###### D. Contractor Responsibilities

1. Assist Architect in selection of products, suppliers and installers.
2. Obtain proposals from suppliers and installers and offer recommendations.
3. On notification of selection by Architect, execute purchase agreement with designated supplier and installer.

4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
  5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- E. Differences in costs will be adjusted by Change Order.
- F. Allowances Schedule:
1. Allowance No. 1: Signage
    - a. Include the sum of Six hundred dollars (\$ 600.00) for all work associated with the purchase and installation of signage. **Cost to be included in Bid Item No. 2 Pierce Field Substation.**
  2. Allowance No. 2: Logo on Exterior of Building
    - a. Include the sum of Two thousand dollars (\$ 2,000.00) for all work associated with the purchase and installation of the East Providence Police logo for the exterior of the building. **Cost to be included in Bid Item No. 2 Pierce Field Substation.**

## PART 2 PRODUCTS

Not Used

## PART 3 EXECUTION

Not Used

END OF SECTION

## SECTION 01025

### MEASUREMENT AND PAYMENT

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Measurement and payment criteria applicable to the Work performed under a unit price and/or lump sum payment method of Items listed in the BID.

###### B. RELATED SECTIONS

1. Section 00300 - Bid
2. Section 00500 - Agreement

##### 1.02 UNIT QUANTITIES SPECIFIED

- A. Quantities and measurements indicated in SECTION 00300 are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer shall determine payment.

- B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit price contracted.

##### 1.03 MEASUREMENTS OF QUANTITIES

- A. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

- B. Measurement by Area: Measured by square dimension using mean length and width or radius.

- C. Linear Measurement: Measured by linear dimension, along the horizontal projection of the centerline or mean chord.

- D. At appropriate points in this text, specifications are given with respect to measuring or estimating certain quantities and the sums due for the same. Except as otherwise provided, the Engineer shall determine the appropriate method for measuring and computing each quantity, and for estimating the sums due for the various kinds of work and material, using such methods, tools and degrees of precision as are suitable for the particular measurement, Item or computation. When so requested by the Engineer, assistance in measuring or determining quantities, shall be provided by furnishing the help of unskilled laborers on the site, by furnishing copies of invoices, or by other means.

- E. For estimating quantities in which the computations of areas by analytic and geometric methods would be laborious, as determined by the Engineer, it is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas and may be used for this purpose.

#### 1.04 UNIT PRICES

- A. Payment will be computed on the basis of the unit price bid in SECTION 00300 for each Item and the quantity of units completed. Unit prices are to include cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.06, this Section.)

#### 1.05 LUMP SUM PRICES

- A. Payment will be computed on the basis of the percentage of work completed on each Item in the contract BID as determined by the Engineer. Lump sum prices are to include the cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.06, this Section.)
- B. The Contractor's breakdown (submit under SECTION 01026) of the lump sum bid will be used only as a guide to determine the percentage of completion.

#### 1.06 PRICES INCLUDE

- A. The prices stated in the Proposal include full compensation not only for furnishing all the labor, equipment and material needed for, and for performing the work, but also for assuming all risks of any kind for expenses arising by reason of the nature of the soil, ground water, or the action of the elements; for all excavation and backfilling; for the removal of and delay or damage occasioned by trees, stumps, pipes, ducts, timber, masonry or other obstacles; for removing, protecting, repairing, or restoring, without cost to the Owner, all pipes, ducts, drains, sewers, culverts, conduits, curbs, gutters, walks, fences, tracks, or other obstacles, road pavements and other ground surfacing whether shown on plans or not for draining, damming, pumping or otherwise handling and removing, without damage to the work or to other parties, and without needless nuisance, all water or sewage from whatever source which might affect the work or its progress, or be encountered in excavations made for the work; for all signs, fencing, lighting, watching, guarding, temporary surfacing, bridging, snow removal, etc., necessary to maintain and protect travel on streets, walks and private ways; for making all provisions necessary to maintain and protect buildings, fences, poles, trees, structures, pipes, ducts and other public or private property affected or endangered by the work; for the repair or replacement of such things if injured by neglect of such provisions for removing all surplus or rejected materials as may be directed; for replacing, repairing and maintaining the surfaces of streets, highways, public and private lands if and where disturbed by work performed under the Contract or by negligence in the performance of work under the Contract; for furnishing the requisite filling materials in case of any deficiency or lack of suitable materials; for obtaining all permits and licenses and complying with the requirements thereof, including the cost of furnishing any security needed in connection therewith;

for protection against inclement or cold weather; for all expenses incurred by or on account of the suspension; interruption or discontinuance of work; for the cost of the surety bond and adequate insurance; for all taxes, fees, union dues, etc., for which the Contractor may be or become liable, arising out of his operations incidental to the Contract; for providing equipment on the site and off site; for providing a field office and its appurtenances and for all general and incidental expenses; for tools, implements and equipment required to build and put into good working order all work contemplated by the Contract; for maintaining and guaranteeing the same as provided; and for fulfilling all obligations assumed by the Contractor under the Contract and its related documents.

- B. The Owner shall pay, and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and for all risks and obligations undertaken by the Contractor under and as required by the Contract.
- C. The prices for those Items which involve excavation shall include compensation for disposal of surplus excavated material and handling water.

#### 1.07 PAYMENT

- A. In general, payment will be made for all Contract work satisfactorily completed through the end of the previous month. The payment will include any additional work which has been completed and approved and change order work agreed upon by the Owner and Contractor which has been completed and approved (See SECTION 00500).
- B. Each application for payment will indicate the total of a minimum percent retainage as defined in SECTION 00500, held by the Owner on the total of all work completed under the contract and approved for payment to-date.
- C. Monthly applications for payment may also indicate reduction or increase of the total Contract price when an approved change order results in a net reduction or net increase in the cost and quantity of work to be performed under the Contract.
- D. Special billings and charges against the Contract as credit or payment to the Owner, that are not for change order work, may be subtracted from monies due on any monthly application for payment but shall not serve to reduce the total Contract price.
- E. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price for work which is incorporated in or made necessary by the Work.

#### 1.08 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

- A. All bid items listed below are applicable for all work included in the Contract Documents.

## **BID ITEM NO. 1     SITE PREPARATION**

### **A. METHOD OF MEASUREMENT**

1. This item shall be paid for at the contract unit price bid per lump sum.

### **B. BASIS OF PAYMENT**

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
  - a. Furnishing, placing, relocating, maintaining, removing and disposing of erosion control measures, including but not limited to catch basin inserts, concrete washout, compost filter sock, and stockpile containment areas throughout the duration of the Work, as indicated on the Drawings or as otherwise directed by the Engineer;
  - b. Any clearing and grubbing as indicated on the Drawings or as required by the Engineer;
  - c. Removal and legal disposal of existing trees, all sizes, as indicated on the Drawings or required by the Engineer;
  - d. Furnishing, placing, maintaining, removing and disposing of temporary tree, dripline, and shrub protection throughout the duration of the Work, as indicated on the Drawings or as otherwise directed by the Engineer;
  - e. Removal and legal disposal, and removal and resetting of all existing fence and gates including posts and post foundations, framework, fabric, hardware and appurtenances as indicated on the Drawings;
  - f. Removal and legal disposal of bituminous and concrete sidewalks, and concrete curb, as indicated on the Drawings;
  - g. Removal and legal disposal of existing roof structure
  - h. Sawcutting and removal and disposal of existing pavement;
2. Any and all other work, whether direct or incidental, associated with the completion of the Site Preparation not specifically identified herein.

## **BID ITEM NO. 2     PIERCE FIELD POLICE SUBSTATION**

### **A. METHOD OF MEASUREMENT**

1. This item shall be paid for at the contract unit price bid per lump sum.

### **B. BASIS OF PAYMENT**

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
  - a. Furnish and installing the Pierce Field Police Substation building, inclusive of all work shown on the Drawings and detailed in the Specifications, including but not limited to concrete, masonry, rough carpentry, finish carpentry and millwork,

insulation, roofing, caulking, doors, frames, hardware, window, glazing, plaster, gypsum board, temperature control, flooring, painting, specialties, fire protection, plumbing, HVAC, electrical, and heat pump mounted on concrete pad, as depicted in the Drawings or as directed or required by the Engineer, in accordance with the specifications;

- b. All restoration work as indicated on the plans including removal and resetting of fence, concrete curbing, replacement of existing concrete sidewalk, new concrete sidewalk and curb ramp, excavation and disposal of material, backfill, signage and pavement markings, concrete stairs and walkways, permanent trench patch, adjusting structures to grade, trimming and fine grading, loam and seed, and all other work and appurtenances required in accordance with the specifications.
2. Mobilization and demobilization including but not limited to the following:
    - a. Initiating and administering the contract, including but not limited to furnishing performance and payment bonds and all other securities and insurances required, project meetings, securing of all necessary permits, etc., for providing all other materials, supplies, tools, equipment, labor, financing, supervision, temporary structures, and any and all other administrative expenses incurred in carrying out the work and furnishing the materials, keeping records and preparing required reports, and assuming risks, which have not been included in the prices in other items of the Proposal;
    - b. Costs, exclusive of the cost of materials, for mobilizing all machinery, plant, tools, and other equipment necessary to carry on and complete the work;
    - c. Establishing and maintaining survey controls for the construction layout of the overall project by a qualified professional, using appropriate means and methods to ensure the accuracy of the layout, as specified and/or as directed by the Engineer;
    - d. Re-establishing all benchmarks, concrete bounds, iron pins, and all permanent property boundary markers;
    - e. Coordinating and scheduling the use of uniformed traffic persons and/or flaggers including tracking or verifying hours worked by traffic persons;
    - f. Furnishing and installing temporary stabilizing erosion control measures in areas after construction activity has ceased.
    - g. Furnishing and spreading calcium chloride and/or water in order to control (minimize) dust at the Work areas;
    - h. Costs for demobilizing all machinery, plant, tools, and other equipment used to perform the work upon completion of the project;
    - i. Costs for performing final cleanup of the project area, exclusive of specific restoration to be paid for under other items.
  3. Any and all other work, whether direct or incidental, associated with the completion of the Police Substation not specifically identified herein.



### **BID ITEM NO. 3 ELECTRICAL SERVICE CONNECTION**

#### **A. METHOD OF MEASUREMENT**

1. This item shall be paid for at the contract unit price bid per lump sum.

#### **B. BASIS OF PAYMENT**

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
  - a. Furnish and installing of electrical service, inclusive of all work shown on the Drawings and detailed in the Specifications, including but not limited to sawcutting, excavation and disposal of material, backfill, conduit and concrete encasement, handholes, utility bollards, primary and secondary services, transformer with pad and containment curb, utility pole and overhead wiring, connection to the Pierce Field Police Substation building and existing service, and all appurtenances required in accordance with the specifications.
  - b. Removal and disposal and removal and stacking of existing vault equipment in coordination with RI Energy.
  - c. Contractor to coordinate all work with RI Energy;
  - d. Temporary and permanent trench patches are included in this lump sum item.
2. Any and all other work, whether direct or incidental, associated with the completion of the Electrical Service Connection not specifically identified herein.

### **BID ITEM NO. 4 WATER SERVICE CONNECTION**

#### **A. METHOD OF MEASUREMENT**

1. This item shall be paid for at the contract unit price bid per lump sum.

#### **B. BASIS OF PAYMENT**

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
  - a. Furnishing and installing the water service connection, as depicted on the Drawings or as directed or required by the Engineer and/or utility provider, including but not limited to joint-restraint fittings and thrust blocks, bends, tees, gate valves, reducers, couplings and adapters, backflow preventer, utility supports, curb stops, corporation stops, valve boxes, and service gate boxes, and all other work as shown on the Drawings or described in the Specifications;
  - b. Pressure testing, disinfection and sampling performed by separate independent and qualified companies and laboratories;
  - c. Sawcutting existing pavement in area of water service connection;
  - d. Removing and disposing of excavated bituminous concrete;
  - e. Excavation, trench support and dewatering;

- f. Removal and disposal of excess material;
  - g. Coordination with East Providence Water Utilities Division for all water utility work associated with the project;
  - h. Excavation and disposal of material, furnishing and installing crushed stone and gravel borrow pipe, bedding/backfill material, and backfilling and compacting as specified, including all incidental work not specifically included for payment under other items;
  - i. Temporary and permanent trench patches are included in this lump sum item.
2. Any and all other work, whether direct or incidental, associated with the completion of the Water Service Connection not specifically identified herein.

## **BID ITEM NO. 5 SEWER SERVICE CONNECTION**

### **A. METHOD OF MEASUREMENT**

1. This item shall be paid for at the contract unit price bid per lump sum.

### **B. BASIS OF PAYMENT**

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
- a. Furnish and installing the gravity sewer, complete-in-place, including all excavation and disposal of materials, furnishing and installing geotextile filter fabric furnishing and installing crushed stone and gravel borrow pipe bedding, backfill material, and compacting as specified;
  - b. Furnishing and installing, complete-in-place, precast concrete sewer doghouse manholes, including sawcutting, temporary excavation support, dewatering, excavation & disposal of material, furnishing and installing bedding material, construction of inverts, base sections, risers, cones or flat slab tops (as required), watertight frames and covers, backfill with gravel borrow and all other work and materials required to complete the work as indicated on the Drawings and as specified;
  - c. Furnishing and installing, complete-in-place, sewer cleanout, including sawcutting, temporary excavation support, dewatering, excavation and disposal of material, furnishing and installing crushed stone bedding material, construction of inverts, riser pipe, cast iron frames and covers, concrete collar, all necessary adapters and fittings, and all other work and materials;
  - d. The work shall include necessary adapters and fittings for re-connection of existing or new lateral services to the new sanitary line including fittings and couplings. Connecting new gravity sewers to new or existing gravity sewer structures or system, modifications to existing structures (including but not limited to for work, coring, cutting, concrete work, masonry and bricks), and furnishing and installing adapters and couplings;
  - e. Sawcutting of the existing pavements and removal and disposal of all existing pavements, including any existing bituminous, concrete or reinforced concrete base (if encountered);

- f. Protection and support of existing utilities, maintaining flows of all utilities, providing sanitary by-pass pumping, and repairing and/or replacing damaged or impacted existing utilities not specifically included for payment under other items (Contractor to test existing sanitary sewer flow prior to providing sewer by-pass);
  - g. Implementing safety precautions, including designing and implementing excavation support;
  - h. Designing, furnishing, installing, operating, maintaining and removing temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction, as well as the appropriate disposal of pumped water;
  - i. Temporary and permanent trench patches are included in this lump sum item.
2. Any and all other work, whether direct or incidental, associated with the completion of the Sewer Service Connection not specifically identified herein.

## **BID ITEM NO. 6 TELECOM SERVICE CONNECTION**

### **A. METHOD OF MEASUREMENT**

1. This item shall be paid for at the contract unit price bid per lump sum.

### **B. BASIS OF PAYMENT**

1. The unit price for this item shall include full compensation for all labor, equipment, materials and incidentals needed to complete the following:
  - a. Furnish and installing of telecommunication conduit as detailed on the Drawings or directed by the Engineer and/or utility provider, including but not limited to sawcutting, excavation and disposal of material, backfill, conduit, handholes as required, nylon pull strings, connection to the Pierce Field Police Substation building and the existing utility pole/handhole and all appurtenances required in accordance with the specification.
  - b. Temporary and permanent trench patches are included in this lump sum item.
2. Any and all other work, whether direct or incidental, associated with the completion of the Telecom Service Connection not specifically identified herein.

**PART 2 PRODUCTS NOT USED**

**PART 3 EXECUTION NOT USED**

**END OF SECTION**

## SECTION 01035

### MODIFICATION PROCEDURES

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Procedures for making modifications to the Contract by change orders or other means.

###### B. Related Sections

1. Document 00500 - Agreement

##### 1.02 CHANGE ORDERS

- A. In general Change Orders will be issued for modification of Contract documents which will incorporate changes in the Contract requirements, including additions or deletions in the Work; for unforeseen field conditions which will necessitate changes in the Work; changes in code provisions or other requirements of federal, state or local authority requiring changes in the Work; changes in the availability of products or for incorporating new products into the work and for changes directed by the Engineer for the benefit of the Owner.
- B. Authority to execute Change Orders shall be that of the Engineer and not of the Contractor. Changes Orders will, in general, originate by a "Change Order Proposal Request" or by issuance of a "Construction Change Authorization".
- C. Unless authorized by the Engineer, no work shall be performed that is involved in the change until a formal Change Order is issued.
- D. To initiate a Change Order, the Engineer will forward a Change Order proposal request describing the proposed changes and if required, include additional or revised drawings and specifications soliciting a formal quotation of cost and time to complete the proposed Change Order work. Upon reaching mutual agreement on the cost and time, the Engineer will sign his approval of the Change Order and submit it to the Contractor for his full signature of acceptance.

### 1.03 FIELD ORDERS

- A. The Engineer may, to avoid costly removal of, or alterations to, present on-going work, issue a Work Directive Change authorizing the Contractor to proceed, subject to later negotiation of the price of the change.

### 1.04 PRICE AGREEMENTS

- A. Prices agreed upon to cover the Change Orders may be either by mutual acceptance of a lump sum or by unit prices as stated in the Contract bid proposal or actual direct cost plus a percentage for overhead, profit and other expenses consistent with Section 00500 – Contract Agreement.
- B. Work done by a subcontractor entitles the General Contractor a percentage of the sum of the actual direct cost, not including the subcontractor's overhead and profit, consistent with Section 00500 – Contract Agreement.
- C. Method for computing the cost of the change shall be based on the net additional increase. No overhead and profit shall be deducted from prices for changes deleting work.
- D. The Change Order form document shall indicate the net adjustment (+/-) to the total Contract price as a result thereof including extension or reduction of time when applicable.

## PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01040

### COORDINATION

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements for coordinating the various parts of Work under this Contract.

##### 1.02 REQUIREMENTS

- A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion.
- C. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- D. Coordinate work with all utility companies necessary for completion of work under this contract.
  - 1. East Providence Water Department  
Jim Marvel  
401-435-7741
  - 2. Rhode Island Energy – Gas  
James Paulette  
401-465-8580
  - 3. Rhode Island Energy – Electric  
Patrick Ventre  
732-672-3359
  - 4. East Providence Wastewater Department  
Thomas Azevedo  
401-433-6363

E. Coordinate work with all other interested parties necessary for completion of work under this contract.

1. City of East Providence Public Works Department  
Daniel Borges, PE  
401-435-7701

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

## SECTION 01045

### CUTTING, CORING AND PATCHING

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements and limitations for cutting, coring and rough and finish patching of holes and openings in existing construction.

###### B. Related Sections

1. Section 01300 – Submittals

##### 1.02 SUBMITTALS

###### A. In accordance with Section 01300 submit written request in advance of cutting or alteration which affects the following:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

###### B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

###### C. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and secure his written permission and the required Change Order prior to proceeding.



## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Concrete and grout for rough patching shall be as specified in Division 3 of this Specification.
- B. Materials for finish patching shall be equal to those of adjacent construction.
- C. For replacement of items removed, use materials complying with pertinent sections of these specifications.
- D. Sealing cored holes in sewer manholes and other structures to be with a resilient seal similar to Kor-N-Seal made by National Pollution Control Systems, Inc., Nashua, NH or similar product.

## PART 3 EXECUTION

### 3.01 GENERAL:

- A. All cutting and coring shall be performed in such a manner as to limit the extent of patching.
- B. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved in writing to the Engineer. No structural members shall be cut without approval of the Engineer and all such cutting shall be done in a manner directed by the Engineer. No holes may be drilled in beams or other structural members without obtaining prior approval. All work shall be performed by craftsmen skilled in this type of work.
- C. If holes are cored through floor slabs they shall be drilled from below the slab.
- D. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match the color, texture and finish of existing surfaces as approved.

### 3.02 EXAMINATION

- A. Site Verification of Conditions
  - 1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
  - 2. After uncovering the work, inspect conditions affecting installation of new work.
  - 3. If uncovered conditions are not as anticipated, immediately notify the Engineer.

4. Do not proceed until unsatisfactory conditions are corrected.

### 3.03 PREPARATION

#### A. Protection

1. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.
2. Perform cutting and demolition by methods which will prevent damage to portions of the Work.

#### B. Surface Preparation

1. Provide proper surfaces to receive installation of repair and new work.

### 3.04 CORING:

- A. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.
- B. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.
- C. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.
- D. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

### 3.05 CUTTING:

- A. Cutting shall be performed with a concrete wall saw and diamond saw blades of proper size.
- B. Provide for control of slurry generated by sawing operation on both sides of wall.
- C. The cutting of a reinforced concrete wall shall be done so as not to damage the bond between the concrete and the reinforcing steel left in structure. The cut shall be made so that steel neither protrudes nor is recessed from face of the cut.
- D. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a release or toppling of cut area during sawing operations.
- E. Provide equipment of adequate size to remove cut panel.

### 3.06 FIELD QUALITY CONTROL

- A. In addition to other requirements specified, upon the Engineer's request uncover work to provide for inspection by the Engineer of covered work, and remove samples of installed materials for testing.
- B. Do not cut or alter work performed under separate contracts without the Engineer's written permission.

### 3.07 ADJUSTING

- A. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

END OF SECTION

## SECTION 01050

### FIELD ENGINEERING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Survey work and other field engineering responsibilities of the Contractor.

##### 1.02 REQUIREMENTS

- A. The Contractor shall be responsible for layout of the work and the establishing of lines and grades.
- B. Establish elevations, lines, levels, reference marks, batter boards, etc., required during the progress of the Work. Verify such marks by instrument to confirm accuracy.
- C. Locate and protect survey control and reference points.
- D. Make, check, and be responsible for all measurements and dimensions necessary for the proper construction of the Work.
- E. The Engineer will be permitted to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor. The Contractor shall correct any errors found in lines, elevations, reference marks, batter boards, etc. Such a check shall not be construed as approval of the Contractor's work and shall not relieve or diminish the responsibility of the Contractor for the accurate construction and completion of the Work.
- F. Control datum for survey as shown on Drawings.

##### 1.03 QUALITY ASSURANCE

###### A. Qualifications

- 1. Employ a Civil Engineer or Land Surveyor registered within the State of Rhode Island, acceptable to the Engineer.

###### B. Certifications

- 1. Submit certificate signed by the Contractor's Engineer or Land Surveyor stating elevations and locations of the Work are in conformance with the Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01060

### REGULATORY REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Building codes, Mechanical codes, and Electrical codes, Regulations, Permits and Fees applicable to the project.

##### 1.02 PERMITS BY CONTRACTOR

- A. The Contractor shall secure all necessary permits from the state, city or town authorities having jurisdiction, for digging of trenches in the streets or highways and all other building and construction operations requiring permits.

##### 1.03 CODES

- A. The Contractor shall conform to the requirements of and pay all fees imposed by local and State Building Authorities having jurisdiction over the Work. The Contractor is responsible to conform to all building, mechanical, electrical and plumbing code requirements.
- B. The Contractor shall conform to the latest requirements of the following codes:
  - 1. Federal, State and Municipal Laws
  - 2. Rhode Island State Building Codes, National Building Code Regulation SBC-1
  - 3. Rhode Island State Building Codes, Plumbing Code Regulation SBC-3
  - 4. Rhode Island State Building Codes, Mechanical Code Regulation SBC-4
  - 5. Rhode Island State Building Codes, Electrical Code Regulation SBC-5
  - 6. Any prevailing rules and regulations pertaining to adequate protection and/or guarding of any moving parts or otherwise hazardous locations.

##### 1.04 FEES

- A. The cost of all permits secured by the Contractor shall be borne by him and shall be considered as having been included in the price or prices stated in the Bid. Copies of all required permits shall be filed with the Engineer prior to starting work for which a permit is required.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01067

### STATE OF RHODE ISLAND AND FEDERAL REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. RHODE ISLAND SALES AND USE TAX
- B. HISTORICAL ARTICLES
- C. PREVAILING MINIMUM WAGE RATES
- D. EXCERPTS FROM RHODE ISLAND LAWS
- E. REQUIREMENTS FOR MINORITY BUSINESS ENTERPRISE, EQUAL OPPORTUNITY AND NONDISCRIMINATION

##### 1.02 RHODE ISLAND SALES AND USE TAX

- A. Materials and equipment purchased for installation under this Contract are exempt from the Rhode Island Sales Tax. The Contractor shall file for exemption on behalf of the Owner, with the State of Rhode Island Department of Taxation as required by law. The exemption from the Sales Tax shall be taken into account by the Contractor during bidding.

##### 1.03 HISTORICAL ARTICLES

- A. During the life of this Contract, the Contractor is herewith required to immediately notify the following organizations in the event that any articles such as "charcoal," "bone," "shell," "cultural objects - fire cracked stones or stone flaking material" or any other such related items of historical significance are discovered.
  - 1. Owner
  - 2. Local Historical Society
  - 3. Rhode Island Historical Commissioner
  - 4. Engineer

##### 1.04 PREVAILING MINIMUM WAGE RATES

- A. Local prevailing minimum wage rates apply to this project. It is the responsibility of the Contractor before bid openings to request, if necessary, any additional information on local prevailing Wage Rates for those tradespeople who are not covered by the applicable local Wage Decision, but who may be employed for the proposed work under this Contract.



- B. The attention of the Contractor is also directed to Specification Subsection 00700, 1.19 in regards to the requirements for certified payrolls. The Contractor shall routinely prepare and submit as a part of the required certified payrolls the "PRIME CONTRACTOR'S OVERALL PAYROLL CERTIFICATION" form.
- C. The Contractor is required to adhere to the requirements of the Davis-Bacon Act.

#### 1.05 EXCERPTS FROM RHODE ISLAND LAWS

- A. The Contractor and each of his subcontractors shall especially note his obligations to comply with the following statutes or excerpts therefrom and any current revisions thereof contained in the General Laws of Rhode Island.
- B. These laws reflect changes made through the end of the 1992 legislative session. While every attempt at accuracy has been made, these are not certified true copies of these laws. The responsibility for compliance with all applicable provisions of Rhode Island laws relating to bidding, award, and performance of public works contracts is the Contractor's. Certified true and complete copies of any Rhode Island laws and regulations may be obtained from the Office of the Rhode Island Secretary of State.

R.I.G.L.

Title, Chapter, Section                      EXCERPT

#### 5-6-2 WORK FOR WHICH LICENSE REQUIRED

"No person, firm, or corporation shall enter into, engage in, or work at the business of installing wire, conduits, apparatus, fixtures and other appliances for carrying or using electricity for light, heat or other purpose, unless such person, firm or corporation shall have received a license and a certificate therefore, issued by the State Board of Examiners of Electricians."

#### 28-26-6 LICENSE REQUIRED FOR OPERATION OF HOISTING MACHINERY - PUBLIC CONTRACTS

"No persons shall operate or be in direct charge of a hoisting or excavation gasoline, steam, diesel, electric or compressed air hoist, shovel, crane, excavator, of five horsepower or more without obtaining a license to do so as provided in this chapter. No user or agent of use of any such described steam, gasoline, diesel, electric or compressed air hoisting machinery shall permit it to be operated unless it is operated by a duly licensed person as hereinafter provided by this chapter.

Every contract in the construction of public works by the State, or by any City or Town, or by persons contracting therewith for such construction, shall contain a clause embodying the provisions of this section."

## Chapter 116

From Chapter 116 of the General Laws of Rhode Island, 1938, relative to the conditions precedent, etc., to carrying on business within this State by foreign corporations:

"The certificate and power of attorney mentioned in the General Corporation Law, properly filled out, subscribed and sworn to, and accompanied by a certified copy of the Charter, articles of association or other similar organization papers, together with all amendments thereto, must be filed in the office of the Secretary of State by all foreign corporations intending to carry on business within this State, or for a foreign corporation to enforce in the courts of this State any contract made within the State."

Detailed information regarding Chapter 116 of the General Laws of Rhode Island, 1938, relative to the conditions precedent, etc., to carrying on business within this State for foreign corporations may be obtained from the Secretary of State, State House, Smith Street, Providence, Rhode Island.

### 1.06 REQUIREMENTS FOR MINORITY BUSINESS ENTERPRISE, EQUAL OPPORTUNITY AND NONDISCRIMINATION

- A. Contracts for work under the bid (proposal) will obligate the contractors and subcontractors not to discriminate in employment practices.
- B. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotions, or transfers; recruitment or recruitment advertising, selection for training including apprenticeship; and participation in recreational and educational activities. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notice to be provided, setting forth the provisions of this non-discrimination clause. The Contractor will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Contract so that such provisions will be binding upon each subcontractor and upon subcontractors for standard commercial supplies or raw materials.
- C. The Contractor shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the Owner may require as consistent with Federal and State law.
- D. The Contractor agrees to comply with such rules, regulations, or guidelines as the State of Rhode Island may issue to implement these requirements. The Contractor further warrants that it will comply with, Title VI of the Civil rights Act of 1964, 42 U.S.C. 200d to d4.

- E. Contractors shall comply with the provisions of the General Laws of Rhode Island and attention is called to Title 37, Chapter 13, Section 1-16, relative to the payment of wages, obligations and charges by Contractors on public works projects. Non-resident Contractors are subject to Section 44-1-6 of the RI General Laws, as amended, regarding OUT-OF-STATE CONTRACTORS.
- F. The Contractor will be required to comply with Equal Opportunity Requirements and to abide by the prevailing wage rates for Public Works Projects for all employees on the job. It is the responsibility of contractors to inform themselves as to the local labor conditions, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of wage rates. Information is available at the Department of Labor.
- G. The attention of the Contractor is directed to the fact that this Contract is subject to both Federal and State requirements regarding Minority Business Enterprises (MBE) and Woman's Business Enterprises (WBE) participation. The Contractor hereby agrees to ensure compliance with all Federal and State MBE/WBE requirements to provide maximum opportunity for such participation.

## PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01090

### REFERENCE STANDARDS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Reference material, abbreviations, and terms used in the Construction Documents and establishes edition dates and complete titles for standards referenced elsewhere in the Specifications.

##### 1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Obtain copies of standards when required by Contract Documents.
- C. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

##### 1.03 SCHEDULE OF REFERENCES

|        |                                                                                                                                 |
|--------|---------------------------------------------------------------------------------------------------------------------------------|
| AA     | Aluminum Association<br>818 Connecticut Ave. N.W.<br>Washington, DC 20006                                                       |
| AASHTO | American Association of State Highway and Transportation<br>Officials<br>444 North Capitol Street, N.W.<br>Washington, DC 20001 |
| ACI    | American Concrete Institute<br>Box 19150<br>Reford Station<br>Detroit, MI 48219                                                 |
| AFBMA  | Anti-Friction Bearing Manufacturers Association                                                                                 |

|        |                                                                                                                               |
|--------|-------------------------------------------------------------------------------------------------------------------------------|
| AGC    | Associated General Contractors of America<br>1956 E Street, N.W.<br>Washington, DC 20006                                      |
| AGM    | American Gear Manufacturers Association                                                                                       |
| AI     | Asphalt Institute<br>Asphalt Institute Building<br>College Park, MD 20740                                                     |
| AISC   | American Institute of Steel Construction<br>400 North Michigan Avenue<br>Eighth Floor<br>Chicago, IL 60611                    |
| AISI   | American Iron and Steel Institute<br>1000 16 <sup>th</sup> Street, N.W.<br>Washington, DC 20036                               |
| AMCA   | Air Movement and Control Association<br>30 West University Drive<br>Arlington Heights, IL 60004                               |
| ANS    | American National Standard                                                                                                    |
| ANSI   | American National Standards Institute<br>1430 Broadway<br>New York, NY 10018                                                  |
| API    | American Petroleum Institute                                                                                                  |
| ARI    | Air-Conditioning and Refrigeration Institute<br>1501 Wilson Boulevard<br>Arlington, VA 22209                                  |
| ASCE   | American Society of Civil Engineers<br>345 East 47 <sup>th</sup> Street<br>New York, NY 10017                                 |
| ASHRAE | American Society of Heating, Refrigerating and<br>Air Conditioning Engineers<br>1791 Tullie Circle, N.E.<br>Atlanta, GA 30329 |

|           |                                                                                                                                                                                               |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASME      | American Society of Mechanical Engineers<br>345 East 47th Street<br>New York, NY 10017                                                                                                        |
| ASPA      | American Sod Producers Association<br>4415 West Harrison Street<br>Hillside, IL 60162                                                                                                         |
| ASTM      | American Society for Testing and Materials<br>1916 Race Street<br>Philadelphia, PA 19103                                                                                                      |
| AWG       | American or Brown and Sharpe Wire Gage                                                                                                                                                        |
| AWPA      | American Wood-Preservers' Association<br>7735 Old Georgetown Road<br>Bethesda, MD 20014                                                                                                       |
| AWS       | American Welding Society                                                                                                                                                                      |
| AWWA      | American Water Works Association<br>6666 West Quincy Avenue<br>Denver, CO 80235                                                                                                               |
| BIA       | Brick Institute of America<br>11490 Commerce Park Drive<br>Reston, VA 22091                                                                                                                   |
| CS        | Commercial Standard                                                                                                                                                                           |
| EJCDC     | Engineers' Joint Contract Document Committee<br>American Consulting Engineers Council<br>1015 15 <sup>th</sup> Street, N.W.<br>Washington, DC 20005                                           |
| FM        | Factory Mutual System<br>1151 Boston-Providence Turnpike<br>PO Box 688<br>Norwood, Massachusetts 02062                                                                                        |
| Fed Spec. | Federal Specification<br>General Services Administration<br>Specification and Consumer Information Distribution Section<br>(WFSIS)<br>Washington Navy Yard, Bldg. 197<br>Washington, DC 20407 |

|        |                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------|
| IBR    | Institute of Boiler and Radiator Manufacturers                                                               |
| ICBO   | International Conference of Building Officials<br>5360 S. Workman Mill Road<br>Whittier, CA 90601            |
| IPS    | Iron Pipe Size                                                                                               |
| JIC    | Joint Industry Conference Standards                                                                          |
| MIL    | Military Specification<br>Naval Publications and Forms Center<br>5801 Tabor Avenue<br>Philadelphia, PA 19120 |
| NASSCO | National Association of Sewer Service Companies<br>101 Wymore Road, Suite 521<br>Altamonte, FL 32714         |
| NBS    | National Bureau of Standards                                                                                 |
| NCMA   | National Concrete Masonry Association<br>PO Box 781<br>Herndon, VA 22070                                     |
| NCPWB  | National Certified Pipe Welding Bureau                                                                       |
| NEMA   | National Electrical Manufacturers' Association<br>2101 'L' Street, N.W.<br>Washington, DC 20037              |
| NFPA   | National Fire Protection Association<br>Battery March Park<br>Quincy, MA 02269                               |
| NPT    | National Pipe Thread                                                                                         |
| OS&Y   | Outside screw and yoke                                                                                       |
| PCA    | Portland Cement Association<br>5420 Old Orchard Road<br>Skokie, IL 60077                                     |

|             |                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------|
| SMACNA      | Sheet Metal and Air Conditioning Contractors' National Assoc.<br>8224 Old Court House Road<br>Vienna, VA 22180 |
| Stl. WG     | U.S. Steel Wire Washburn and Moen, American Steel and Wire<br>or Roebling Gage                                 |
| UL          | Underwriters' Laboratories, Inc.<br>333 Pfingston Road<br>Northbrook, IL 60062                                 |
| USS Gage    | United States Standard Gage                                                                                    |
| 125-lb. ANS | American National Standard for Cast-Iron Pipe Flanges and Flange                                               |
| 250-lb. ANS | Fittings, Designation B16.1-1975, for the appropriate class                                                    |

#### 1.04 EDITION DATES

- A. Reference to publications and reference material shall be understood to mean the latest edition, unless stated otherwise.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

NOT USED

END OF SECTION



## SECTION 01300

### SUBMITTALS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements for submission of schedules and shop drawings.

##### 1.02 PROGRESS SCHEDULE

- A. Within fourteen (14) calendar days after execution of the Contract Documents, the Contractor shall submit to the Engineer for review a construction progress schedule conforming to requirements specified. This schedule should show the proposed dates of commencement and completion of each of the various subdivisions of work required under this Contract and the anticipated monthly percentage of completion based on the total contract price. The Contractor shall be responsible for updating and/or revising this schedule whenever directed by the Engineer throughout the duration of the Contract.
- B. Special attention is directed to the requirement that the Contractor shall start the Work, as specified under this Contract, no later than thirty (30) calendar days after the execution of the Contract Documents, unless otherwise directed by the Owner. The Contractor shall comply with all pre-construction requirements as specified. The Owner reserves the right to delay the commencement of the Work or any part thereof if the specified requirements as determined by the Engineer have not been satisfied. The Owner further reserves the right to limit or, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest and/or safety to do so.
- C. The Contractor shall contact the appropriate town or city authorities concerning any public or semi-public events that may occur during the construction period that may affect construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delay, extra materials handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for delays caused by said restrictions.

##### 1.03 SHOP DRAWINGS

- A. Submit six (6) copies of all shop and working drawings of concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.

- B. A maximum of two (2) submittals of each shop drawing will be reviewed by the Engineer. If more submittals are required due to the Contractor's neglect or failure to fulfill the requirements of the Contract plans and specifications, or to make corrections or modifications required by the Engineer in the review of the first two submittals, the Engineer will review the submittal and the Contractor will be responsible for the cost of the review, as determined by the Owner based on the Engineer's documentation of time and rates for additional services established in the Engineering Agreement between the Owner and the Engineer.
- C. If resubmittals on shop and working drawings are required, the Engineer will retain three (3) copies and three (3) copies will be returned to the Contractor. When resubmittals are returned to the Engineer, six copies of the complete submittal shall again be required.
- D. Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When the dimensions are of particular importance, or when specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.
- E. When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings.
- F. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings to eliminate delay to the Work due to the absence of such drawings. All shop and working drawings must be submitted to the Engineer within thirty (30) calendar days prior to incorporation into the Work, unless otherwise permitted by the Engineer. **Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals.** The schedule shall identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. Prior to and during the progress of the Work the schedule shall be revised and resubmitted as requested by the Engineer.
- G. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- H. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which review is required.

- I. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24 inch by 36 inch sheets, except those which are made by changing existing standard shop and working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitable numbered. Submitted shop drawings shall be accompanied by a letter of transmittal, completed by the Contractor as approved by the Engineer.
- J. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.
- K. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.
- L. The review of shop and working drawings by the Engineer will be general only, and nothing contained in this Section shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance as specified. The Contractor shall be responsible for errors and omissions in shop drawings.
- M. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires, appurtenances, or layouts etc., either existing or as detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do the work necessary to make such modifications.
- N. The Contractor shall furnish additional copies of shop drawings or catalog cuts when so requested.

## PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01400  
QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Contractor's quality control of products, suppliers, manufacturers, services, site conditions, and workmanship, to produce Work of specified quality.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Comply fully with manufacturers' instructions, including each step in sequence.
- B. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- D. Perform work by persons qualified to produce workmanship of specified quality.
- E. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.03 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified to be removed, clear area only after field sample has been accepted by the Engineer.

1.04 CERTIFIED WELDERS

- A. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required.

- B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Engineer before any work is preformed.
- C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

## PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01410

### TESTING LABORATORY SERVICES

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Qualification, duties and responsibilities of testing laboratories.
2. Coordination and scheduling responsibilities of the Contractor.

###### B. Related Sections

1. Section 01600 - Materials and Equipment

##### 1.02 PAYMENT PROCEDURES

###### A. Initial Testing

1. Testing will be performed as required by the Engineer.

###### B. Retesting

1. When initial tests indicate noncompliance with the Contract Documents, subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency.

###### C. Contractors Convenience Testing

1. Inspecting and testing performed exclusively for the Contractor's quality control purpose and for conformance with the specifications shall be the sole responsibility of the Contractor.

##### 1.03 REFERENCES

###### A. American Society for Testing and Materials (ASTM)

1. E329, Agencies Engaged in Construction Inspection and/or Testing

##### 1.04 REQUIREMENTS

###### A. Work included:

1. Cooperate with the Owner's selected testing agency and all others responsible or testing and inspecting the Work.
2. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.
3. Where no testing requirements are described, but the Owner directs testing, the Contractor shall provide testing under the requirements of this Specification.

B. Work not included:

1. Selection of testing laboratory: The Owner will select a qualified independent testing laboratory.

## 1.05 QUALITY ASSURANCE

A. Qualifications

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Regulatory requirements

1. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.
2. Regulatory Requirements Inspections and tests required by codes or ordinances, or by a plan approved authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600 - Materials and Equipment.

- B. Promptly process and distribute, to the Engineer, required copies of test reports and instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

## 1.07 SCHEDULING

A. Establishing schedule

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within the construction schedule.
3. Coordinate testing activity with the appropriate testing laboratory.

B. Revising schedule

1. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule

1. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Site Tests

1. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
2. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.
3. Sieve and Proctor analysis are required for all in-situ aggregate to be used in the Work. Sieve and Proctor analysis to be stamped and signed by a Professional Engineer registered in the State of Rhode Island.
4. Sieve analysis are required for all aggregate and soils delivered to the job site to be used in the Work. Sieve analysis to be stamped and signed by a Professional Engineer registered in the State of Rhode Island. Contractor responsible for sieve analysis for this purpose.
5. Sample all imported soils and aggregates at a minimum frequency of one (1) per one thousand cubic yards each to verify materials free of contamination. The material shall be tested for the following: volatile organic compounds (VOC's) (EPA method 8260), Poly-Nuclear Aromatic Hydrocarbons (PAH's) (EPA method 8270), total Petroleum Hydrocarbons ((TPH), and RCRA 8 Metals.
6. If identified by Engineer and based on results of field testing, soil compaction testing for paved areas shall be performed for every 3,000 square feet of roadway



or parking lot, minimum. Soil compaction testing to be performed for every 50 linear feet of excavated trench repair.

7. Asphalt compaction testing each day permanent bituminous concrete is placed. Testing shall be provided for every 3,000 square feet of roadway or parking lot, minimum.

END OF SECTION

## SECTION 01560

### TEMPORARY CONTROLS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements for cleaning, maintenance of the site, barriers and fences required during construction.

##### 1.02 CLEANING DURING CONSTRUCTION

- A. Unless otherwise specified under the various trade Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.
  - 1. Control accumulation of waste materials and rubbish; periodically dispose of off-site. Bear all costs, including fees resulting from disposal.
  - 2. Clean interior areas prior to start finish work and maintain areas free of dust and other contaminants during finishing operations.
  - 3. Maintain project in accordance with all local, State and Federal Regulatory Requirements.
  - 4. Store volatile wastes in covered metal containers, and remove from premises.
  - 5. Prevent accumulation of wastes that create hazardous conditions.
  - 6. Provide adequate ventilation during use of volatile or noxious substances
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - 1. Do not burn or bury rubbish and waste materials on site.
  - 2. Do not dispose or volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 3. Do not dispose of wastes into streams or waterways.
  - 4. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
  - 5. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
  - 6. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and wind-blown debris, resulting from construction operations.

7. Provide on-site containers for collection of waste materials, debris, and rubbish.
8. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas off the construction site.
9. Handle material in a controlled manner with as little handling as possible. Do not drop or throw materials from heights.
10. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.
11. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
12. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc. shall, upon completion of the work, be left in a clean and neat condition.

#### 1.03 DUST CONTROL

- A. Provide adequate means for the purpose of preventing dust caused by construction operations throughout the period of the construction contract.
- B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions or performance obligations of the General Contractor.

#### 1.04 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts for clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Construct sediment control devices for discharge from dewatering trenches.

G. Construct all sedimentation control devices shown on the plans.

#### 1.05 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with Silencers, and power equipment with mufflers.

2. Manage vehicular traffic and scheduling to reduce noise.

#### 1.06 POLLUTION CONTROL

A. Special care shall be taken to prevent contamination or muddying up or interfering in any way with the stream flows, if any along the line of work. No waste matter of any kind will be allowed to discharge into the stream flows or impounded water of any pools or other bodies of water.

#### 1.07 SURFACE WATER CONTROL

A. Take all precautions to prevent damage to the work or equipment by high waters or by storms. The Engineer with the approval of the Owner may prohibit the carrying out of any work at any time when in his judgement, high water or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress.

B. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Engineer may require, at no additional expense to the Owner.

#### 1.08 BARRIERS AND ENCLOSURES

A. Fences and Barricades

1. Provide and maintain temporary fences, barriers, lights, guardrails, and barricades as indicated in the Contract Documents, or as necessary to secure the Work and adjacent property, and protect persons and property.

2. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate tasks requiring items mentioned herein.

B. Protection of Trees

1. The Contractor shall take care not to harm trees along the sides of roads or within the existing facility in which the construction work is to be done or trees on adjacent lands except as indicated on the drawings or with the written permission of the Owner and any other owner of the trees involved. Care shall be taken not to cut tree roots so as to harm the growth of trees to remain.
2. If, in the opinion of the Engineer, any trees damaged during construction can be repaired, the Contractor shall satisfactorily repair same at no further cost to the Owner.
3. If, in the opinion of the Engineer, any tree damaged during construction cannot be repaired and should be removed, the Contractor shall satisfactorily remove and replace, in kind, same at no further cost to the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01570

### TRAFFIC REGULATIONS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements for traffic control for the duration of the Contract.

##### 1.02 REFERENCES

- A. This specification includes requirements of additional specifications as listed. The Contractor shall perform the Work in accordance with requirements of the referenced specification in addition to the requirements of this Specification Section 01570.
- B. The Contractor shall obtain and familiarize himself with all requirements of these specifications.
  - 1. Rhode Island Department of Transportation Standard Specification for Road and Bridge Construction, including all addenda issued by the State of Rhode Island Department of Public Works. (referred to as the Standard Specification).
  - 2. The most recent version of the Manual on uniform Traffic Control Devices (MUTCD)

##### 1.03 PERFORMANCE REQUIREMENTS

- A. Contractor shall have the sole responsibility for the maintenance and protection of traffic.
- B. An authorized representative of the Contractor shall be available on a 24-hour basis for the duration of the Contract for the purpose of correcting construction related impediments or hazards.

##### 1.04 SUBMITTALS

###### A. Shop Drawings

- 3. In accordance with SECTION 01300 – SUBMITTALS, submit a traffic plan delineating requirements of this section, the Contract Drawings, and the City of East Providence requirements.
- 4. Traffic control plans shall detail all typical work zones and detours.

## 1.05 SITE CONDITIONS

- A. Replace at no cost to the City of East Providence pavement markings, legends and lane arrows removed or damaged by the construction operation.
- B. Restore temporary detours to original condition.
- C. Replace traffic signal loops damaged during construction within 72 hours.

## 1.06 SCHEDULING

- A. There shall be no time limitations on construction operations except those hours and locations where noise regulations may apply and except as required for the maintenance of traffic as required by the City of East Providence.
- B. Keep closing of travel lanes to a minimum.
- C. Notify Town departments 48 hours prior to construction operations on travel ways.
  - 1. Police Department
  - 2. Fire Department
  - 3. Department of Public Works

## PART 2 PRODUCTS

### 2.01 TRAFFIC CONTROL DEVICES

- A. In accordance with the Standard Specification.

## PART 3 EXECUTION

### 3.01 INSTALLATION OF TRAFFIC CONTROL DEVICES

- A. In accordance with the Standard Specification.

### 3.02 PROTECTION OF TRAFFIC

- A. Barricade trenches and roadway excavations at the end of each work period with temporary precast concrete barriers, properly lighted and marked to guide traffic to designated travel lane. Or other means acceptable to the Engineer and approved on the Traffic Plan.

- B. Maintain and protect traffic movements for the entire length of the project.
- C. Keep one lane of traffic open at all times except for brief stoppages dictated by the construction operation involving safety of vehicles in the travel lanes.
- D. Maintain access to business and private ways during construction operations as much as possible. The contractor shall coordinate access to private ways and parking restrictions within the roadways with the DPW Director, the resident engineer and the residents adjacent to the project prior to commencing work within the neighborhood block.
- E. Furnish sufficient number of signs, temporary precast concrete barriers, warning lights, drums and traffic cones to warn traffic of construction and guide traffic through the construction area.

### 3.03 TRAFFIC PERSONS

- A. Contractor shall procure the service of uniformed traffic persons as required to perform construction while safely managing the movement of non-construction traffic through active project areas. Contractor shall be responsible for determining the need for uniformed traffic persons over the course of the project, and shall schedule traffic persons in a timely fashion in advance of when said traffic persons will be needed.
- B. Traffic persons shall be City of East Providence police officers, unless otherwise authorized or required.
- C. Traffic persons used by the Contractor shall be compensated directly by the City of East Providence, based on the number of hours actually worked (both straight time and overtime) and the corresponding hourly rates for each time classification. Contractor shall be responsible for tracking or verifying hours worked by traffic persons on the project.
- D. The intent is to insure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open trenches.
- E. Nothing contained herein shall be construed as relieving the Contractor of any of his responsibilities for protection of persons and property under the terms of the Contract.

END OF SECTION



## SECTION 01600

### MATERIALS AND EQUIPMENT

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for delivery, storage, handling and installation of systems, materials, manufactured units, equipment, components, and accessories used in the work.

###### B. Related Sections

1. Section 01300 - Submittals

##### 1.02 DELIVERY

- A. Refer to Specifications' Sections for requirements pertaining to delivery and handling of materials and equipment.
- B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry.
- C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.
- D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

##### 1.03 STORAGE AND PROTECTION

- A. Refer to Specifications' Sections for requirements pertaining to storage and protection of materials and equipment.
- B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.
- C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

- D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- E. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

#### 1.04 INSTALLATION STANDARDS

- A. Comply with Specifications and referenced standards as minimum requirements.
- B. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.
- C. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.
- D. Perform work by persons qualified to produce workmanship of specified quality.
- E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- F. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300 - Submittals, distribute copies to persons involved, and maintain one set in field office.
- G. Perform work in accordance with details of instructions and specified requirements.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01700

### CONTRACT CLOSE-OUT

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements for specific administrative procedures, record keeping, close-out submittals, and forms used at substantial and final completion of the Work.
- B. Contractor shall satisfy all administrative requirements within the Contract Documents and the Requirements listed in this section prior to Contract Close-out.

##### 1.02 FINAL CLEANING

- A. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- B. The Contractor shall restore or replace, when and as directed, any public or private property damage by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required, all necessary highway or driveway, walk and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.
- C. Unless otherwise specified under the various Sections of the Specifications, the Contractor shall perform final cleaning operations as herein specified prior to final inspection.
- D. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.
- E. Cleaning shall include all surfaces, interior and exterior in which the Contractor and all Subcontractors have had access whether existing or new.

- F. Refer to Sections of the Specifications for cleaning of specific products or work.
- G. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
- H. Use only those cleaning materials and methods that are recommended by the manufacturer of surfaces material to be cleaned.
- I. Employ experienced workmen, or professional cleaners, for final cleaning operations.

### 1.03 PROJECT RECORD DOCUMENTS

- A. Project Record Documents also referred here as As-Built Drawings shall consist of all the contract drawings.
- B. The Contractor and all Subcontractors shall be required to maintain one set of As-Built Drawings, as the work relates to their Sections of the Specifications, at the site.
- C. As-Built Drawings shall be stored and maintained in the General Contractor's field office apart from other documents used for construction. The As-Built Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.
- D. As-Built Drawings shall be available at all time for inspection by the Engineer. All deficiencies noted shall be promptly corrected.
- E. The following information shall be indicated on the As-Built Drawings for storm drain construction:
  - 1. Rim elevations on inlets, catch basins, manholes and other structures.
  - 2. Invert elevations of all pipes within inlets, catch basins, manholes, end sections, headwalls, culverts and other structures.
  - 3. Linear distance along drain from structure to structure, and branch connections, including size and type of pipe.
  - 4. Recalculated pipe slopes based on as-built elevations.
  - 5. Location of manholes, inlets, catch basins, outlets, headwalls, other structures and service line connections with 3 swing ties.
- F. At the end of each month and before payment for materials installed, the Contractor, and his Subcontractors, shall review As-Built Drawings for purpose of payment. If the changes in location of all installed elements are not shown on the as-built drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.

- G. At the completion of the contract, each Subcontractor shall submit to the Contractor a complete set of his respective As-Built Drawings indicating all changes. After checking the above drawings, the Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the As-Built Drawings to the Engineer.

#### 1.04 WARRANTIES

- A. Comply with requirements of Section 01740 Warranties.

#### 1.05 FINAL INSPECTION

- A. The Contractor shall submit written certification that:

1. Project has been inspected for compliance with Contract Documents.
2. Equipment and systems have been tested in the presence of the manufacturer's representative and are operational and satisfactory.
3. Project is completed, and ready for final inspection.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01740

### WARRANTIES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. General administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

##### 1.02 SUBMITTAL

- A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than a date of Substantial Completion for the Work, or a designed portion of the Work, submit written warranties upon request of the Owner.
- B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner prior to acceptance of this portion of the Work.
- C. Refer to individual Sections of Division 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

##### 1.03 WARRANTY REQUIREMENT

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
- E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.
- F. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

#### 1.04 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

NOT USED

END OF SECTION

## SECTION 01800

### MAINTENANCE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Procedures for maintaining work completed under this Contract.

##### 1.02 MAINTENANCE PERIOD

- A. The general maintenance period for all construction or materials under this Contract shall be one (1) year subsequent to the date of the acceptance of the work by the Owner, or as provided by other sections of this Specification.
- B. If the Owner puts any structure or equipment to use prior to acceptance of all work under the Contract, the maintenance period for such structures or equipment shall be calculated from the time use begins.
- C. Contractor agrees to replace the material which does not conform to the Contract requirements, and to repair any damage of material or work without cost to the Owner, to satisfaction of Engineer, in conformance with Contract Documents provided orders for replacement and/or repairs are received in writing by the Contractor within the one year period.
- D. This Section shall in no way limit the duration of the Contractor's responsibility for the correction of any defect due to workmanship or materials provided by the Contractor which are not in compliance with the Contract Documents.

##### 1.03 ABUSE OF WORK

- A. Contractor is not obligated to perform work of replacement or repair that he may prove is required because of abuse by parties other than the Contractor, after the date the Owner puts to continuous use the work requiring replacements or repair, or after date the Owner has approved the Certificate of Completion.

##### 1.04 EMERGENCY REPAIRS

- A. If the Owner deems necessary, the Owner shall order replacement or repairs be undertaken within 24 hours.



- B. If the Contractor delays or fails to make the ordered replacement or repairs within the time specified, the Owner shall have the right to make such replacements or repairs and the expense shall be deducted from moneys due the Contractor, or moneys of the Contractor retained by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

## **DIVISION 2**

## SECTION 02140

### DEWATERING

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for designing, furnishing, installing, maintaining, operating and removal of temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction.
2. Requirements for disposing of pumped water.

###### B. Related Sections

1. Section 02200 – Earth Excavation, Backfill and Grading

##### 1.02 DEFINITIONS

- A. Dewatering: Lowering the zone of saturation and intercepting groundwater seepage which would otherwise emerge from the slopes or bottom of the excavations. The purposes of dewatering are to increase the stability of excavated slopes; prevent loss of material from beneath the slopes or bottom of the excavation; improve the excavating and hauling characteristics of on site soil; prevent rupture or heaving of the bottom of an excavation; and dispose of pumped water. In addition, dewatering is required to place and compact structural fill.

##### 1.03 DESIGN REQUIREMENTS

- A. The Contractor is responsible for the adequacy of the dewatering system.

###### B. Design dewatering systems to:

1. Effectively reduce the hydrostatic pressure and lower the groundwater levels to a minimum of 2 feet below excavation in soil;
2. Develop a substantially dry and stable subgrade for the protection of subsequent operations;
3. Result in no damage to adjacent buildings, structures, utilities and other work, included in this contract.
4. Depressurize stratified layers of sand that may be confined by silt layers so that a stable excavation bottom is maintained.

- C. Methods may include sump pumping, single or multiple stage well point or jet eductor well point systems, deep wells, or combinations thereof.

- D. Locate dewatering facilities where they will not interfere with existing utilities, facilities and/or construction work to be done under this Contract.

- E. Contractor is responsible to obtain all necessary permits from state and local authorities regarding the operation and discharge of the dewatering system, and to conduct all necessary sampling and testing that may be required by those authorities.

#### 1.04 SUBMITTALS

##### A. Shop Drawings

1. In accordance with Section 01300 submit the following prior to dewatering system installation:
  - a. Proposed system components.
  - b. Operational plan to include locations and depth of components.
  - c. Method of disposal of pumped water, including method of insuring proper sediment removal should upset in dewatering system occur.
2. Provide test pit data.
  - a. Depth
  - b. Soil material encountered
  - c. Depth to groundwater
  - d. Depth to sewer

##### B. Quality Assurance/Control Submittals

1. In accordance with Section 01300 submit the following:
  - a. Dewatering systems to be designed under the direct supervision of a professional Civil Engineer registered in the state which the work is to be done.
  - b. Complete Certificate of Design at the end of this section.
  - c. Provide documentation demonstrating ability and experience of installing contractor for the type of conditions under this contract.
  - d. Names, addresses and telephone numbers of supervisory personnel actively involved in at least five successful projects requiring dewatering.

#### 1.05 PROJECT/SITE CONDITIONS

##### A. Environmental Requirements

1. Dispose of all pumped water in accordance with all U.S. Environmental Protection Agency, Rhode Island Department of Environmental Management (RIDEM), and City of East Providence requirements.

##### B. Existing Conditions

1. Groundwater surface is subject to fluctuations during periods of heavy precipitation.
2. Conduct test pits during the initial phases of work to determine soil conditions.

#### PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

### 3.01 SITE PREPARATION

#### A. Surface Drainage

1. Construct dikes, ditches, pipe lines, sumps or other means to intercept and divert precipitation and surface water away from excavations.

#### B. Drainage of Excavated Areas

1. Construct dikes, ditches, pipe lines, sumps or other means to collect surface and seepage water which may enter the excavation.
2. Discharge water through settling basins or method approved by Engineer when water is to be deposited into an existing watercourse.

### 3.02 INSTALLATION

- #### A. Advise Engineer of changes made to Operation Plan as submitted under article 1.05 of this section, made to accommodate field conditions.

### 3.03 MONITORING

- #### A. Observe and record daily the elevation of the groundwater during the length of the dewatering operation and provide data to Engineer on daily basis.

### 3.04 OPERATION

- #### A. Operate dewatering systems to lower the groundwater level in excavations allowing all subsequent work to be done on a stable dry subgrade.
- #### B. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, to prevent further damage. Modifications made at no additional expense to the Owner.
- #### C. Maintain the water level a minimum of two (2) feet below subgrade or at lower elevation to eliminate hydrostatic pressure on structures.
- #### D. Prevent disturbance of foundation soils and loss of ground as water is removed.
- #### E. Notify the Engineer of disturbance to the foundation soils caused by an interruption or inadequacy of the dewatering system.
- #### F. Maintain on site, auxiliary equipment to operate the dewatering system continuously while excavations are opened below elevation of final grade.

### 3.05 DISPOSAL OF WATER

- #### A. Discharge water in a manner that will not cause erosion, flooding, damage to existing facilities, completed Work or adjacent property, improved or otherwise.

### 3.06 REMOVAL

- A. Remove all material and equipment from the site upon completion of dewatering operations.
- B. Seal all dewatering wells upon completion of the dewatering by pressure injecting a grout capable of sealing the wells and preventing leakage.

END OF SECTION

CERTIFICATE OF DESIGN

Re: Contract Between

OWNER: \_\_\_\_\_  
(Name)

and  
CONTRACTOR: \_\_\_\_\_  
(Name)

on  
CONTRACT: \_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Number) Dated: \_\_\_\_\_

Contractor hereby certifies that \_\_\_\_\_  
(Designer)

1. Is licensed or registered to perform professional engineering work in the state of \_\_\_\_\_  
(Location of Project)
2. Is qualified to design the \_\_\_\_\_  
(Item)  
specified in Section \_\_\_\_\_ of the subject contract;
3. Has designed \_\_\_\_\_ before;
4. Has prepared the design in full compliance with the applications and requirements of  
Section \_\_\_\_\_ of subject contract including all applicable laws, regulations, rules and  
codes; and
5. The work has been signed and sealed pursuant to the applicable state law.

FOR: \_\_\_\_\_  
(Contractor)

BY: \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Name and Title) Dated: \_\_\_\_\_

## SECTION 02149

### MAINTAINING EXISTING SEWAGE FLOW

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements to maintain existing flow and implement and complete all flow diversions and/or bypass pumping required to complete all Work.

##### 1.02 SYSTEM DESCRIPTION

###### A. Performance Requirements

1. It is essential to the operation of the existing sewerage system that there be no interruption of the wastewater flow throughout the duration of this project. An interruption shall be considered to be, but may not be limited to, any condition that in the sole opinion of the Engineer adversely affects or alters operation of the existing sewage system and/or any other portion or component of the existing sewerage treatment and collection system including the associated flows; allows the level of sewage flow to increase, rise, collect, surcharge and/or overflow existing facilities in any manner; or results in any operational or permit violations being issued to the Owner.
2. The Contractor shall provide, maintain, and operate temporary facilities such as dams, bulkheads, pumping equipment (both primary and backup units as required), conduits, electrical power, and all other labor and equipment to intercept and maintain the existing sewage flow before it reaches the point where it would interfere with his work, carry it past his work, and return it to the existing facilities beyond his work.
3. **The Contractor is responsible for measuring flows prior to beginning work in the area and sizing bypass equipment accordingly.** The Contractor's attention is directed to the fact that the existing wastewater flow can be affected by high groundwater and rainfall. Increases in normal flow should be expected during high groundwater seasons and periods of wet weather. The Contractor should therefore take all precautions necessary including monitoring weather forecasts to fully accommodate, control and sufficiently handle the increased flow during periods of wet weather and/or storms as well as periods of normal flow.
4. The Engineer may prohibit the carrying out of work at any time when, in his sole judgment, increased flow conditions are unfavorable or not suitable, or at any



time, regardless of the existing flows, when proper precautions are not being taken to safeguard the existing sewerage system, previously constructed work, work in progress and/or the general public.

5. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Owner may require, at no additional expense to the Owner.

### 1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Submit detailed plans and descriptions outlining all provisions and precautions to be taken regarding the control and handling of existing sewage flows. Submission shall include such items as schedules, locations, elevations, capacities of equipment, materials, traffic maintenance plans, and all other incidental items necessary and/or required by the Owner to insure proper protection of the facilities and compliance with the requirements herein specified.
2. Submit detailed proposal for noise prevention measures for review of at least 30 consecutive calendar days prior to anticipated usage.
3. Qualifications as described herein.
4. Submit shop drawings for all pumping, piping and appurtenances for type and size of equipment required to perform the flow diversion and/or bypass pumping work as required herein.
5. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall proposal and/or operations without claim, should the Engineer deem it to be in the Owner's or the public's best interest to do so.

### 2.02 QUALITY ASSURANCE

A. Qualifications

1. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor who can demonstrate to the Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of similar size and complexity in wastewater applications performed by his firm within the past three (3) years within New England. The bypass system shall meet the requirements of codes and regulatory agencies having jurisdiction.

## B. Pre-Installation Meeting

1. Contractor shall schedule and attend a pre-installation meeting with the vendor, Owner and Engineer prior to installation of by-pass system.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. At a minimum, all equipment shall be supplied in duplicate for emergency situations. Provide adequate on-line backup facilities so that no interruption in service is encountered. Equipment and installation are subject to the approval of the Owner and the Engineer.

### 2.02 PUMPING SYSTEM(S)

- A. All pumping units (primary and secondary) and appurtenances shall be sized properly to handle the flows encountered including increased flows due to wet weather.

### 2.03 PIPING SYSTEM(S)

- A. All piping systems (primary and secondary) and appurtenance shall be sized properly to handle the flows encountered including increased flows due to wet weather.

### 2.04 POWER GENERATING FACILITIES

- A. Include power generating facilities capable of providing all power necessary to operate any primary and secondary pumping systems.
- B. Maintain facility to be ready for use if required.

### 2.05 NOISE PREVENTION

- A. Noise prevention measures for all equipment shall be used to insure minimum noise impact or surrounding areas.
- B. Measures may include but shall not be limited to enclosures, insulation, electric pumping units, and hospital grade silencers or mufflers.
- C. Noise levels shall be maintained such that increase shall not exceed 10 dBA over background at the nearest property line.
- D. Should at any time prior to or during the performance of above mentioned work, the Engineer determines the noise prevention measures being used are not adequate, the

Contractor shall at no additional cost to the Owner suspend all work until acceptable measures are incorporated.

## PART 3 EXECUTION

### 3.01 ADVANCE NOTICE

- A. Contractor shall provide Town sufficient information to provide press releases. Information shall include schedule for various areas and outline of the program, with specific attention to what can be expected to take place.
- B. Contractor shall provide door to door notification within 24 hours before work begins. Notification shall include time and duration of service interruption, if any.

### 3.02 PUBLIC SAFETY AND CONVENIENCE

#### A. General

- 1. The Contractor shall at all times keep the streets, highways, roads, driveways, parking lots, private walks, and public sidewalks open for pedestrian and vehicular traffic unless otherwise authorized by the Owner/Engineer.

#### B. Public Travel Ways

- 1. Any authorized temporary closure of any streets, highways or roads shall be coordinated with the local Fire, Police and/or Department of Public Works as required by the municipality.

#### C. Municipal, Commercial and Private Property

- 1. Any authorized, temporary closure of any municipal, commercial or private driveway or access route will require the Contractor provide 48 hour notice to abutters of the temporary restriction of access to their property. The Contractor will make every attempt to schedule his work with as little inconvenience to the property owner as possible

### 3.03 INSTALLATION

- A. Keep the Engineer advised at all times of any changes made to the overall operation(s) to accommodate field conditions.
- B. Flow diversions and/or bypass pumping shall be maintained at all times as long as it is necessary to maintain the flow through the limits of the project during construction.
- C. Maintain auxiliary and/or emergency equipment at the site to continue flow diversion and/or by-pass pumping operations in the event of a breakdown and/or loss of normal power.

- D. No work shall begin until all provisions and requirements of this Section have been reviewed and approved by the Engineer.
- E. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall activities and/or operations at any time without claim should the Engineer deem it to be in the Owner's or the public's best interest to do so.

END OF SECTION

## SECTION 02160

### EXCAVATION SUPPORT

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The Contractor shall properly design and furnish all labor and materials necessary and shall construct complete, all sheeting, bracing supports, and appurtenances required to perform the Work including sheet piling for construction of structures and buildings, trench support and cofferdams, permanent and temporary alike, as indicated on the Drawings and specified or as otherwise directed by the Engineer or required by agencies having jurisdiction over the Work.
- B. Wood timber or steel sheeting shall be used except where otherwise indicated, specified or directed by the Engineer and agencies having jurisdiction over the work.

##### 1.02 DESIGN RESPONSIBILITY

- A. The Contractor shall be fully responsible for providing complete and adequately designed sheeting as required and/or directed by the Engineer in accordance with the provisions set forth herein. The sheeting shall be designed to resist hydrostatic pressures in accordance with the Contractor's dewatering design.
- B. The Contractor shall engage, at his own expense, the services of a fully competent and qualified Professional Engineer, hereinafter referred to as the "Contractor's Engineer", registered in the State in which the Work is being constructed, for the design of all sheeting requirements to accomplish the Work specified, and for supervising the proper on-site installation associated therewith. The Contractor's Engineer shall be acceptable to the Engineer and demonstrate a minimum of ten (10) years documented experience in the field of sheeting design and implementation. Prior to the actual employment of the Contractor's Engineer, the Contractor shall submit to the Engineer, to the full extent deemed necessary, a detailed resume stating the Contractor's Engineer's professional qualifications, related experience and references, and if requested, examples of work similar to that required for the Work specified, for a general review by the Engineer and a means of documenting the requisite experience hereinbefore specified. Only after a satisfactory review of the Contractor's Engineer's overall qualifications by the Engineer in fulfillment of the requisite experience hereinbefore specified shall the Contractor finalize such employment and begin the design aspects of the Work.
- C. The Contractor's attention is directed to the fact the acceptance of the Contractor's Engineer and/or his/her qualifications by the Owner and/or Engineer shall not be an overall approval of the Contractor's Engineer nor the sheeting designs and methods of installation employed during the Work. It being understood that all sheeting requirements necessary to accomplish the Work specified and/or indicated on the Drawings shall be designed by and installed under the direct supervision of the Contractor's Engineer who shall ultimately and fully bear the responsibility for that Work.

### 1.03 QUALITY ASSURANCE

- A. The Contractor's Engineer shall provide and maintain throughout the sheeting installation and/or Work sufficient supervision and technical guidance to the Contractor for proper sheeting materials, equipment, operations and methods to the extent necessary to assure strict compliance with the Contractor's Engineer's design, all safety procedures and standard requirements for such Work, and the successful completion of the Work. Failure to provide and/or maintain such supervision and/or technical guidance during the Work shall in no way relieve the Contractor's Engineer and/or the Contractor from their overall responsibilities and obligations under the Contract, nor shall it be a basis for any claim by either against the Owner and/or Engineer.
- B. The Contractor and Contractor's Engineer shall fully indemnify and save harmless the Owner and Engineer and their agents, employees and representatives, from and against any and all claims as stipulated under the Agreement, whether directly or indirectly arising out of, relating to or in connection with the Work.
- C. Quality assurances and proper safety procedures must be maintained at all times and be in strict accordance with the Contractor's Engineer's requirements and consistent with all federal, state and local regulatory agencies having jurisdiction over the Work. Should any conflict in requirements, regulations, restrictions or codes exist between that which is specified by the Contractor's Engineer and any federal, state or local agency, the more stringent application shall prevail.

### 1.04 PRODUCTS AND DESIGN CRITERIA

- A. The overall sheeting design, quality of materials and methods of installation for all sheeting applications necessary to accomplish the Work specified shall be consistent with the established standards of the construction industry and must, as a minimum, comply with the requirements for earth support systems for excavations as defined by current US Department of Labor, Occupational Safety and Health Act (OSHA) regulation applicable thereto, and any other federal, state and local agencies having jurisdiction and/or requirements pertaining thereto including Building Code requirements for the State in which the work is being performed. The design and implementation thereof shall be in accordance with sound engineering practice and modern accepted principles of soil mechanics, and shall include the effects of hydrostatic forces and all surcharge loads which may be reasonable anticipated. The methods employed shall be to the extent necessary to permit the proper and satisfactory installation and construction of the Work specified; to withstand all loads and forces encountered; to provide soil restraint and control of water as required; to insure the safety of the workers and all other personnel on or near the site; to prevent injurious caving or erosion, or loss of ground; to maintain at all times proper and safe pedestrian, vehicular traffic on public and private streets, property and rights-of-way; and to stabilize unforeseen areas of work encountered during the execution of the Work as deemed necessary by the Owner and/or Engineer.
- B. The Contractor and Contractor's Engineer's attention is directed to the fact that should any additional investigations, subsurface explorations and/or other appurtenant information be required to fulfill the needs of this design, as determined by the Contractor's Engineer above and beyond that which is already provided under these Contract Documents, the Contractor shall obtain all such information and data required at his own expense.

## 1.05 SHOP DRAWINGS AND/OR DESCRIPTIVE LITERATURE

- A. Prior to the installation of any sheeting, the Contractor shall submit to the Engineer for documentation ONLY, complete sheeting layout and detail drawings and sheeting descriptions bearing the Contractor's Engineer's State of Rhode Island Professional Seal and signature. Said submission shall be for informational purposes only as a means of documenting the work to be performed and will not be considered an approval or disapproval of the design and/or the implementation thereof. This submission will not relieve the Contractor of the sole responsibility for the adequacy of the system nor shall it be construed as an approval or guarantee that the Contractor's proposed equipment, materials and methods for the sheeting, bracing or appurtenances will be adequate for the work required at the locations of and for the Work required by this Contract.
- B. Included as part of this submission, the Contractor's Engineer must provide a complete listing of all references, codes and specifications used by the Contractor's Engineer and required by any federal, state or local agency having jurisdiction, and to which the sheeting design conforms.
- C. Specific design calculations are not to be submitted to the Engineer. In the event design calculations are submitted to the Engineer, they shall be returned to the Contractor without review or checking by the Engineer.

## 1.06 CERTIFICATE OF DESIGN

- A. The Contractor's special attention is directed to the required "Certificate of Design", the form of which is provided at the end of this Section. The Contractor and Contractor's Engineer shall complete this "Certificate" in its entirety for each location of work to be done, and any revisions associated there with, and submit it simultaneously with, as an integral part thereof, the sheeting submission. Any submission made without the completed "Certificate", appropriately signed and sealed, shall be returned to the Contractor. The Owner and/or Engineer hereby reserves the right to delay sheeting work and/or any work associated with, or dependent upon, the proper implementation of sheeting, without cause for claim against the Owner or Engineer, until a complete and appropriate submission is rendered. This Certification shall indicate that the sheeting, bracing and all appurtenances related thereto are designed to withstand the required loads, forces to be encountered, and to provide soil and water control, and are in compliance with these specifications and all federal, state or local agencies having jurisdiction over the Work to be performed.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Timber sheeting and bracing:
  - 1. Timber sheeting and bracing may be of any species of wood which will satisfactorily withstand all driving and construction stresses and the loads to which the members will be subjected. Sheeting shall not be less than 3 inches nominal thickness and shall be provided with continuous interlocks. All timber sheeting and bracing shall be free from

worm-holes, windshakes, loose knots, decayed or unsound portions or other defects which might impair its strength or tightness.

B. Steel sheeting:

1. The shapes, sizes, and lengths of steel sheeting to be utilized are optional with the Contractor, providing they are satisfactory to withstand all driving and construction stresses and provided with continuous interlocks.

C. Bracing, Hardware and Fastenings:

1. Bracing and other supports whether of steel or of timber, shall be of the strength and dimensions necessary to satisfactorily withstand the loads to which they will be subjected. All bracing and other supports shall be free from any defects which might impair this strength. The Contractor shall provide all necessary hardware and fastenings necessary in connections with satisfactory installation of all sheeting and bracing.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. The Contractor shall be fully responsible for ensuring adequate safety measures are provided at all times and shall comply with all safety requirements of federal, state and local agencies having jurisdiction over the Work. Installation of the sheeting including all bracing, supports and appurtenances, shall be adequate to permit the performance of the Work and be in accordance with the requirements of the Contractor's Engineer and the sheeting design associated therewith.
- B. Any movements of sheeting and/or appurtenances which prevent the proper completion of the work shall be corrected at the expense of the Contractor.
- C. Sheeting shall be installed in a manner which will prevent the disturbance of the surrounding surface, subsurface conditions and/or structures. Any such disturbances shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

### 3.02 REMOVAL

- A. All sheeting shall be removed except as shown on the Contract Drawings or directed by the Engineer.
- B. All sheeting approved for removal by the Engineer shall become the property of the Contractor.
- C. All restoration and clean up shall be as indicated and as specified.



# **CERTIFICATE OF DESIGN**

\_\_\_\_\_  
(Owner)

Contract Reference: \_\_\_\_\_  
\_\_\_\_\_, dated \_\_\_\_\_.

In accordance with the provisions of the above referenced Contract, as the designated Contractor,

\_\_\_\_\_  
(Contractor's Name and Address)

hereby certifies that \_\_\_\_\_

\_\_\_\_\_  
(Contractor's Engineer's Name and Address)

- (1) Is properly licensed and currently registered as a Professional Engineer in the State (or Commonwealth) of \_\_\_\_\_;
- (2) Is fully qualified to design and supervise the \_\_\_\_\_

\_\_\_\_\_  
(Item of work and location)

In accordance with the provision specified under the appropriate Section and/or Subsections of the Contract Documents:

- (3) Has successfully designed and supervised \_\_\_\_\_

\_\_\_\_\_  
(Item of work)

before and demonstrates a minimum of ten (10) documented years of proven experience in such field;

- (4) Has personally examined the type(s) and locations(s) of the Work required under this Contract, and the overall conditions associated therewith, to the extent necessary to fully satisfy his or her professional responsibilities for designing and supervising the above referenced work;

- (5) Has prepared the attached design in full compliance with the applications and requirements of the Contract Documents, sound engineering practice, modern accepted principles of construction, and all applicable federal, state and local laws, regulations, rules and codes having jurisdiction over the Work;
- (6) Will provide sufficient supervision and technical guidance to the Contractor throughout the Work to ensure compliance with the design and all quality assurances necessary to successfully complete the Work;
- (7) Hereby indemnifies and holds harmless the \_\_\_\_\_  
 \_\_\_\_\_ and BETA Group, Inc.,  
 (name of owner)
- and their agents, employees and representatives, from and against any and all claims, whether directly or indirectly, arising out of, relating to or in connection with the Work; and
- (8) This "Certificate of Design" together with all applicable designs, drawings, details, specifications on other related documents necessary to complete the Work as specified, have been signed and sealed pursuant to applicable state law.

In recognition and observance of the above referenced statements, the undersigned parties hereby acknowledge and accept the responsibilities and obligations associated therewith.

CONTRACTOR:

CONTRACTOR'S ENGINEER:

\_\_\_\_\_  
 (Contractor's Name)

\_\_\_\_\_  
 (Engineer's Name)

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

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

\_\_\_\_\_  
 (Name and Title)

\_\_\_\_\_  
 (Name and Title)

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

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

(SEAL)

(P.E. STAMP)

(Note: Contractor to fully reference all attachments below)

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper has a slight shadow on the right side, suggesting it's resting on a surface.

END OF SECTION

## SECTION 02200

### EARTH EXCAVATION, BACKFILL, FILL AND GRADING

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for; excavating in earth for trenches and structures; backfilling excavations; furnishing necessary material; compaction; constructing embankments and fills; miscellaneous earth excavations and miscellaneous grading.

###### B. Related Sections

1. Section 01025 - Measurement and Payment
2. Section 01410 - Testing Laboratory Services
3. Section 02140 – Dewatering
4. Section 02149 – Maintaining Existing Flow
5. Section 02160 – Excavation Support
6. Section 02215 - Aggregate Materials
7. Section 03300 - Cast-In-Place Concrete

##### 1.02 REFERENCES

###### A. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).

##### 1.03 MEASUREMENT AND PAYMENT PROCEDURES

###### A. Test Pits

1. Where determination of the exact location of pipe or other underground structure is necessary for doing the work properly, the Contractor may be required to excavate test pits to determine such locations. When such test pits may be properly considered as incidental to other excavation, the Contractor shall receive no additional compensation, the work being understood to be included as part of the excavation. When the Engineer orders test pits beyond the limits of excavation he considers a part of the work, such test pits shall be paid for as specified in SECTION 01025.

## 1.04 QUALITY ASSURANCE

### A. Field Samples

1. Provide samples of materials as requested by the Engineer, to the Quality Control Engineer hired by the Owner, prior to delivery of materials on site, in order to facilitate field testing of compaction operations and material properties.

## 1.05 PROJECT/SITE CONDITIONS

### A. Existing Conditions

1. There are pipes, drains, and other utilities in locations not indicated on drawings, no attempt has been made to show all services, and completeness or accuracy of information given is not guaranteed.

## 1.06 MAINTENANCE

### A. Maintain all work in accordance with SECTION 01800.

## PART 2 PRODUCTS

## 2.01 MATERIALS

### A. Suitable Aggregate

1. The nature of materials will govern both acceptability for backfill and methods best suited for placement and compaction.
2. All material whether from excavations or from borrow pits, after being placed and properly compact, will make a dense stable fill and containing no vegetation, masses of roots, individual roots more than 18 inches long, or more than 1/2 inch in diameter, stones over 6 inches in diameter, or porous matter.
3. Organic matter to be well distributed and not to exceed minor quantities.

### B. Trench and Excavation Backfill

1. In general, and unless other material is indicated on drawings or specified, material used for backfilling trenches and excavations shall be suitable material which was removed in the course of making the construction excavations. If sufficient suitable material is not available from the excavations, the backfill material shall be crushed stone, gravel borrow or select borrow as directed by the Engineer, in according to respective Specification Sections.

### C. Structure Backfill

1. Unless otherwise indicated or specified, all fill and backfill under structures and pavement adjacent to structures shall be compacted gravel borrow containing not more than 10 percent material passing a 200 sieve. When coarse aggregate and fine aggregate are indicated or specified for use under structures, they shall conform to the requirements for coarse and fine aggregate specified in SECTION 03300.

### D. Filling and Embankment Backfill

1. Suitable selected materials available from the excavations and not required for backfill around pipes or against structures may be used for filling and building embankments, except as otherwise specified. Material needed in addition to that available from construction operations shall be obtained from suitable gravel banks or other suitable deposits. The Contractor shall furnish, at his own expense, all borrow material needed on the work.

### E. Additional materials

1. Concrete: In accordance with SECTION 03300.
2. Crushed stone: In accordance with SECTION 02215.
3. Gravel borrow: In accordance with SECTION 02215.
4. Selected borrow: In accordance with SECTION 02215.

## 2.02 EQUIPMENT

### A. Well Points

1. Designed to drain soil and prevent saturated soil from flowing into excavation.

### B. Pumping Units

1. Designed for use with the wellpoints, capable of maintaining a high vacuum and, handling large volumes of air and water at the same time.

### C. Underdrain Pipe

1. HDPE pipe enclosed in crushed stone encased in filter fabric.
2. Sewer pipe of quality known as "seconds".

## 2.03 SOURCE QUALITY CONTROL

- A. Provide Engineer with access to location of off site sources of materials.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify all existing utilities and facilities prior to excavation.

### 3.02 PROTECTION

#### A. Utilities

1. Support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated.
2. Restore items damaged during construction without compensation, to a condition at least equal prior to construction.

#### B. Trees

1. Enclose the trunks of trees adjacent to work with substantial wooden boxes of height necessary to protect trees from injury from piled material, equipment, operations or otherwise.
2. Employ excavating machinery and cranes of suitable type and size and operate with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
3. When trimming is required, make all cuts smooth and neat without splitting or crushing.
4. Cover cut areas with an application of grafting wax or tree healing paint.
5. Branches, limbs, and roots shall not be cut except by permission of the Engineer.

#### C. Plantings

1. Protect by suitable means or temporarily replant and maintain cultivated hedges, shrubs, and plants which may be injured by the Contractor's operations
2. Replant in their original positions and care for until growth is re-established, once the construction operations have been substantially completed.
3. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of kind and quality at least equal to which existed prior to the start of the Work.

#### D. Paved surfaces

1. Do not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels shaped as to cut or injure paved surfaces.
2. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to which existed prior to start of the Work.
3. Suitable materials and methods shall be used for such restoration.

### 3.03 PREPARATION

#### A. Pavement Removal

1. Remove only existing pavement as necessary for the prosecution of the work.
2. Engineer may require that pavement be cut with pneumatic tools or saws without extra compensation to Contractor, where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
3. Dispose of large pieces of broken pavement before proceeding with excavation.

#### B. Top Soil Removal

1. Unless otherwise noted, from areas which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated, at no cost to the owner.

#### C. Subgrade

1. Remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas where embankments will be built or material will be placed for grading.
2. Shape as indicated on the drawings and prepare by forking, furrowing, or plowing to bond first layer of the new material placed.

### 3.04 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

- A. The structures to which the provisions of this article apply include pipes, wires, and other structures which meet all of the following:
1. Are not indicated on the drawings or otherwise provided for.
  2. Encroach upon or are encountered near and substantially parallel to the edge of the excavation.
  3. In the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.



- B. In removing existing pipes or other structures, the Contractor should use care to avoid damage to materials, and the Engineer shall include for payment only those new materials which, in his judgment, are necessary to replace those unavoidably damaged.
- C. Whenever the Contractor encounters certain existing structures as described above and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.
- D. When fences interfere with the Contractor's operations, he shall remove and (unless otherwise specified) later restore them to a condition which existed prior to the start of the Work, all without additional compensation. The restoration of fences shall be done as promptly as possible and not left until the end of the construction period.

### 3.05 SHEETING AND BRACING

- A. Provide in accordance with specification Section 02160.

### 3.06 DEWATERING

- A. Provide in accordance with specification Section 02140.

### 3.07 EXCAVATION

- A. Execute operation of dewatering, sheeting and bracing without undermining or disturbing foundations of existing structures or of work previously completed under this contract.
- B. Excavate to widths that provide suitable room for:
  - 1. Building structures or laying and jointing piping.
  - 2. Placing all sheeting, bracing, and supports.
  - 3. Cofferdamming, pumping and draining.
- C. Render bottom of excavations firm, dry and acceptable in all respects.
- D. Do not plow, scrap or dig by machinery, earth at finished subgrade which results in disturbance of material below subgrade, unless indicated or specified, and remove with pick and shovel, last of material to be excavated, just before placing pipe, masonry or other structure.
- E. Make all excavations in open, except as otherwise specified or permitted.

#### F. Excavation Near Existing Facilities

1. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools. Such manual excavation when incidental to normal excavation shall be included in the work to be done under items involving normal excavation.

#### G. Unauthorized Excavation

1. If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted gravel borrow, if the excavation was for a pipeline, or with Class B concrete, if the excavation was for a masonry structure.

#### H. Unsuitable Material

1. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, crushed stone, gravel borrow, fine aggregate or concrete as directed.

### 3.08 TRENCHING

#### A. Trench Excavation

1. Where pipe is to be laid in specified bedding material or concrete cradle, the trench may be excavated by machinery to, or to just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed, as approved by the Engineer.
2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery, but, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.

#### B. Depth Of Trench

1. Excavate trench to depths permitting the pipe to be laid at the elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.

### C. Width Of Trench

1. Excavate trench as narrow as practicable and do not widen by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
2. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and an elevation 1 ft. above the top of the pipe.

### D. Trench Excavation In Fill

1. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least 1 ft. above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

- E. Length of trench open at any one time will be controlled by conditions, subject to any limits that may be prescribed by Engineer.

## 3.09 BACKFILLING

### A. General

1. Frozen material shall not be placed in the backfill nor shall backfill be placed upon frozen material. Previously frozen material shall be removed or shall be otherwise treated as required, before new backfill is placed.

### B. Fill And Backfill Under Structures

1. The fill and backfill materials shall be placed in layers not exceeding 6 in. in thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent in accordance with ASTM D1557.

### C. Backfilling Around Structures

1. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been done, special leakage tests, if required, shall be made. Promptly after the completion of such tests, the backfilling shall be started and then shall proceed until its completion. The best of the excavated materials shall be used in backfilling within 2 ft. of the structure. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.
2. The material shall be placed and compacted to 90 percent in accordance with ASTM D1557 unless otherwise indicated or specified.

#### D. Backfilling Pipe Trenches

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. No stone or rock fragment larger than 12 in. in greatest dimension shall be placed in the backfill nor shall large masses of backfill material be dropped into the trench in such a manner as to endanger the pipeline. If necessary, a timber grillage shall be used to break the fall of material dropped from a height of more than 5 ft. Pieces of bituminous pavement shall be excluded from the backfill unless their use is expressly permitted, in which case they shall be broken up as directed.
4. Zone Around Pipe
  - a. Backfilled with the materials and to the limits indicated on the drawings.
  - b. Material shall be compacted to 90 percent by tamping.
5. Remainder of Trench
  - a. Compact by water-jetting, or tamping, in accordance with the nature of the material to 95 percent in accordance with ASTM D1557. Water-jetting may be used wherever the material does not contain so much clay or loam as to delay or prevent satisfactory drainage. However, tamping shall be used if water-jetting does not compact the material to the density required.
6. Excavated material which is acceptable to the Engineer for surfacing or pavement subbase shall be placed at the top of the backfill to such depths as may be specified elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

#### E. Placing And Compacting Embankment Material

1. After the subgrade has been prepared as hereinbefore specified, the material shall be placed thereon and built up in successive layers until it has reached the required elevation.

2. Layers shall not exceed 12 in. in thickness before compaction. In embankments at structures, the layers shall have a slight downward slope away from the structure; in other embankments the layers shall have a slight downward slope away from the center. In general, the finer and less pervious materials shall be placed against the structures or in the center, and the coarser and more pervious materials, upon the outer parts of embankments.
3. Each layer of material shall be compacted by the use of approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
4. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
5. The portion of embankments constructed below proposed structures shall be compacted to 95 percent in accordance with ASTM D1557. The top 2 ft. of an embankment below a pavement base shall be compacted to 95 percent. All other embankments shall be compacted to 90 percent in accordance with ASTM D1557.

### 3.10 METHODS OF COMPACTION

#### A. Water-Jetting

1. Saturate backfill material throughout its full depth and at frequent intervals across and along the trench until all slumping ceases.
2. Furnish one or more jet pipes, each of sufficient length to reach the specified depth and of sufficient diameter (not less than 1-1/4 in.) to supply an adequate flow of water to compact the material.
3. Equip jet pipe with a quick-acting valve, supply water through a fire hose from a hydrant or a pump having adequate pressure and capacity to achieve the required results.

#### B. Tamping and Rolling

1. Deposit backfill material and spread in uniform, parallel layers not exceeding 8 in. thick before compaction. Before the next layer is placed, each layer shall be tamped to obtain a thoroughly compacted mass. Care shall be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively

and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar power equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting.

2. If necessary to ensure proper compaction by tamping (or rolling), the backfill material shall first be wet by sprinkling. However, no compaction by tamping (or rolling) shall be done when the material is too wet either from rain or too great an application of water to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Miscellaneous Requirements.

1. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. Only suitable quantities of stones and rock fragments shall be used in the backfill; the Contractor shall, as part of the work done under the items involving earth excavation and rock excavation as appropriate, furnish and place all other necessary backfill material.
2. All voids left by the removal of sheeting shall be completely backfilled with suitable materials, and thoroughly compacted.

3.11 DISPOSAL OF SURPLUS EXCAVATED MATERIALS

- A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted by the Engineer.
- B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted and without additional compensation. Prior to re-use of in-situ material, the material shall be tested to determine if the material meets the requirements of applicable Specification Section for crushed stone, gravel borrow, or select borrow.
- C. Surplus excavated materials not needed as specified above shall be hauled away and dumped by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him.

3.12 DUST CONTROL

- A. During the progress of the Work, maintain the area of activities, by sweeping and sprinkling of streets to minimize the creation and dispersion of dust. If the Engineer

decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

### 3.13 BRIDGING TRENCHES

- A. Provide suitable and safe bridges and other crossings where required for the accommodation of travel, and to provide access to private property during construction. Remove once bridges and crossings are no longer needed.

### 3.14 FIELD QUALITY CONTROL

#### A. Site Tests

- 1. In accordance with SECTION 01410

### 3.15 CARE AND RESTORATION OF PROPERTY

- A. Restoration of existing property or structures shall be completed within 5 business days of completing the work within the property. and not left until the end of the construction period.

END OF SECTION

## SECTION 02210

### ROCK EXCAVATION

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for removal and disposal of rock.

###### B. Related Sections

1. Section 00500-Agreement
2. Section 00800- Supplementary Conditions
3. Section 02200-Earth Excavation, Backfill, Fill and Grading

##### 1.02 DEFINITIONS

- ###### A. Rock-as defined in SECTION 00500.

##### 1.03 REQUIREMENTS

- ###### A. Excavate rock if encountered, to the lines and grades indicated on the drawings or as directed, dispose of the excavated material, and furnish acceptable material for backfill in place of the excavated rock.
- ###### B. Excavate rock in pipe trenches to a limit which provides 6-inches clearance minimum from the pipe after it has been laid. Before the pipe is laid, the trench shall be backfilled to the correct subgrade with thoroughly compacted, suitable material or, when so specified or indicated on the drawings, with the same material as that required for bedding the pipe, furnished and placed at the expense of the Contractor.
- ###### C. The use of explosives will not be allowed.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

##### 3.01 EXCESS ROCK EXCAVATION

- ###### A. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below in this section.



- B. In pipe trenches, excess excavation below the elevation of the top of the bedding, cradle, or envelope shall be filled with material of the same type, placed and compacted in the same manner, as specified for the bedding, cradle, or envelope. Excess excavation above said elevation shall be filled with earth as specified in the article titled "Backfilling Pipe Trenches" in SECTION 02200.
- C. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with 3000 psi concrete. Other excess excavation shall be filled with earth as specified in the article titled "Backfilling Around Structures" in SECTION 02200.

### 3.02 SHATTERED ROCK

- A. If the rock below normal depth is shattered, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches screened gravel shall be used for backfill. All such removal and backfilling shall be done by and at the expense of the Contractor.

### 3.03 PREPARATION OF ROCK SURFACES

- A. Whenever so directed during the progress of the work, remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly, using steam to melt snow and ice, if necessary. Water in depressions shall then be removed as required so that the whole surface of the designated area can be inspected to determine whether seams or other defects exist.
- B. The surfaces of rock foundations shall be left sufficiently rough to bond well with the masonry and embankments to be built thereon, and if required, shall be cut to rough benches or steps.
- C. Before any masonry or embankment is built on or against the rock, the rock shall be scrupulously freed from all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means shall be used to accomplish this cleaning. Remove free water left on the surface of the rock.

### 3.04 REMOVAL OF BOULDERS

- A. Remove piles of boulders and loose rock encountered within the limits of earth embankments and dispose in a suitable place.

### 3.05 DISPOSAL OF EXCAVATED ROCK

- A. All excavated rock shall be handled, transported and disposed of by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him without additional cost to the Owner.
- B. Excavated rock may be used in backfilling trenches subject to the following limitations:
  - 1. Pieces of rock larger than permitted under the article titled "Backfilling Pipe Trenches" in SECTION 02200 shall not be used for this purpose.

2. The quantity of rock used as backfill in any location shall not be so great as to result in the formation of voids.
  3. Rock backfill shall not be placed within 36 in. of the surface of the finish grade.
- C. Surplus excavated rock shall be disposed of as specified for surplus excavated material as specified in SECTION 02200.

### 3.06 BACKFILLING ROCK EXCAVATIONS

- A. Where rock has been excavated and the excavation is to be backfilled, the backfilling above normal depth shall be done as specified in SECTION 02200. If material suitable for backfilling is not available in sufficient quantity from other excavations, the Contractor shall, at his own expense, furnish suitable material from outside sources.

END OF SECTION

## SECTION 02215

### AGGREGATE MATERIALS

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for furnishing and placing materials, which include Crushed Stone, Gravel Borrow and Common Borrow.
2. Location of specified materials as detailed on the Drawings or as directed by the Engineer for excavation below normal depth, utility support, replacement of unsuitable material or elsewhere, as ordered.

###### B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading.
2. Section 02500 - Paving

##### 1.02 REFERENCES

###### A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification.

1. Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, together with all errata addenda additional revisions, and supplemental specifications, (referred to as Standard Specification).

###### B. American Association of State Highway and Transportation Officials (AASHTO).

1. T11, Amount of Material Finer than 0.075 mm Sieve in Aggregate
2. T27, Sieve Analysis of Fine and Coarse Aggregates.

###### C. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).

##### 1.03 DEFINITIONS

###### A. The term Screened Gravel as used in the Contract Documents shall mean Crushed Stone.

##### 1.04 SUBMITTALS

###### A. Shop Drawings

1. Provide sieve analysis when gradation requirements are given in the Specification.

B. Samples

1. Furnish representative sample including location of source with Shop Drawing transmittal sheet.

1.05 QUALITY ASSURANCE

A. Field Samples

1. The attention of the Contractor is directed to the fact that under Specification SECTION 00700, 1.03 Materials and Equipment, all materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Engineer. The Engineer shall be the sole judge as to the acceptability of proposed materials and said judgement shall be final, conclusive, and binding.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. In accordance with Specification SECTION 00700, 1.03 Materials and Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone

1. For bedding and pipe zone material for pipe larger than 3 inches diameter. Well graded in size from 3/8 inches to 3/4 inches or such other sizes as may be approved.
2. For bedding and pipe zone material for plastic pipe 3 inches diameter and less, maximum particle size shall be 3/8 inches.
3. Clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin elongated, laminated or disintegrated pieces.
4. Screened Stone of similar size and grading to this specification may be used instead of Crushed Stone.

B. Crushed Stone Under Structures

1. Crushed stone material must meet the requirements set forth in the Standard Specifications.

C. Gravel Borrow

1. Shall be in accordance with the RIDOT Standard Specifications, Section M01.09, Table 1, Column 1b.

D. Common Borrow

1. Shall meet RIDOT Standard M01.01 Common Borrow.

E. Gravel Base Course

1. Shall be in accordance with the RIDOT Standard Specifications, Section M01.09, Table 1, Column 1b.

F. Suitable Material

1. Shall meet RIDOT Standard M01.01 Common Borrow.

2.02 SOURCE QUALITY CONTROL

A. Test, Inspection

1. Engineer may elect to sample material supplied at the source.
2. Assist the Engineer and/or personnel from the designated testing laboratory in obtaining samples.

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed Stone

1. Spread in layers of uniform thickness not greater than 6 inches.
2. Compact thoroughly by means of a suitable vibrator or mechanical tamper.

B. Gravel Borrow

1. Spread in layers of uniform thickness not exceeding 12 inches before compaction and moistened or allowed to dry as directed.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment.
3. Compaction shall conform to 95% of minimum dry density per ASTM D1557.
4. The percolation rate for the compacted bank-run gravel shall not exceed 5 minutes per inch.

C. Common Borrow/Suitable Material

1. Spread in layers of uniform thickness not exceeding 12 in. (loose lift) before compaction and moistened or allowed to dry.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment unless otherwise directed by the Engineer.

3.02 FIELD QUALITY CONTROL

A. Material and compaction testing

1. In accordance with SECTION 01410.

END OF SECTION

## **SECTION 02 41 19**

### **SELECTIVE DEMOLITION**

#### **PART 1 - GENERAL**

##### 1.01 SUMMARY

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### 1.02 SECTION INCLUDES

- A. All material, labor and equipment required for demolition and removal of existing structures and items as shown on the drawings and as may be required to permit the proper installation of any new work.

##### 1.03 QUALITY ASSURANCE

- A. Perform work in accordance with all applicable local and state Codes.

##### 1.04 SEQUENCING

- A. Coordinate with the occupancy of the owner under provisions of Section 01 10 00.
- B. Avoid interference with the use of and passage to and from adjacent buildings and facilities.

#### **PART 2 - PRODUCTS**

Not Used

#### **PART 3 - EXECUTION**

##### 3.01 PREPARATION

- A. Inspection
  - 1. The contractor shall inspect the entire site, premises and all objects designated to be removed and those to be preserved.
  - 2. Locate all existing utility lines and determine the requirements for their protection or abandonment.
- B. Notification
  - 1. Notify the owner at least two full working days prior to commencing the work of this section.

C. Verification

1. Prior to commencing the work of this section, verify with the owner and the Architect all objects to be removed and all objects to be preserved.

D. Protection

1. Protect all objects and utilities designated to remain as required. Active utilities shall not be interrupted.
2. Provide shoring and bracing for the support of existing structures, that are to remain in place, where necessary to prevent collapse of structures.
3. Dust control shall be as necessary to prevent the spread of dust and flying particles during performance of the work of this section. Provide taped fire resistant polyethylene dust barriers as required. Thoroughly moisten all surfaces as required. Protect HVAC systems from absorbing excessive amounts of contaminants.
4. The contractor shall be responsible to repair or replace all items designated to remain that are damaged due the surrounding demolition.

3.02 CLEANING

A. Clean work under provisions of Section 01 70 00.

B. Remove all debris and trash from the site on a daily basis and dispose of in accordance with all local and state Codes.

C. All removed items scheduled to be retained shall be given to the owner for their use.

D. Burning at the site will not be permitted.

3.03 SCHEDULE

A. Site Work

1. Remove all concrete equipment pads, sidewalks and bituminous paving indicated on the plans or as required by new construction. Remove all foundations and structures indicated to be removed.
2. Sawcut pavement where existing pavement is to butt against new pavement.
3. Assume that all concrete work is reinforced. Cut or burn reinforcing flush with concrete scheduled to remain.
4. Prior to starting site work, locate, disconnect and cap all utility services designated to be removed. Locate and protect all utility services designated to remain. All work shall be performed in accordance with the requirements of the utility company or agency involved.

B. Finishes

1. Remove all existing floor finishes, base materials and adhesives in all areas scheduled to receive new finishes unless instructed otherwise. Patch and repair all substrate damaged by removal as required to install new finish.
2. Remove all finishes as indicated on the drawings and as required by new construction. Repair or replace substrate damaged by removals.

C. Concrete

1. Assume all concrete is reinforced.
2. Use a saw cut on all concrete to be removed that butts concrete to remain
3. Always remove concrete in small sections
4. Provide core boring through concrete floors and roofs as required to install new utilities.
5. Remove all concrete slabs, walls or foundations as indicated on the drawings.

D. Masonry

1. Assume all masonry is reinforced.
2. Remove all masonry as indicated on the drawings and as required by new construction
3. All new openings in existing walls will be saw cut.
4. Saw cut masonry walls as required to install new flashing as indicated on the drawings.
5. Remove reinforcing flush with surfaces scheduled to remain.
6. Remove steel lintels within walls to be demolished.
7. Provide core boring through masonry walls as required to install new utilities.
8. Remove all appurtenances, equipment and fixtures from masonry partitions to be demolished.

E. Structural Steel

1. Remove all structural steel as indicated on the drawings and as required by new construction.
2. Remove all appurtenances and fasteners from the steel being demolished.

F. Doors, Windows and Louvers

1. Remove all doors, frames, hardware, fasteners, sub frame material and anchors from openings indicated on the plans or as required by new construction.
2. Remove window, sub frame materials, and other related items indicated on the plans or as required by new construction.
3. Remove louvers, grills, and vents, including anchors and sub frame materials where indicated or as required by new construction.
4. Modify existing openings for new construction as indicated on plans.
5. Provide new lintels as required by new construction.

G. Mechanical, Electrical and Plumbing.

1. Refer to the mechanical, electrical, and plumbing drawings and specifications for equipment removal requirements.
2. Provide cutting of holes in floors, partitions or ceilings for all mechanical, electrical, and plumbing as required.
3. Remove all mechanical, electrical, and plumbing equipment and fixtures from partitions to be demolished.



4. Remove all existing fixtures and equipment in areas scheduled to receive new fixtures and equipment unless instructed otherwise.  
Patch and repair all substrate and finishes damaged by removal of items as required to match existing or to prepare for a new finish as scheduled. Dispose of all removed fixtures and equipment unless noted otherwise.

END OF SECTION

## SECTION 02500

### PAVING

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for construction of all temporary and permanent pavement on paved areas affected or damaged by his operations, whether inside or outside the normal trench limits, as indicated on the drawings and as herein specified.

###### B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

##### 1.02 REFERENCES

###### A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition including all addenda, issued by the State of Rhode Island Department of Transportation, (referred to as the Standard Specification).

###### B. American Society for Testing and Materials

1. C117 Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
2. C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

##### 1.03. PAVEMENT SCHEDULE

###### A. The Contractors attention is directed to the various pavements required under this contract, and their locations as detailed below.

###### B. All pavement thickness specified in this specification shall be of the thickness required after compaction.

###### **Pavement:**

|               |                                  |
|---------------|----------------------------------|
| Description:  | Permanent Trench Width Pavement  |
| Requirements: | 5" Class 12.5 HMA Base Course    |
|               | 12" Gravel Base Course (Minimum) |

## PART 2 PRODUCTS

### 2.01 MATERIALS

#### A. Asphalt Tack

1. Tack coat shall consist of emulsified asphalt, grade RS-1 or cutback asphalt grade RC-70 conforming to the requirements of the Rhode Island Standard Specification Section 403 and M03.01.

#### B. Bituminous Base

1. Bituminous Base shall conform to the requirements of the Rhode Island Standard Specification Section 401 and Class 12.5 HMA for Base Course.

#### C. Bituminous Surface

1. Bituminous Surface Course shall conform to the requirements of the Rhode Island Standard Specification Section 401 and Class 9.5 HMA for Surface Course.

#### D. Temporary Trench Patch

1. Temporary Pavement shall be Temporary Patching Material conforming to the requirements of the State of Rhode Island Standard Specification, Subsection 410, Class 9.5 HMA, and M03.04 for High Performance Cold Patching Material.

#### E. Gravel Base Course

1. Gravel base course in accordance with State of Rhode Island Standard Specification, Subsection M01.09, Meeting the gradation requirements of Table 1, Column 1, with 100% passing 3-inch Square Mesh Sieves.

### 2.02 SOURCE QUALITY CONTROL

- A. The paving plant used by the Contractor for preparation of bituminous paving materials shall be acceptable to the Engineer who shall have the right to inspect the plant and the making of the material.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Prior to placing pavement, all backfill shall have been properly compacted as specified under SECTION 02200 to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and gravel base course shall be compacted, brought to the proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surfaces of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24 hours between completion of preparation of subgrade or placing of gravel base course and placing of paving, or if subgrade or gravel base

course has been eroded or disturbed by traffic, the subgrade or gravel base course shall be restored before placing pavement.

- B. When installing permanent pavement on bituminous concrete roadway the edges of existing pavement shall be cut back 12-inches, or more as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, cleaned, and painted with an accepted asphalt emulsion to ensure a satisfactory bond between it and the newly placed surface courses. Existing surface courses shall be stripped from the bituminous concrete base course for at least a 6-inch width and trimmed square and straight so that new permanent surfacing shall be placed on undisturbed bituminous concrete base course. Existing pavement shall be swept clean prior to placing any asphalt emulsion over it. Existing pavement that will be under new pavement shall be painted with asphalt emulsion to ensure a satisfactory bond.
- C. Before permanent pavement is installed, the base shall be brought to the proper grade, and temporary pavement and excess gravel base shall be removed.
- D. All manhole covers, catch basin grates, valve and meter boxes, curbs, walks, walls and fences shall be adequately protected and left in a clean condition. Where required, the grades of manhole covers, catch basin grates, valve boxes, and other similar items shall be adjusted to conform to the finished pavement grade.
- E. Contractor shall remove and acceptably dispose of all surplus and unsuitable material.
- F. The bituminous base course within the trench shall be brought to the surface (total 5-inches of base course installed).
- G. Existing pavement shall be swept clean prior to placing any asphalt emulsion over it. Existing pavement that will be under new pavement shall be painted with asphalt emulsion to ensure a satisfactory bond.
- H. Temporary trench patch shall be installed at the end of each working day, no open trenches will be allowed overnight unless otherwise approved by the Engineer.

### 3.02 INSTALLATION

- A. General
  1. All construction methods and materials shall be satisfactory to the Engineer.
  2. Unless indicated otherwise, all permanent bituminous pavements shall be installed in two courses or more. Bituminous base courses shall be carefully spread and raked to a uniform surface and thoroughly rolled before application of the top course.
  3. All top courses of permanent paving shall be applied with acceptable mechanical spreaders in widths of at least 9 feet.

4. The rolling for all bituminous and gravel base courses shall conform to the standards listed in the appropriate Subsection of the Standard Specification.
5. Pavement shall be placed so that the entire roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section with a smooth transition to existing pavement.

B. Gravel Base Course

1. The gravel base shall be placed to such depth that the furnished compacted gravel base course is the depth as indicated on the drawings and specified herein.
2. The top of the compacted gravel base shall be below the furnish grade a distance required to accommodate the compacted pavement material as indicated on the drawings and specified herein.

C. Bituminous Base

1. Bituminous Base shall be used in city streets and parking areas as listed in Article 1.03 of this specification.
2. Bituminous Base shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the Standard Specification and as detailed in the Contract Drawings.

D. Permanent Pavement Patch

1. Permanent pavement patch shall be placed over all trenches in paved areas where directed by the Engineer.
2. The Contractor, shall install the permanent trench patch upon the removal of the temporary trench patch, completing the backfilling and compaction of the trenches in the streets and the placing of the gravel base course.
2. Maximum pavement thickness per course not to exceed 3 inches.
3. Permanent Pavement Patch shall be placed in two courses and shall consist of 4-inch compacted thickness of Class 12.5 HMA Base Course, on a 12-inch compacted thickness gravel base as directed by the Engineer.
4. Contractor to vary pavement thickness to maintain a minimum cross sectional slope equaling 0.02 ft/ft.
5. Cut back distances shall be directed by the Engineer, however under no circumstances less than the minimum indicated in the chart below.

E. Temporary Pavement Patch

1. Temporary pavement shall be placed over all trenches in paved areas where directed by the Engineer.
2. The Contractor, upon completing the backfilling and compaction of the trenches in the streets and the placing of the gravel base course, shall be required to construct temporary pavement at the end of each day.
2. Maximum pavement thickness per course not to exceed 3 inches.
3. Temporary Pavement Patch shall be placed in one course and shall consist of a 3-inch compacted thickness of Class 9.5 HMA Surface Course, on a 12-inch compacted thickness gravel base as directed by the Engineer.
4. Contractor to vary pavement thickness to maintain a minimum cross sectional slope equaling 0.02 ft/ft.

5. Cut back distances shall be directed by the Engineer, however under no circumstances less than the minimum indicated in the chart below.

| MAXIMUM PAVEMENT LIMITS            |                         |                 |                                                   |                 |
|------------------------------------|-------------------------|-----------------|---------------------------------------------------|-----------------|
| DIAMETER OF<br>PIPE D IN<br>INCHES | TRENCH WIDTH IN<br>FEET |                 | PERMANENT<br>TRENCH<br>PAVEMENT WIDTH<br>IN FEET* |                 |
|                                    | TRENCH DEPTH            |                 | TRENCH DEPTH                                      |                 |
|                                    | < OR =<br>10'           | > 10' TO<br>20' | < OR =<br>10'                                     | > 10' TO<br>20' |
| 12 AND<br>SMALLER                  | 5.00                    | 6.00            | 8.00                                              | 9.00            |
| 15                                 | 5.25                    | 6.25            | 8.25                                              | 9.25            |
| 18                                 | 5.50                    | 6.50            | 8.50                                              | 9.50            |
| 21                                 | 5.75                    | 6.75            | 8.75                                              | 9.75            |
| 24                                 | 6.00                    | 7.00            | 9.00                                              | 10.00           |
| 27                                 | 6.25                    | 7.25            | 9.25                                              | 10.25           |
| 30                                 | 6.50                    | 7.50            | 9.50                                              | 10.50           |
| 36                                 | 7.00                    | 8.00            | 10.00                                             | 11.00           |
| 42                                 | 7.50                    | 8.50            | 10.50                                             | 11.50           |
| 48                                 | 8.00                    | 9.00            | 11.00                                             | 12.00           |
| 54                                 | 8.50                    | 9.50            | 11.50                                             | 12.50           |
| 60                                 | 9.00                    | 10.00           | 12.00                                             | 13.00           |
| 66                                 | 9.50                    | 10.50           | 12.50                                             | 13.50           |
| 72                                 | 10.00                   | 11.00           | 13.00                                             | 14.00           |

#### Notes

1. Temporary trench pavement includes 1' cut back of existing pavement along each side of the trench.
2. Trench depth measured from the existing ground surface to 6" below the bottom of the constructed pipe.
3. Quantities for pavement shall be in accordance with the above limits or the actual widths, whichever is less.

#### F. Bituminous Surface

1. Bituminous Surface shall be used in the streets as listed in Article 1.03 of this specification.
2. Bituminous Surface shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the Standard Specification and as detailed in the Contract Drawings.

#### G. Sidewalks, Driveways, Parking Lots and Curbing

1. Sidewalks, driveways, parking lots and curbing that are removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the State of Rhode Island Standard Specification.
2. Where the trench location is in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.
4. Parking lots shall be repaved in accordance with Article 3.01 of this section.
5. Gravel base course under sidewalks and driveways shall not be less than 12" inch thick.

#### H. Surface Maintenance

1. During the guarantee period, the Contractor shall maintain the bituminous surface and shall promptly make good all defects such as cracks, depressions, and holes that may occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by the Contractor, the Contractor shall remove all bituminous concrete and base course as is necessary to properly correct the defect. After removing bituminous concrete and base course, the Contractor shall correct the cause of the defect and replace the base course and bituminous concrete in accordance with these specifications.

END OF SECTION

## SECTION 02530

### RESTORATION OF CURB, SIDEWALKS AND VEGETATED AREAS

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for removal and replacement of granite curb, concrete and bituminous sidewalks including sidewalks at driveways and wheelchair ramps.
2. Requirements for restoration of vegetated areas, plantings and tree beds.
3. Requirements for construction of sidewalks in sensitive tree areas.
4. Restoration to include those areas designated by the Contract Drawings and those affected or damaged by the construction operations, outside the limits of Work.

###### B. Related Sections

1. Section 01060 – Regulatory Requirements
2. Section 02200 – Earth Excavation, Backfill, Fill and Grading

##### 1.02 REFERENCES

###### A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification.

1. Materials and construction methods shall conform, insofar as applicable, to the requirements of the Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition, together with all errata addenda additional revisions, and supplemental specifications, (referred to as the Standard Specification).

##### 1.03 SUBMITTALS

###### A. Submit in accordance with Section 01300,

1. Sieve analysis for aggregates and loams.
2. Mix designs for batched materials.
3. Certifications for landscape material.
4. Samples when requested by the Engineer.



5. Submit with seed, certificates confirming seed mixture, purity, germinating value, and crop year identification.

## PART 2 PRODUCTS

### 2.01 MATERIALS

#### A. Gravel Borrow

1. In accordance with State of Rhode Island Standard Specification, Subsection M01.02, Meeting the gradation requirements of Table 1, Column 1, with 100% Passing 3-inch Square Mesh Sieves.

#### B. Concrete Curb

1. In accordance with the requirements of the State of Rhode Island Standard Specification, Section M09.

#### C. Granite Curb

1. In accordance with the requirements of the State of Rhode Island Standard Specification, Section M09.

#### D. Cement Concrete

1. In accordance with the requirements of the State of Rhode Island Standard Specification, Section M02.

#### E. Bituminous Concrete

1. In accordance with the requirements of the Rhode Island Standard Specification Section 401 for Surface Course, Class 12.5 HMA and the gradation requirements for Class 12.5 HMA or sidewalk in section M03.01.

#### F. Loam, Seed, Lime, Fertilizer, Mulch and Water

1. In accordance with Section M18 of the Rhode Island Standard Specification.

#### G. Plant Materials

1. In accordance with Section M18 of the Rhode Island Standard Specification.

### 2.02 SOURCE QUALITY CONTROL

- A. The plants used by the Contractor for preparation of bituminous paving materials and cement concrete shall be acceptable to the Engineer who shall have the right to inspect the plant and the making of the material.

## PART 3 EXECUTION

### 3.01 INSTALLATION/RESTORATION

A. Excavation to be in accordance with Section 02200 unless otherwise noted in the referenced specification below.

B. Granite Curb

1. Installing or Remove, Salvage and Reset granite curb at the locations indicated on the Drawings or as directed by the Engineer shall be in accordance with Section 906 of the State of Rhode Island Standard Specification.

C. Concrete Curb

1. Installation of concrete curb at the locations indicated on the Drawings or as directed by the Engineer shall be in accordance with Section 906 of the State of Rhode Island Standard Specification.

D. Bituminous Concrete Berm or Bituminous Concrete Curb

1. Installation of concrete curb at the locations indicated on the Drawings or as directed by the Engineer shall be in accordance with Section 906 of the State of Rhode Island Standard Specification.
2. Installation of bituminous concrete berm shall conform to Section 906.03.3 Method A of the Rhode Island Standard Specification.

E. Sidewalks

1. Installation of new or replacing existing sidewalks, driveways and wheelchair ramps at the locations shown on the Drawings or as directed by the Engineer to be in accordance with Section 905 of the State of Rhode Island Standard Specification.

F. Vegetated Areas, Plantings and Tree Beds

1. Restore all disturbed areas in accordance with the following Sections of the State of Rhode Island Standard Specification.
  - a. Loam in accordance with L01
  - b. Seeding in accordance with L02
  - c. Plantings and Tree Beds in accordance with L06 and L08

G. Tree Root Pruning

1. This work shall include both mechanical and manual pruning of existing tree roots in order to allow for the installation of drain lines and/or other work without causing extensive damage to the root system. Pruning work shall be performed at the locations indicated on the Plans or as directed by the Engineer.

2. All work shall be performed under direct on site supervision of the Engineer.
3. All work indicated on the plans or as directed by the Engineer shall be performed under direct on-site supervision of a Rhode Island Licensed Arborist (A copy of the arborist's current license must be given to the Engineer seven days in advance of the work beginning) and shall be retained by the Contractor.
4. Excavation shall proceed in shallow layers that do not exceed 4 inches in depth until the root system is located. The Contractor shall carefully hand dig the soil from the delineated areas taking care not to rip or otherwise damage the roots during excavation process.
5. Remove material taking special care not to damage underlying tree roots. The root system may be located directly existing surface in some areas. The Engineer must be present during work near tree roots.
6. Remove and dispose all debris immediately from the job site. No stockpiling of removed material will be allowed around the root zone of any tree.
7. The tree roots will not be allowed to remain uncovered for more than one (1) hour. Loam borrow will be placed over the tree roots until the final cover is installed. The roots will also be kept moist, and not allowed to dry out. Water shall be provided by the contractor until the actual surface is placed within the sidewalk area. Heavy equipment shall not be permitted to traverse the remaining root system.
8. The roots to be pruned shall be field verified prior to commencement of this item by the Contractor and the Engineer. Roots shall be pruned using hand equipment which must be disinfected, sharp, and approved by the Engineer. Manual root pruning limits may be extended to other areas within the project area at the discretion of the Engineer.

#### H. Restoration Limits

1. Where the trench location is in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
2. Sidewalks shall be cut at existing joints or as directed otherwise by the Engineer.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.

#### I. Restoration Outside Limits of Work

1. Sidewalks, driveways, parking lots and curbing that are or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the Standard Specification.
2. There shall be no cost to the Owner for this work.

J. Salvaged Granite Curb

1. All existing granite curb which remains unused at the end of the project shall be returned by the Contractor to the City of East Providence Department of Public Works. Coordinate delivery of unused curb with Department of Public Works personnel.

END OF SECTION

## SECTION 02607

### PRECAST CONCRETE MANHOLES

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for modular precast concrete manhole sections with tongue-and-groove joints, cast iron covers, accessories and appurtenances.

###### B. Related Sections

1. Section 02622 - Polyvinylchloride Gravity Sewer Pipe
2. Section 03300 - Cast-In-Place Concrete

##### 1.02 REFERENCES

###### A. American Society for Testing and Materials (ASTM)

1. A48/A48M-00 Standard Specification for Gray Iron Castings
2. A615/A615M-01b Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
3. C32-93(1999)e1 Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale), AASHTO Designation M91-42, Red Sewer Brick Only Grade SS.
4. C144-02 Standard Specification for Aggregate for Masonry Mortar
5. C150-02a Standard Specification for Portland Cement
6. C207-91(1997) Standard Specification for Hydrated Lime for Masonry Purposes
7. C443-02 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
8. C478-02a Standard Specification for Precast Reinforced Concrete Manhole Sections
9. C923-00 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
10. C990-01a Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
11. D4101-02a Standard Specification for Polypropylene Injection and Extrusion Materials

B. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, (referred to as the Standard Specification).

### 1.03 SYSTEM DESCRIPTION

#### A. Design Requirements

1. Manholes shall conform in shape, size, dimensions, materials, and other respects to the details indicated in the Contract drawings.
2. All manholes shall have concrete bases. Invert channels shall be brick construction.
3. Manhole walls (barrels and cones) shall be precast concrete sections. The top of the cone (not to be more than 12-in.) shall be built of brickwork to permit adjustment of the frame to meet the finished surface.
4. The inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerlines of adjoining pipelines.

### 1.04 SUBMITTALS

#### A. Shop Drawings

1. In accordance with Specification Section 01300.

#### B. Samples

1. Provide representative samples of materials if requested by the Engineer.

## PART 2 PRODUCTS

### 2.01 PRECAST CONCRETE SECTIONS

A. Conform to the ASTM C478 with the following exceptions and additional requirements:

1. All cast in place concrete shall conform to the requirements specified under Section 03300.
2. Wall sections to be 5-inch thick minimum.
3. Type II cement in accordance with ASTM C150.

4. 4.0 feet and 5.0 feet diameter manholes minimum of 4,000 psi - 28 days compressive strength.
5. 6.0 foot diameter manhole minimum of 5,000 psi. - 28 days compressive strength except as otherwise permitted.
6. Sections shall be cured by subjecting them to thoroughly saturated steam at a temperature between 100°F and 130°F. for a period of not less than 12 hours or, when necessary for such additional item as may be needed to enable the sections to meet the strength requirements.
7. No more than two lift holes may be cast or drilled into each section.
8. The date of manufacture and the name of trademark of the manufacturer shall be clearly marked on the inside of the barrel.
9. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.

B. Flat Slab Tops

1. Thickness and reinforcement as indicated on the drawings and in accordance with ASTM C478.

C. Cones

1. Cones shall be precast sections of construction similar to above.

D. Bases

1. The tops of the bases shall be suitably shaped by means of accurate bell-ring forms to receive the barrel sections.
2. All holes for pipes shall be cast in the base sections so that there is a clear distance of four inches minimum between the inside bottom of the base section and the pipe invert.
3. Base pad shall be pre-cast with extended base as indicated on drawings and herein specified.
4. Openings for pipe and materials to be embedded in the wall of the base for these joints shall be cast in the base at the required locations during the manufacture of the base.

## 2.02 COMPONENTS

A. Pipe Seals

1. Pre-molded elastomeric-sealed joints fitted or cast integrally into the pipe opening of the manhole base and/or wall section.
2. Provide a watertight joint.
3. Maximum 10-degree omni-directional deflection.
4. In accordance with ASTM C923.

5. Seals to be:
  - a. Lock Joint Flexible Manhole Sleeve by Interpace Corp., Parsippany, NJ;
  - b. Kor-N-Seal by National Pollution Control Systems, Inc., Nashua, NH;
  - c. A-LOK manhole pipe seal by A-LOK Corp., Trenton, NJ;
  - d. or an acceptable equivalent product.
6. All materials, accessories and construction methods used in making the joints shall be supplied or approved by the manufacturer of the pre-molded elastomeric-sealed joint. Furnish manufacturer's written instructions to the Engineer.

#### B. Aluminum Manhole Steps

1. Cast into walls of the precast sections to form a continuous ladder with a distance of 12 inches between steps.
2. Aluminum drop-front type.
3. Acceptable Manufacturers:
  - a. Stock No. 12653B made by Aluminum Company of America, Pittsburgh, PA.
  - b. Stock No. F-14-2-B made by New Jersey Aluminum Co., New Brunswick, N.J.,
  - c. Approved Equal.
4. Before the steps are built into the masonry and after thorough cleaning, those parts of aluminum steps which will be embedded shall be given a protective coating of an acceptable, heavy-bodied, bituminous material. The cleaning shall be done by suitable means and with suitable cleaning agents to ensure that the surfaces to be coated are free from all foreign matter such as dirt, oil, and grease. The steps shall be thoroughly rinsed and dried before the coating is applied and the coating shall have become thoroughly dry before the steps are built into the masonry.

#### C. Plastic Manhole Steps

1. Install in walls of the precast sections to form a continuous ladder with a distance of twelve inches (12) between steps.
2. Copolymer Polypropylene plastic manhole step Model PS2-PFSL as manufactured by M. A. Industries, Inc., Peachtree City, Georgia or approved equal.
3. Plastic steps to be in conformance with ASTM D4101 for Type II propylene copolymers.
4. Plastic to encase 1/2-inch grade 60 steel reinforcing rod conforming to ASTM A615.

#### D. Exterior Coating

1. The material shall be:
  - a. Minwax Fibrous Brush Coat made by the Minwax Co., New York, N.Y. or



- b. Tremco 121 Foundation Coating made by the Koppers Co., Inc., Pittsburgh, PA; or
- c. Acceptable equivalent product.

E. Rubber Gaskets (between manhole sections)

- 1. In accordance with ASTM C443.
- 2. Gasket configuration per manufacturer's recommendation.

F. Butyl Resin Gaskets (between manhole sections)

- 1. In accordance with ASTM C990.
- 2. Gasket configuration per manufacturer's recommendation.

## 2.03 ACCESSORIES

A. Manhole Frames and Covers

- 1. Furnish all cast-iron manhole frames and covers conforming to the details shown on the drawings, or as hereinbefore specified.
- 2. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sand holes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
- 3. Casting shall be thoroughly cleaned and subject to a careful hammer inspection.
- 4. Castings shall be at least Class 25 conforming to ASTM A48.
- 5. Standard drain manhole frames and covers to have 24 inch opening, and be manufactured by E.L. LeBaron Foundry Co. (East Jordan Iron Works), Model no. LK256-2-000 or approved equal. Pattern of cover and lettering shall comply with the Owner's standards.
- 6. Standard sanitary sewer manhole frames and covers to have a 24 inch opening, and be E.L. LeBaron Foundry Co. (East Jordan Iron Works), Model LC246, or approved equal. Pattern of cover and lettering shall comply with the Owner's standards.
- 7. Watertight sanitary sewer manhole frames and covers to have 24 inch diameter covers with 4 bolts, and gasket, and be E.L. LeBaron Foundry Co., Model LCB246, or approved equal. Pattern of cover and lettering shall comply with the Owner's standards.

B. Brick

- 1. Sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer.
- 2. In accordance with ASTM C32.
- 3. In accordance with AASHTO M91-42, Red Sewer Brick Only Grade SS.

4. Reject brick shall be immediately removed from the work.

C. Mortar for Brickwork

1. Composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volume of cement and lime.
2. The proportions of cement and lime shall be 1:1/4.
3. Cement shall be Type II Portland cement in accordance with Specification SECTION 03300.
4. Hydrated lime shall be Type S conforming to the ASTM C207.
5. Hydrated lime shall be "Mortaseal" manufactured by U.S. Gypsum, "4X Hydrate" manufactured by the New England Lime Company or approved equal.
6. Sand shall conform to ASTM C144.

2.04 STUBS IN MANHOLES

- A. The stubs shall be of PVC pipe and shall have PVC stoppers sealed with premolded gasket joints in accordance with Specification SECTION 02622.
- B. Lengths as indicated on the Drawings.

2.05 DROP INLETS

- A. Construct with pipe as specified in SECTION 02622 or with precast concrete sections provided by the manhole manufacturer with all materials conforming to this Specification.

2.06 STRUCTURES FOR DRAINAGE WORK

- A. All Manholes, Inlets and Catch Basins to be used for drains shall be in accordance with Section 702 of the Rhode Island Standard Specification.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manhole Sections

1. Set so as to be vertical and with sections and steps in true alignment.
2. Rubber gaskets shall be installed in all joints in accordance with the manufacturer's recommendations.
3. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or with mortar. The mortar shall be one (1) part cement to one and one half (1-1/2) parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and

an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. Rubber and/or Butyl Resin Gaskets (between manhole sections)

1. In accordance with manufacturers recommendation.
2. Install in all joints between precast sections.

C. Brickwork

1. Only clean bricks shall be used.
2. Bricks shall be moistened by suitable means, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
3. Each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded.

D. Plastering And Curing Brick Masonry

1. Outside faces of brick masonry adjustment courses shall be plastered with mortar to a thickness of on half (1/2) inch.
2. If required, the masonry shall be properly moistened prior to application of the mortar.
3. The plaster shall be carefully spread and troweled. After hardening, the plaster shall be carefully checked by being tapped for bond and soundness.
4. Unbonded or unsound plaster shall be removed and replaced.
5. Brick masonry and plaster shall be protected from too rapid drying by the use of burlaps kept moist, or by other suitable means, and shall be protected from the weather and frost, to insure maximum strength.

E. Exterior Coating

1. The exterior surfaces of all manholes shall be given two coats of bituminous waterproofing material.
2. The waterproofing material shall be applied by brush or spray and in accordance with the instructions of the manufacturer.
3. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

### 3.02 SETTING MANHOLE FRAMES AND COVERS

- A. Manhole frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface or as indicated on the drawings or directed. Frames shall be set concentric with the top of the masonry and in full bed of mortar so that the space between the top of the manhole masonry and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar

extending to the outer edge of the masonry shall be placed all around and on the top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.

- B. Manhole covers shall be left in place in the frames on completion of work at the manholes.
- C. Manhole frames and covers installed in State Roads to have concrete collars in accordance with RI Standard Detail 4.95.

### 3.03 INSTALLING STUBS IN MANHOLES

- A. Stubs shall be set accurately to the required line and elevation and shall be installed in the manhole as indicated on the drawings and in accordance with Specification SECTION 02622.

### 3.04 DROP INLETS

- A. Construct to the required line and elevations as indicated on the Drawings.

### 3.05 CLEANING

- A. Manholes to be free of construction debris prior to final inspection.

### 3.06 STRUCTURES FOR DRAINAGE WORK

- A. Installation of all Manholes, Inlets and Catch Basins to be used for drains shall be in accordance with Section 702 of the Rhode Island Standard Specification.

END OF SECTION

## SECTION 02615

### PAVEMENT MARKINGS, THERMOPLASTIC & EPOXY RESIN

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The work under this section shall include removing existing pavement markings and furnishing and applying a reflectorized oil and grease impervious thermoplastic road marking material which is hot extrusion applied with a surface application of glass spheres or an epoxy resin road marking material. The properly applied markings shall be reflectorized and able to durably resist degradation and deformation by traffic.

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. The thermoplastic material shall be homogeneously composed of pigment, filler, resins, and glass reflectorizing spheres and shall be available in both white and yellow.
- B. The pigment, beads, and filler shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt, and foreign objects and shall comply with requirements according to TABLE 1.

**TABLE 1 COMPOSITION**

| <b>Component</b>                    | <b>By Weight</b> |
|-------------------------------------|------------------|
| <u>Binder</u>                       | 18.0% Min.       |
| Glass Beads (AASHTO M247 Type 1)    | 25.0% Min.       |
| Titanium Dioxide (ASTM D476-Type 2) | 8.0% Min.        |
| Yellow (For Yellow Only)            | 2.0% Min.        |
| Calcium Carbonate & Inert Filler    | See Note         |

Note: Amount of Calcium Carbonate and inert fillers shall be at the option of the manufacturer, providing all other requirements of the specification are met.

- C. The binder shall be primarily composed of maleic-modified glycerol ester of resin and the binder shall not contain, oil and grease compatible, petroleum-based hydrocarbon resins.
- D. The thermoplastic material after heating for four (4) hours at 425° and cooled at 77° shall meet the following color characteristics:

WHITE: Daylight reflectance at 45° - 0°...75% Min.

YELLOW: Daylight reflectance at 45° - 0°...45% Min.  
and match Federal Test Standard Number 595 - color 13538.

- E. When applied at a temperature range of 412° + 12.5° F and thickness of 0.125" the thermoplastic material shall set to bear traffic in not more than two (2) minutes when the air temperature is 50° F and not more than ten (10) minutes when the air temperature is 90°F.
- F. After heating the thermoplastic material for four (4) hours at 425°F the bond strength to Portland Cement concrete shall exceed 180 psi.
- G. For at least ninety (90) days after application the material shall show no cracks other than with substrate cracking.
- H. The solid block material shall be packaged in suitable corrugated containers, 14" x 28" x 3" in size weighing approximately 50 pounds, which will not adhere to material while in storage. Each batch shall designate the color, manufacturer's name, batch number and date of manufacture. Each batch manufactured shall have its own separate number. The label shall warn the user that the material shall be heated in the range of 400° - 440°F during application.
- I. Properly formulated oil impervious thermoplastic will, when 100 grams of a sample is melted and mixed thoroughly with 10 grams (10%) of Quaker State non-detergent motor oil to approximately 425°F remain hard after cooling and show definite separation of the oil as a distinct layer on top of the cooled thermoplastic.

## 2.02 EPOXY RESIN PAVEMENT MARKINGS

- A. General. The two-component, 100 percent solids paint shall be formulated and designed to provide a simple volumetric mixing ratio (e.g., 2-part component A to 1 part component B) specifically for service as a hot-spray applied binder for glass beads in such a manner as to produce maximum adhesion, friction and reflection. The material shall be composed of epoxy resins and pigments only and meet the following requirements:
  - 1. Color. White – the color (after drying at the specified thickness) shall be a flat white, free from tint, furnishing good opacity and visibility under both daylight and artificial light, and shall match Chip No. 17875 of Federal Standard 595. Yellow – the color (after drying at the specified thickness) shall match Chip No. 13538 of Federal Standard 595.

The paint shall be well mixed in the manufacturing process and shall be free from defects and imperfections that may adversely affect the serviceability of the finished product. The paint shall not liver, thicken, curdle, gel, settle

excessively, or otherwise display any objectionable properties after storage. Individual components shall not require mixing prior to use when stored for a maximum of twelve months.

2. Composition. The overall paint composition shall be left to the discretion of the manufacturer, but shall meet the following requirements.

|         |                    |                            |
|---------|--------------------|----------------------------|
| White:  | Titanium Dioxide   | 20+/- 2 percent, by weight |
|         | ASTM D476 Type III |                            |
|         | Epoxy Resin        | 80+/- 2 percent, by weight |
| Yellow: | Chrome Yellow      | 25+/- 2 percent, by weight |
|         | ASTM D211 Type III |                            |
|         | Epoxy Resin        | 75+/- 2 percent, by weight |

3. Epoxy Content (Component A). The epoxy content of the epoxy resin will be tested in accordance with ASTM D1652 and calculated as the weight per epoxide equivalent (WPE) for both white and yellow.

The epoxy content will be determined by a pigment free basis. The WPE shall meet a target value provided by the manufacturer within a tolerance of +/- 50.

4. Amine Value (Component B). The amine value shall be tested in accordance with ASTM D2074 to determine its total amine value. The total amine value shall meet a target value provided by the manufacturer within a tolerance of +/- 50.

The manufacturer may specify an alternate test method for determining the amine value subject to the approval of the Engineer.

5. Toxicity. Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property. A certification stating such is required to be submitted to the Engineer.
6. Abrasion Resistance (ASTM D4060). When the abrasion resistance of the material is tested with a CS-17 wheel under a load of 1,000 grams for 1,000 cycles, the wear index shall be no greater than 82.
7. Hardness (ASTM D2240). The Type D durometer hardness of the material shall not be less than 75 nor more than 100 after the material has been conditioned for not less than 72 hours nor more than 96 hours at 23degrees +/- 2 degrees C.
8. Tensile Strength (ASTM D638). The tensile strength of the material shall not be less than 6,000 psi after 72 hours of conditioning at 23+/-2 degrees Celsius.

9. Compressive Strength (ASTM D695). The compressive strength of the material shall not be less than 12,000 psi after 72 hours of conditioning at 23+/- 2 degrees Celsius.
  10. Infrared Spectrophotometer Analysis (ASTM D2621). Samples of both Part A and Part B (and of that mixed to the proper ratio) shall be analyzed by infrared spectrography. The spectrum of each component and final product shall be a reasonable match to the spectrum of the original formulation submitted by the manufacturer.
  11. Directional Reflectance (ASTM E1347). The daylight directional reflectance (without glass spheres) shall be not less than 84 percent for white and not less than 50 percent for yellow (relative to Magnesium Oxide).
  12. Dry Time – Laboratory (ASTM D711). The epoxy resin compounds, when mixed in the proper ratio and applied to a uniform wet film thickness of 20 mils and immediately dressed with glass beads at the proper rate, shall exhibit a no-tracking drying condition in not more than 30 minutes at 72 degrees F.
  13. Dry-Time – Field. The no-tracking condition for the field shall be considered as the condition where no visual displacement of the epoxy resin striping material is observed.
- B. Certification. The manufacturer shall furnish a certified test report by an independent testing laboratory prior to the start of the work indicating that the material as specified has been tested in accordance with the above procedures and that the results comply with the above requirements. A Material Safety Data Sheet is also required.
- C. Packaging. The epoxy materials shall be shipped in appropriate, durable, and substantial containers. Individual containers shall be plainly marked with the following information: manufacturer's name and address; name of product; lot number; batch number; color; net weight and volume of contents; date of manufacture; date of expiration; statement of content (i.e., Part A-contains pigment and epoxy resin; Part B – contains catalyst); mixing proportions, application temperatures and instructions; and safety information.

## 2.03 GLASS BEADS – DUAL GRADATION

- A. Scope. This specification covers the requirements for glass beads which are to be dropped onto white and yellow epoxy resin pavement marking material to produce a highly weather-and-wear resistant reflectorized traffic marking.
- B. Detailed Requirements.
1. Reflective Glass Spheres. The glass spheres shall be transparent, clean, smooth, and spherically shaped, free of milkiness, pits, or excessive air bubbles and conform to the following specific requirements.



- a. Coatings. The spheres shall be coated to enhance their embedment characteristics to the binder. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps.
- b. Quality Assurance. The spheres shall be segregated into maximum lots of 2,500 pounds and lot numbers shall be stamped onto each. Each lot shall be tested for gradation, rounds and coating and a Certificate of Compliance stating such will accompany each lot.
- c. Gradation. The glass spheres shall meet the following gradation requirements when tested in accordance with ASTM D1214.

| Type I     |                 | Type II    |                 |
|------------|-----------------|------------|-----------------|
| Sieve Size | Percent Passing | Sieve Size | Percent Passing |
| 10         | 100             | 20         | 95-100          |
| 12         | 95-100          | 30         | 80-95           |
| 14         | 80-95           | 50         | 9-42            |
| 16         | 10-40           | 80         | 0-10            |
| 18         | 0-5             | -          | -               |
| 20         | 0-2             | -          | -               |

- d. Roundness. The glass spheres shall have a minimum of 80 percent rounds per screen for the two highest sieve quantities for Types I and II, and no more than 3 percent angular particles per screen for the Type I gradation. The remaining fractions shall typically be no less than 75 percent rounds as tested according to ASTM D1155, Procedure A.
- e. Refractive Index. The glass spheres shall have a refractive index of 1.50 to 1.52 when tested according to AASHTO M247.
- f. Silica Content. The silica content of the glass spheres shall not be less than 60 percent.
- g. Packaging. Reflective glass spheres shall be shipped in moisture resistant bags. Each bag shall be marked with the name and address of the manufacturer, the name and net weight of the material, batch or lot number, and shall include a certified test report stating that they meet the above test requirements.

### PART 3.00 EXECUTION

- A. The thermoplastic material shall readily be applicable at temperatures between 400° and 440°F from the approved equipment to produce a 0.090" cross section of line at varying width in yellow or white as shown on the plans.
- B. Equipment supplies shall consist of a completely enclosable steel mobile trailer

containing a thermoplastic applicator equal to Pave-Mark Corporation's Apollo System II Plus 1, a spare propane gas bottle, spare tire, 4" and 12" width extrusion dies and a variable width bead dispenser.

- C. The approved thermoplastic applicator must be capable of thermostatically melting and properly applying at least 175 lbs. of thermoplastic material per hour without the use of a separate melting kettle. A block thermoplastic material preheater shall be quick mountable at an 82° vertical angle on the applicator to rapidly melt material. The material discharged into the extrusion die shall be heated by means of a covered radiant heater. Torch flame heating the die is unacceptable.
- D. The CONTRACTOR shall supply a minimum of 100 pounds of, AASHTO M-247, drop-on beads for each ton of thermoplastic material purchased. The glass bead dispenser shall be automatically operated only by the extrusion die control handle. The knurled bead shaft shall not rotate more than one-half inch wider than the thermoplastic line width in order to conserve material.
- E. Any existing pavement marking consisting of thermoplastic and/or paint must be removed from the roadway surface within the project area prior to application of any new striping using a pavement marking removing technique approved by the CITY.

### 3.01 EPOXY RESIN PAVEMENT MARKINGS

- A. Equipment – Equipment for the application of epoxy resin traffic stripes or special handwork shall consist of one or more mobile, truck-mounted and self-contained pavement marking machines, specifically designed to apply epoxy resin striping material and reflective glass beads in continuous and skip-line patterns. The equipment shall be capable of applying straight and curved lines in a true arc. In Addition, the truck mounted unit shall be provided with accessories to allow for the marking of legends, symbols, crosswalks, and other special patterns. At any time throughout the duration of the project, the Contractor shall provide free access to the equipment for inspection by the Engineer. The Engineer may approve the use of portable applicator in lieu of mobile truck mounted accessories for use in applying special markings only, provided such equipment can demonstrate satisfactory application of reflectorized epoxy markings in accordance with these specifications.

The application equipment shall be capable of installing a minimum of 10 miles of epoxy reflectorized pavement markings in an eight hour day and shall include the following features:

1. Individual material reservoirs for the storage of each of the individual epoxy resin components and each type of glass beads.
2. Heating element of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application.
3. Two separate gravity type glass beads dispensers capable of uniformly applying glass beads to epoxy resin traffic stripes at the rate required.
4. Accurately calibrated, tamper-proof, metering type device to monitor the ratio

of the components being fed to the spray nozzle. The devices should be visible to the operator while the equipment is in use and can be capable of displaying the proportioning such that the actual mixing ratio can be determined at all times.

5. Accurately calibrated, tamper-proof, metering type devices that measure and record the number of gallons of epoxy resin material used and corresponding length of stripe(s) applied. Each application gun shall have individual footage accumulators which are activated only when material is being applied. This information shall be provided in a format that permits a direct determination of the yield (average mil thickness) of the applied materials.
  6. All applicator guns on the spray carriages shall be in full view of the operator during operation. The equipment shall be capable of placing two lines simultaneously with either line a solid or intermittent pattern on yellow or white. When the color of the material is changed, a quantity of material equal 150 linear feet of stripe(s) shall be wasted to eliminate the chance of contamination of the alternate color.
  7. An air pressure nozzle shall be directed to the area to be striped to permit cleaning of the road surface immediately prior to application of the material. The pressure in the line shall be a minimum of 175 psi.
  8. When working on a roadway with more than one lane in either direction, the applicator truck shall have a permanently mounted, variable direction, illuminated arrow board, fully operational and visible to approaching traffic.
- B. General. Before any pavement marking work is begun, a schedule of operations shall be submitted for the approval of the Engineer. At least 5 days prior to the starting of striping, the Contractor shall provide the Engineer with the epoxy manufacturer's written instructions for use, including but not limited to, material mixing ratios and application temperatures.

When pavement markings are applied under traffic flow conditions, the Contractor shall provide all necessary signs, cones, arrow boards, etc., in accordance with the contract provisions and the latest edition of MUTCD to maintain and protect the traffic, the marking operation, and the pavement markings until thoroughly set.

If, for any reason, it is not possible to place epoxy lane and center lines within the guidelines and restrictions of the contract, and no previous lines exist, the Contractor, at his expense, shall place the appropriate color of four-inch reflective temporary pavement markings for the entire length of the roadway that is unstriped in accordance with the latest edition of the MUTCD. The temporary pavement markings and possible subsequent removal shall be at the Contractor's expense. The type of temporary markings will be approved by the Engineer.

The Contractor shall be responsible for removing, to the satisfaction of the Engineer, all tracking marks, spilled epoxy markings applied in unauthorized areas.

- C. Power Wash. All special patterns, handwork, and oil or other deleterious substances shall be removed by a power wash machine with a pressure of 1400-2800 psi with the water heated to 180-195 degrees F. No chemicals shall be added to the water in the process. The machine will be equipped with a turbo blast tip with oscillating head and shall be capable of supplying 5 gallons/minute/gun.

Pavement cleaning shall consist of at least a brushing with a rotary, non-metallic broom and additionally as may be recommended by the manufacturer, all to the satisfaction of the Engineer. New Portland cement concrete shall be cleaned by sandblasting to remove any surface treatments and/or laitance. Surface cleaning and preparation work shall be performed only in the area of the epoxy markings applications. The pavement surface shall be air-blasted to remove dirt and residues just prior to the application of the markings.

1. Restrictions. Epoxy striping material shall be applied to substantially dry pavement surfaces. The pavement surface temperature and the ambient temperature shall be a minimum of 35 degrees F. at time of application. Operations shall neither start nor be continued during periods of rain or in the case of damp pavement. Operations shall not continue until the Engineer determines that the roadway surface is dry enough to achieve adhesion.

The individual epoxy components shall be heated to the temperatures recommended in the epoxy manufacturer's written instructions for use or as stated in the FHWA Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (note maximum temperature of 140 degrees F.)

The ratio of the two components shall be monitored during the application, using the installed metering devices. Should the ratio fall outside the range of +/- 5 percent of the manufacturer's specified mixing ration for over 30 seconds or at any time fall outside the range of +/- 10 percent, the application shall be stopped and the cause of the problem determined and corrected before proceeding.

2. Application. Epoxy pavement markings must be reflectorized for night visibility by adding reflective spheres before the paint dries or sets, by the double-drop method. The reflective spheres, Type I followed immediately by Type II, shall be evenly dispersed on a minimum wet film thickness of 20 mils on existing and new pavements at a minimum rate of 12 pounds per gallon for each type of glass sphere. All special patterns and handwork (i.e., stop bars, arrows, legends, symbols, etc.) shall meet the above application rates with the following exception: The double-drop application of glass spheres will use the Type II gradation only with two applications at a minimum of 12 pounds per gallon each

The Contractor shall place necessary spotting at appropriate points to provide horizontal control for striping and to determine necessary starting and stopping points. Longitudinal joints, pavement edges and existing markings shall serve as horizontal control when approved by the Engineer.

Epoxy reflectorized pavement markings shall be placed at the width, thickness, and pattern designated by the Contract Documents. Marking operations shall not begin until applicable surface preparation work is completed and approved by the Engineer, and the atmospheric conditions and pavement surface temperature are acceptable to the Engineer. The temperature of the mixed epoxy may be adjusted as required for prevailing conditions, including air temperature and pavement temperature to achieve the prescribed no-track time. The speed of the applicator truck shall not exceed the recommended rate for the combination of the truck rate, pressure in the lines, and the tip opening and height of the spray gun to insure the required thickness.

- D. Quality Assurance. A tolerance of ¼-inch under or over the specified width will be allowed for striping provided the variation is gradual and does not detract from the general appearance. Alignment deviations for the control guide shall not exceed 2 inches provided the variation is gradual and does not detract from the general appearance. Material shall not be applied over a longitudinal joint. Establishment of these tolerances shall not relieve the Contractor of his responsibility to comply as closely as practicable with planned dimensions.

Retroreflection shall be measured using a 30-meter geometry portable unit following ASTM D6359 with the following exceptions: minimum values shall not be less than 350 mcd/lum/m<sup>2</sup> for white and 225 mcd/lum/m<sup>2</sup> for yellow as measured by the Engineer; and measurement for acceptance shall be performed between 14 and 60 days after placement.

Epoxy reflectorized pavement markings, which after application and curing are determined by the Engineer to be defective and not in compliance with this Specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Engineer at no additional cost to the City. Repair methods shall be detailed and submitted for approval to the Engineer prior to corrective action.

- E. Symbols and Word Messages. Symbols and word messages shall be applied to the pavement where designated on the Plans or as directed by the Engineer. The letters shall be elongated in the direction of traffic as shown on the Plans or as directed by the Engineer.
- F. Epoxy Retroreflection Values. Payment will be as follows:
1. Minimum 350/225 (white/yellow): 100% contract unit price
  2. Minimum 330/205 (white/yellow): 90% contract unit price
  3. Minimum 310/185 (white/yellow): 80% contract unit price
  4. Minimum 300/175 (white/yellow): 75% contract unit price
  5. Below 300/175 (white/yellow): 0% contract unit price

END OF SECTION

## SECTION 02622

### POLYVINYL CHLORIDE GRAVITY SEWER PIPE

#### PART 1 GENERAL

##### 1.01 SUMMARY

###### A. Section Includes

1. Requirements for furnishing, installing and testing polyvinyl chloride (PVC) gravity sewer pipe and fittings.

###### B. Related Sections

1. Section 02200 - Earthwork
2. Section 02215 - Aggregate Materials

##### 1.02 REFERENCES

###### A. American Society for Testing and Materials (ASTM) Publications

1. D3034, Specification for Type PSM Poly (vinyl chloride) (PVC) Sewer Pipe and Fittings.
2. D3212, Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
3. F477, Specification for Elastometric Seals (Gaskets) for Joining Plastic Pipe.
4. F679, Specification for Poly (vinyl chloride) (PVC) Large - Diameter Plastic Gravity Sewer Pipe and Fittings.

##### 1.03 SUBMITTALS

###### A. Shop Drawings

1. In accordance with SECTION 01300 - SUBMITTALS.
2. Submit for review shop drawings showing pipe dimensions, joints, joint gaskets, and other details for each size of pipe to be furnished for the project.
3. All pipe furnished under the contract shall be manufactured only in accordance with the Specifications and the reviewed drawings.

###### B. Samples

1. Submit samples of products if requested by the Engineer.

## 1.04 QUALITY ASSURANCE

### A. Certifications

1. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to the herein-mentioned ASTM specifications.
2. Pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such tests as he deems necessary.
3. All tests shall be made in accordance with the methods prescribed by the herein-mentioned ASTM specifications, and the acceptance or rejection shall be based on the test results.
4. Assist the Engineer in inspecting the pipe upon delivery.
5. Pipe not conforming to the requirements of this contract will be rejected and shall be immediately removed from the site by the Contractor.

## 1.05 DELIVERY, STORAGE, AND HANDLING

### A. Storage and Protection

1. All pipe shall be stored at the site or 111 Mount Hope Avenue, Bristol, RI until installation in accordance with the manufactures recommendations.

## PART 2 PRODUCTS

## 2.01 MATERIALS

### A. Pipe, Fittings, And Specials

1. Diameters four (4) inch through 15 inch, in conformance with ASTM D3034
2. Diameters 18 inch through 27 inch in conformance with ASTM F679 (Wall thickness T-1).
3. The pipe shall have pipe diameter to wall thickness ratio (SDR) of a maximum of 35, unless otherwise indicated and/or approved by the Engineer.

### B. Straight Pipe

1. Lengths of not more than 13 feet..

### C. Y-branches

1. Lengths of not more than three (3) feet., unless otherwise permitted by the Engineer.
2. Saddle Y-branches will not be allowed.

#### D. Specials

1. Conform to the specifications for straight pipe as applicable and to the details indicated on the drawings or bound into the back of the specifications.

#### E. Joints

1. Conforming to ASTM D3212.
2. Push-on bell and spigot joints using elastomeric ring gaskets

#### F. Gaskets

1. Conforming to ASTM F477.
2. Securely fixed into place in the bells so that they cannot be dislodged during joint assembly.
3. Composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.

#### G. Lubricant

1. In accordance with manufacturers requirements.

### PART 3 EXECUTION

#### 3.01 PREPARATION

##### A. Inspection of Pipe

1. Inspect each pipe unit before being installed.
2. No single piece of pipe shall be laid unless it is generally straight and undamaged.
3. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16 in. per ft. of length.
4. If a piece of pipe fails to meet this required check for straightness, it shall be rejected and removed from the site.
5. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

##### B. Handling of Pipe



1. Each pipe unit shall be handled into its position in the trench, by such means as acceptable to the Engineer. Care shall be taken to avoid damaging the pipe and fittings.

#### C. Preparation of Existing Pipe

1. Existing pipe shall be exposed to a sound durable section and cut clean.

### 3.02 INSTALLATION

#### A. Placement

1. Except as otherwise indicated on the drawings, support pipe with compacted Crushed Stone in accordance with Specification SECTION 02215. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
2. Provide suitable depressions in crushed stone to accept pipe bells, so that after placement, only the barrel of the pipe receives bearing pressure from the supporting material.
3. Clear pipe and fittings of debris, dirt, etc., before being installed, keep clean until accepted in the completed work.
4. Install pipe and fittings to the lines and grades indicated on the drawings or as required by the Engineer. Care shall be taken to ensure true alignments and gradients.

#### B. Joining Pipe

1. Before any joint is made, the previously installed unit shall be checked to assure that a close joint with the adjoining unit has been maintained and that the inverts are matched and conform to the required grade.
2. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber or other unyielding object.
3. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer's recommendation.
4. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket.
5. Suitable devices shall be used to force the pipe units together so that they will fit with a minimum open recess inside and outside and have tightly sealed joints.
6. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.
7. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.
8. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units.

9. Gasket installation and joint assembly shall follow the directions of the manufacturers of the joint material and of the pipe, all subject to review by the Engineer. The resulting joints shall be watertight and flexible.
10. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.

#### C. Rejecting Pipe

1. Pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM Specifications as hereinbefore specified. If the pipe is unsatisfactory, as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

#### D. Bedding Pipe

1. After each pipe has been properly placed, enough crushed stone shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment.
2. Bell holes (depressions), provided for jointing, shall be filled with crushed stone and compacted, and then crushed stone shall be placed and compacted to complete the pipe bedding, as indicated on the drawings.

#### E. Protecting Pipe

1. Take all necessary precautions to prevent flotation of the pipe in the trench.
2. Close the open ends of the pipe with temporary watertight plugs, at all times pipe installation is not in progress.
3. If water is in the trench when work is to be resumed, the plug shall not be removed until suitable provisions have been made to prevent water, earth, or other substances from entering the pipe.
4. Pipelines shall not be used as conductors for trench drainage during construction.

#### F. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends of the new pipe and the existing service pipe shall be cleaned thoroughly for a distance of eight (8) inches
2. After assembly and inspection and before being backfilled, all exterior surfaces of buried sleeve-type couplings, shall be thoroughly coated with an approved heavy-bodied bituminous mastic. Care shall be taken and appropriate devices used to

ensure that the undersides, as well as the more readily accessible parts, are well coated.

#### G. Backfilling Pipelines

1. In accordance with SECTION 02200.

### 3.03 ALLOWABLE PIPE DEFLECTION

- A. Pipe provided under this specification shall be installed not exceeding a maximum deflection of seven and one half percent (7.5%). Deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
- B. Upon completion of a section of sewer, including placement and compaction of backfill, the Contractor shall measure the amount of deflection by pulling a specially designed gauge assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and be acceptable to the Engineer.
- C. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

### 3.04 CLEANING

- A. Care shall be taken to prevent earth, water, and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, clean out the pipeline and manholes, being careful to prevent soil, water, and debris from entering any existing sewer.

### 3.05 FIELD QUALITY CONTROL

#### A. Pipeline Flushing

1. Care shall be taken to prevent earth, water, and other materials from entering the pipe.. As soon as possible after the pipe and manholes are completed on any street, flush out the new pipeline, using a rubber ball ahead of the water, flushing water or debris will not be permitted to enter any existing sewer.

#### B. Inspection By Light

1. The alignment of the pipe will be checked by shining a flashlight through the pipe from one manhole to the adjacent manhole. The inspector must be able to see the full circumference of the lighted pipe for its entire length when looking through the pipe from the adjacent manhole towards the manhole from which the light is being emitted.

### C. Leakage Tests

1. The pipeline shall be made as nearly watertight as practicable, and leakage tests and measurements shall be made after the pipeline has been backfilled.
2. Where the groundwater level is more than one (1) foot. above the top of the pipe at its upper end, the Contractor shall conduct either infiltration tests or low pressure air tests.
3. Where the groundwater level is less than one (1) foot. above the top of the pipe at its upper end, conduct either exfiltration tests or low-pressure air tests.
4. At the time of the test, determine the groundwater elevation from observation wells, excavations or other means, all subject to review by the Engineer.
5. For making the infiltration and exfiltration tests, furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the tests on sections of acceptable length.
6. The sewers shall be tested before any connections are made to buildings.
7. Provide all instruments, weirs, bulkheads, water and equipment required to test the sewer.
8. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation.
9. If, in the judgment of the Engineer, it is impracticable to follow the procedures specified in this Specification for any reason, acceptable modifications in the procedures shall be made as required, but in any event, the Contractor shall be responsible for the ultimate tightness of the line.

### D. Low Pressure Air Test

1. For making the low-pressure air tests, use equipment specifically designed and manufactured for the purpose of testing sewer pipelines using low-pressure air. The equipment shall be provided with an air regulator valve or air safety so set that the internal air pressure in the pipeline cannot exceed eight (8) psig.
2. The leakage test using low pressure air shall be made on each manhole-to-manhole section of pipeline after placement of the backfill.
3. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
4. All air used shall pass through a single control panel.
5. Low-pressure air shall be introduced into the sealed line until the internal air pressure reaches four (4) psig. greater than the maximum pressure exerted by the groundwater that may be above the invert of the pipe at the time of the test. However, the internal air pressure in the sealed line shall not be allowed to exceed

eight (8) psig. When the maximum pressure exerted by the groundwater is greater than four (4) psig., conduct only an infiltration test.

6. At least two minutes shall be allowed for the air pressure to stabilize in the section under test. After the stabilization period, the low-pressure air supply hose shall be quickly disconnected from the control panel. The time required in minutes for the pressure in the section under test to decrease from three and one half (3.5) to two and one half (2.5) psig (greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe) shall not be less than that shown in the following table:

| <u>Pipe diameter in inches</u> | <u>Minutes</u> | <u>Pipe diameter in inches</u> | <u>Minutes</u> |
|--------------------------------|----------------|--------------------------------|----------------|
| 6                              | 3.0            | 18                             | 9.0            |
| 8                              | 4.0            | 21                             | 10.0           |
| 10                             | 5.0            | 24                             | 11.5           |
| 12                             | 5.5            | 27                             | 13.0           |
| 15                             | 7.5            |                                |                |

#### E. Infiltration Test

1. For making the infiltration tests, underdrains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable.
2. Upon completion of a section of the sewer, dewater it and conduct a satisfactory test to measure the infiltration for at least 24 hours. The amount of infiltration, including manholes, tees, and connections, shall not exceed 200 gal. per inch diameter per mile of sewer per 24 hours.

#### F. Exfiltration Test

1. For making the exfiltration tests, the sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of two (2) feet. above the top of the sewer at its upper end. Where conditions between manholes, may result in test pressures which would cause leakage at the stoppers in branches, provisions shall be made by suitable ties, braces, and wedges to secure the stoppers against leakage resulting from the test pressure.
2. The rate of leakage from the sewers shall be determined by measuring the amount of water required to maintain the level two (2) feet. above the top of the pipe.
3. Leakage from the sewers under test shall not exceed the requirements for leakage into sewers as hereinbefore specified.

END OF SECTION

## SECTION 02930

### LOAMING AND SEEDING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements for loaming, fertilizing, seeding, and related work in areas disturbed in the process of performing the Work under this contract.

##### 1.02 SUBMITTALS

- A. In accordance with SECTION 01300 submit the following:
  - 1. Submit with seed, certificates confirming seed mixture, purity, germinating value, and crop year identification.
  - 2. Submit test samples of loam.

##### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Fertilizer:
  - 1. Delivered mixed as specified in standard size, unopened containers showing weight, analysis, and name of manufacturer.
  - 2. Store in weather proof place.
- B. Seed:
  - 1. Delivered in original unopened containers with mixture listed.

##### 1.04 REFERENCES

- A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall familiarize themselves with all requirements reference by this specification.
  - 1. State of Rhode Island Department of Transportation (RIDOT) Standard Specifications, 2022 Edition with latest addenda.

#### PART 2 PRODUCTS

##### 2.01 LOAM

- A. Fertile, natural topsoil, typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Mixture of sand, silt and clay particles in approximately equal proportions. Free of stumps, roots, heavy or stiff clay, stones large than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other deleterious matter.
- B. Not less than 5 percent nor more than 20 percent organic matter as determined by loss on ignition of oven-dried samples.

- C. Loam test samples dried to constant weight at temperature of 230 degrees. F., plus or minus nine degrees.
- D. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.

## 2.02 LIME, FERTILIZER AND SEED

- A. Ground agricultural limestone containing not less than 85 percent of total carbonates.
- B. Complete fertilizer, at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight:  
     Nitrogen 10%                  Phosphorus 10%                  Potash 10%
- C. Turf grass seed, clean, high in germinating value and latest year's crop mixture as follows:

| Name                      | Minimum<br>Proportion<br>by Weight | Percent<br>Purity | Percent<br>Germination |
|---------------------------|------------------------------------|-------------------|------------------------|
| Kentucky bluegrass        | 20%                                | 87%               | 85%                    |
| Merion Kentucky bluegrass | 20%                                | 87%               | 85%                    |
| Red Chewings fescue       | 45%                                | 98%               | 85%                    |
| Italian rye               | 15%                                | 98%               | 90%                    |

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Supply suitable quantities of water, hose, and appurtenances.

### 3.02 LOAM

- A. Spread loam on areas to 6-inch depth after compaction, fine grade and compact.

### 3.03 LIME, FERTILIZER AND SEEDING

- A. Apply lime by mechanical means at rate of 3000 pounds per acre.
- B. Apply fertilizer at rate of 1200 pounds per acre.
- C. Remove weeds or replace loam and reestablish finish grades, if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 175 pounds per acre on calm day, by mechanical means. "Hydro-Seeding" not permitted unless otherwise permitted or required by the Owner or Owner's Representative. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.

- D. Water lawn areas adequately at time of sowing and daily thereafter, initially with fine spray, and continue throughout maintenance and protection period.
- E. Seed during approximate time periods of April 1 to May 15 and August 15 to October 1, and only when weather and soil conditions are suitable for such work, unless otherwise permitted.

#### 3.04 MAINTENANCE OF SEEDED AREAS

- A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing at least three times. Weed thoroughly once and maintained until time of final acceptance. Reseed and re-fertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.
- B. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.
- C. Repair or replace all seeded areas which, in judgment of Owner or Owner's Representative, have not survived and grown in satisfactory manner, for a period of one year after acceptance.
- D. Seeding replacement, same seed mixture as specified and furnished and installed as specified.

#### 3.05 TEMPORARY COVER CROP

- A. Sow a temporary cover crop of buckwheat, domestic rye grass or other acceptable seed if there is insufficient time in the planting season to complete seeding, fertilizing, and permanent seeding at the option of Contractor or order of Owner or Owner's Representative. Cut and water cover crop as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into soil, the areas shall be fertilized and permanent seed crop sown as specified.

END OF SECTION



## **DIVISION 3**

## **SECTION 03 31 00**

### **CAST-IN-PLACE CONCRETE**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Description for the complete installation of standard concrete construction.

##### **1.02 REFERENCES**

- A. ASTM C150 - Specification for Portland Cement
- B. ASTM C33 - Specification for concrete aggregates
- C. ASTM A-15 - Standard metal reinforcement
- D. ASTM A-305 - Minimum requirements for the deformation of deformed steel bars for concrete reinforcement
- E. ASTM A-185 - Standard specifications for welded steel wire fabric for concrete reinforcement.
- F. ASTM C-192 - Method of making and curing concrete compression and flexure test specimens in the laboratory.
- G. ASTM C-31 - Method of making and curing concrete compression and flexure test specimens in the field.
- H. ASTM C-39 - Test for compressive strength of cylindrical strength of cylindrical concrete specimens.
- I. ASTM C-143 - Test for slump of Portland Cement Concrete
- J. ASTM C-42 - Method of obtaining and testing drilled cores and sawed beams of concrete
- K. ASTM C-94 - Standard Specifications for Ready-Mix concrete.

##### **1.03 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Test reports shall be submitted for approval and the results distributed as follows: Copy to field office, 1 copy to contractor's office and 4 copies to Architect's office
- C. Shop drawings shall indicate dimensions, bar schedules, bending details and placing diagrams and details for all reinforcement.
- D. Design data shall be by the architect 30 days prior to commencing any concrete operations.

- E. Record documents regarding concrete pours shall be kept by the contractor and submitted to the Architect, upon request including the following data: date of pour, starting time, mean temperature, total yardage pour location, time of finish and curing duration.

#### 1.04 QUALITY ASSURANCE

- A. Concrete Quality: When there is any question as to the quality of the concrete of the structure, the Architect may require the Contractor, at the Contractor's expense, to have tests made in an approved independent testing and inspection laboratory. Such tests shall be in accordance with ASTM C-42 or Section 201 and 202 of the current A.C.I. Building code for Reinforced Concrete (A.C.I. 318) as may be required. The criteria for acceptability of the concrete under the latter shall be that given therein. If tested concrete is below contract requirements, the Architect may condemn such concrete already installed. Remove such condemned concrete and replace with new concrete that meets the proper criteria.

#### 1.05 QUALIFICATIONS

- A. All companies involved in performing the work of this section shall have documented experience specializing in such work for a minimum of five years.

#### 1.06 REGULATORY REQUIREMENTS

- A. All concrete construction shall meet state and local code requirements.

#### 1.07 MEASUREMENT OF MATERIALS

- A. Measurement shall be by weight by weighing devices accurate within 1% except that water may be measured by either weight or volume and the water measuring device shall be controllable to one-half of one percent.

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS:

- A. Cement: Cement shall be Portland cement Type I, conforming to ASTM Specification C-150. Type III High Early Cement shall be used between December 1st and April 1st.
- B. Only one brand of cement shall be used for all structural concrete to be left exposed, so that even coloring is assured for all such surfaces.
- C. Fine Aggregate: Sand for concrete work shall conform to ASTM Specification C-33, and shall be composed of clean, hard, durable, uncoated grains free from silt, loam and clay.
- D. Coarse Aggregate: Coarse aggregate shall be gravel or crushed stone conforming to ASTM Specification C-33 and shall be composed of clean, hard, durable, uncoated grains of strong material. Maximum size of aggregate shall be 1 inch.
- E. Water: Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances.

- F. Metal Reinforcement: Reinforcing bars shall conform to (ASTM Designation: A 615/A 615M, Grade 60, deformed).
- G. Wire Fabric: Welded wire fabric for concrete reinforcement shall conform to ASTM Designation A-185.
- H. Metal Accessories: Include all spacers, chairs, ties and other devices necessary for properly placing, spacing, supporting and fastening reinforcement in place.
- I. Floor Hardener: Floor Hardener in all areas where floor finish is exposed concrete, not otherwise covered or given floor coating shall be Lapidolith as manufactured by L. Sonneborn Sons, Inc., Flintox Liquid manufactured by Toch Bros., Inc., Hornolith manufactured by A.C. Horn Products of Dewey and Almy Chemical Division, W.R. Grace & Co., or Agatex manufactured by Devoe-Truscon. Number of coats and application procedure shall be in strict accordance with applicable manufacturers specification.
- J. Inserts: Inserts shall be either adjustable, threaded or wedge types depending on use as manufactured by Hohmann & Barnard, Inc., 205 East 53rd Street, New York, New York.
- K. Admixtures: The use of any admixtures other than those which may be specified, shall be used only when and as approved in writing by the Architect. Anti-freeze admixtures shall not be used. All exposed concrete shall have Pozzo-lith additive and Dorex air entraining additive.
- L. Aggregate for Exterior Ramps and Stairs: Concrete finish shall be made non-slip by using Coarse (C.F.) Alundum Aggregate (40 lbs. per 100 sq. ft.), as manufactured by the Norton Co., Worcester, Mass.
- M. Curing Material: Demicon with fugitive dye or approved equal as manufactured by McMillan Products Co., applied in accordance with manufacturer's instructions. Kraft paper for protection shall be similar to SE-30 as manufactured by American Sisalkraft Corp., properly lapped and secure in place.

## 2.02 MIXES

- A. Concrete details, plain or reinforced to conform to the current provisions of the A.C.I. Code. Design and strength of concrete 3000 lbs. per sq. inch at 28 days; minimum cement content 6 bags per cu. yd. of concrete and not more than 6-1/2 gallons of water per bag of cement shall be used to maintain proper strength, workability and consistency. Maximum slump shall be 5" however, exposed concrete shall have a maximum slump of 4" plus or minus 2".
- B. Design of Mixes: The testing laboratory, selected by the Architect shall prepare the designs of mixes for the strength of concrete specified to be used. For trial mixes, use identical proportions of cement and aggregate that will be used for job mix. Tests shall be in accordance with ASTM C-192 and C-39. Laboratory trial mix shall develop concrete comprehensive strength 15% higher than required minimum. Prepare mix design for each type of cement.

## 2.03 MIXING OF CONCRETE:

- A. Equipment: The mixing equipment shall be capable of combining the aggregates, cement and water within the specified time into a thoroughly mixed and uniform mass and of discharging the mixture without separation.
- B. Truck Mixing: Truck mixers shall be of the revolving drum type, watertight, and so constructed that the concrete can be mixed to insure a uniform distribution of materials. All solid materials for the concrete shall be accurately measured in accordance with section on measuring and charged into the drum at the proportioning plant. The truck mixer shall be equipped with a tank for carrying water, and the tank equipped with a device by which the quantity of water added can be readily verified. Only the predetermined amount of water shall be added to the dry mixture at the site. Truck mixing shall be continued for not less than fifty revolutions after all ingredients, including the water, are in the drum and shall not continue for more than ten minutes before being used.
- C. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM Designation C-94.
- D. Hand Mixing: When hand mixing is authorized, it shall be done on a watertight platform and in such a manner as to insure a uniform distribution of the materials throughout the mass. Mixing shall be continued until a homogeneous mixture of the required consistency is obtained.
- E. Retempering: The retempering of concrete or mortar which has partially hardened will not be permitted.

## 2.04 QUALITY CONTROL

- A. Concrete Tests: Tests of concrete shall be made by the testing laboratory. Not less than one test, or as may be directed by the Architect, for each 100 cu. yd. of concrete for each strength of concrete placed will be required with a minimum of one test for each day's pour. Not less than four specimens will be made and stored by the Contractor for each test. All specimen shall be cured and tested by the Laboratory. Specimen shall be made and tested in accordance with current ASTM Specifications C-39 and C-31. Slump tests shall be made on each batch tested in accordance with current ASTM Specification C-143.
- B. Each test shall consist of four specimens of which one cylinder shall be tested after 7 days; two cylinders shall be tested after 28 days; fourth cylinder shall be tested at 45 days only when 28 day tests are below specified strength. In all cases where strength of specimen falls below required minimum ultimate compressive strength, the Architect shall have the right to make whatever changes are necessary to secure the required strength.

## 2.05 CEMENT FINISHES:

- A. Concrete Floor Slab Finishes: Finished floor slab surfaces shall be true plane surfaces with a tolerance of 1/8" in 10' unless otherwise indicated. Surfaces shall be pitched to drains. The dusting of finished surfaces with dry materials will not be permitted.
- B. Monolithic Finish: Floor slabs shall be finished by tamping the concrete with special tools to force the coarse aggregate away from the surface then screeding and floating with straight edges to bring the surface to the required finish level. While the concrete is still green but sufficiently hardened to

bear a man's weight without deep imprint, it shall be wood-floated to a true, even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood float to bring moisture to the surface. After surface moisture has disappeared, surfaces shall be steel-troweled to a smooth, even, impervious finish free from trowel marks.

- C. Wood Float Finish: shall be provided for exterior concrete slabs, ramps, stairs and platforms. The surfaces shall be finished by tamping the concrete to force coarse aggregate away from surface, screeding and floating to bring the surfaces to the required finish level and wood-floated to an even, smooth surface.
- D. Exterior Cement Finish: Tread surfaces of exterior platforms and steps shall have non-slip aggregate incorporated in the finish at the rate of 40 lbs. of abrasive to 100 sq. ft. of surface. Tread surfaces to receive a wood float finish. Keep covered with damp sand for 10 days. Vertical surfaces to be steel troweled smooth.
- E. Steel-Trowel Finish: shall be provided for floor slabs in rooms and spaces to have exposed concrete floor finish and floor slabs that are to receive vinyl tile floor finishes and where thin set quarry tile floors are indicated.
- F. General Finish: (Walls) Where concrete is not exposed to view, except footings, immediately after removing forms cut back all metal form ties. Wet concrete and fill all voids or honeycomb surfaces with 1:2 cement mortar.
- G. Standard Finish: (Walls) Where concrete is exposed to view, immediately after removing forms, remove all joint marks, projections and loose materials, cut back all metal form ties, point up all voids and 1:2 cement mortar, rub entire surface with carborundum to a smooth even surface.

### **PART 3 - EXECUTION**

#### **3.01 FORMS:**

- A. Forms shall conform to the shape, lines, grades and dimensions of the concrete as called for on drawings. Forms for exposed surfaces shall be lined with new plywood or masonite. All joints to be filled with suitable form joint filler to produce a smooth surface. The inside of such forms shall be coated with non-staining mineral oil or other approved material before reinforcement is placed. Forms for exposed slabs and walls shall be new of materials specified.
- B. For unexposed surfaces and rough work, undressed lumber may be used. Lumber once used in forms shall have nails withdrawn and surfaces to be in contact thoroughly cleaned before being used again. Forms shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain the desired position and shape during and after placing concrete. Where ties cannot be used, adequate shore or truss supports shall be provided. All forms shall be thoroughly wetted before concrete is placed.
- C. Bolts and Rods: shall preferably be used for internal ties and shall be so arranged that when the forms are removed no metal shall be within 1" of any surface.
- D. Temporary Openings: shall be provided at the base of wall and column forms and at other points where necessary to facilitate cleaning and inspection immediately before placing of concrete. Suitable openings shall be provided in these forms for pouring concrete limiting the drop of

concrete to a maximum of 6'. Elephant trunks or chutes on a 1 or 2 slope may be used to limit the drop of concrete.

- E. Removal of Forms: The minimum time elapse before stripping forms, when temperature is 70 degrees to 90 degrees shall be as follows:
  - a. Walls and footings - 1 1/2 days.
  - b. Columns and beam sides - 2 days.
  - c. Beam soffits and slabs - 5 days with immediate re-shoring.
  - d. When temperature is at a higher or lower range than indicated above, stripping shall be as directed by the Architect.
- F. All footing shall be poured between plank side forms. Remove only when concrete is determined to have developed ample strength to support superimposed loads. Contractor shall be fully responsible for obtaining depth of footing indicated on drawings. If nature of soil permits, forms may be eliminated upon written permission from the Architect.
- G. Install in forms all inserts, anchors, sleeves, hangers, floor clips and similar devices to carry out the intent of the drawings.
- H. Thoroughly clean pitch and repair in an approved manner, all form material before reusing.
- I. Forms for concrete to which cement finish is not applied shall be treated with a coating of oil, paraffin wax or other approved material.
- J. In the removal of forms from surface to be exposed, care shall be taken to avoid damage to arises and faces.

### 3.02 PLACING OF STEEL REINFORCEMENT:

- A. Metal reinforcement before placing shall be free from loose mill and rust scale and other coatings that destroy or reduce the bond. No concrete shall be placed before the placing and binding of reinforcement has been inspected and approved by the Architect. Metal reinforcement shall not be straightened or rebent in a manner that will injure the material. All bars shall be bent cold.
- B. Steel reinforcement shall be accurately positioned and secured against displacement by using wire ties and shall be supported by metal supports.
- C. Concrete covering over steel reinforcement shall be the following thicknesses.
  - a. Footings and other principal structural members in which concrete is deposited against the ground, 3" between steel and ground.
  - b. Where concrete surfaces, after removal of forms, are exposed to weather or ground.
    - For bars more than 5/8" in diameter, 2"
    - For bars 5/8" or less in diameter, 1 1/2"

### 3.03 PLACING OF CONCRETE:

- A. Concrete shall be handled from the mixer and in the case of truck-mixed concrete, from the transporting vehicles to the place of final deposit as rapidly as practicable by methods which shall prevent the separation or loss of the ingredients. Under no circumstances shall concrete that has partly hardened be deposited in the work.
- B. Forms for walls or thin section of considerable height shall be provided with opening or other devices that will permit the placing of concrete without segregation. Concrete, during and immediately after deposit, shall be thoroughly compacted by spading, rodding, or by mechanical vibration.
- C. Concrete shall be deposited continuously or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause a formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings, or approved by the Architect. Do not secure vibrator, to forms or reinforcement, operate in place not less than fifteen (15) seconds and of sufficient duration to produce concrete of uniform and maximum density with even distributing of ingredients and complete embedment of reinforcement. 1-1/2" head vibrators shall be provided for wall and column pours.
- D. Approved external mechanical vibrating equipment applied lightly to exterior studs and walls when such vibration is necessary to secure surfaces that are even, dense, free from aggregate pockets and honeycomb. Vibration shall be carried on continuously with the placing of concrete. Vibration shall not be used in partly set concrete.
- E. No concrete to be placed when temperatures are below 32 degrees F.
- F. Concrete shall not be deposited during rains unless adequately protected, and in any case shall be protected from rain until it has hardened sufficiently to resist the formation of seams and planes of weakness within the section. The top surface shall be generally level.

### 3.04 CONSTRUCTION JOINTS:

- A. Construction joints shall be located only as herein specified, where shown on the drawings or as approved by the Architect.
  - a. Floor Slab on Ground: Joints shall be as located on plans or a maximum of 20'-0" in all directions. Slabs can be poured in alternate panels, checkerboard fashion.
  - b. Grade Beams and Foundation Walls: Vertical joints shall be placed so that maximum continuous pour does not exceed approximately 80 feet in length. Joints shall be placed at points of minimum shear. Water stops of type specified shall be provided at all construction joints. Care shall be taken to thoroughly work concrete around water stop. Embedment of water stop shall be a minimum of 3" on each side of joint. See drawings for placement. Horizontal construction joints shall not be permitted except as shown on the drawings, or approved in writing by the Architect.
- B. Exposed joints shall be straight and true.



- C. Bulkheads shall be keyed and doweled unless the thickness is less than 4 inches.
- D. At least 2 hours must elapse after depositing concrete in the columns or walls before deposited in beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith unless otherwise specifically indicated on the plans.
- E. Reinforcement shall be continuous through construction joints unless otherwise specified. For added reinforcement at construction joints, see drawings.
- F. Expansion joints shall be located as herein specified or as shown on the drawings. Joint materials shall be full thickness indicated.

### 3.05 CURING AND PROTECTION:

- A. Protect all concrete work against injury from elements and defacement of any nature during construction operations, which included protection of mechanical rooms with plywood prior and during mechanical installation.
- B. When the temperature is below 30 degrees F., or is likely to fall below 35 degrees F., adequate equipment shall be provided for heating the concrete materials and maintaining the concrete at not less than 50 degrees F. for at least 72 hours for Type I, or for as much time as is necessary to insure proper rate of curing of the concrete. Temperature of the separate materials, including the mixing water, when placed in the mixer, shall not exceed 140 degrees F. When placed in forms, the concrete shall have a temperature between 60 degrees F., and 90 degrees F. The use of salts, chemicals to prevent freezing or accelerating agents shall not be permitted.
- C. Keep exposed surfaces of concrete moist for a period of at least seven (7) days after being placed. Protect all concrete except slabs on ground, placed during hot weather, from rays of sun and air currents, cover with two layers of wet burlap and keep wet for seven (7) days.
- D. Keep concrete, except slabs, as moist as practicable during curing period in temperatures below 40 degrees F.
- E. Curing of slabs shall be done by spraying Demicoin Cure-Hard in accordance with manufacturer's directions.

### 3.06 FOOTINGS:

- A. See foundation plan for layout.
- B. Stone concrete, dimensions, keys, and reinforcement are as indicated on drawings.
- C. Footings under entire wall in areas not excavated shall run down to solid bearing to elevations indicated. Bottom of footing is to be located as required to meet minimum state building code requirements or as shown on drawings. The earth bottoms shall be undisturbed before concrete is placed. Footings shall not be poured on frost, ice or snow.
- D. Observe all notations on drawings before starting work.

- E. Protect footings from the effects of frost, any concrete affected by frost action shall be removed and replaced at Contractor's expense. Do not load footings until they are completely set.

### 3.07 FLOOR SLABS:

- A. Slabs on Grade: concrete base slabs shall be installed over 8 inch bank run gravel fill and shall be reinforced with wire mesh lapped 6". Prior to starting the floor work, verify completion of all piping and any mechanical equipment occurring below the floor level. Electrical conduit, if occurring, shall be installed prior to installation of wire mesh.
- B. Provide depressions in slabs required to receive various floor finishes.
- C. Concrete shall be firmly tamped and the surface of slabs to be screeded and floated true and level, (the mixing water content in the concrete to be kept uniform to avoid slump irregularity in the slab surfaces). Pipe screeds shall be installed in ground or on forms, wet screeds prohibited.
- D. Slab surfaces shall be finished and steel troweled to receive specified finished floor material directly. Floor showing trowel marks, swirls, depressions, etc. will be rejected. All exposed slabs shall not have any deviations exceeding 1/8" in 16'. Finish shall have a hard surface without air pockets or other defects. In the event that finishing workmanship is deemed inadequate by the Architect, the contractor shall modify his methods to improve the resulting finish.
- E. Floor slabs to be poured before interior partitions are erected.
- F. Perimeter Filler: Cleavage joints between vertical concrete or other surfaces and floor slabs on grade shall be 1/2" wide and shall extend the full depth of slab. The joints shall be filled with premoulded expansion joint filler to within 1/2" of top of slab. The top of the joint shall be filled with an approved joint sealer.
- G. INTEGRAL DAMPPROOFING: The contractor shall use in slabs on grade "Anti-Hydro" dampproofing or an approved equal integral dampproofing done in strict accordance with manufacturer's printed instructions.

### 3.08 EXTERIOR PLATFORMS AND STEPS:

- A. Reinforced Concrete, indicated on drawings.
- B. Slope steps 1/8" per width of tread. Pitch all platforms to drain dry.
- C. Exterior platforms shall be floated and made non-slip by embedding abrasive aggregate (aluminum oxide particles 0.4 lbs. per sq. ft.) uniformly in the surface.

3.09 ANCHOR BOLTS: The structural steel contractor will furnish an approved anchor bolt location plan. General Contractor shall set anchor bolts and be responsible for position and height of bolt projection. Modification to steel due to incorrect position of anchor bolts will be borne by the General Contractor.

3.10 CONCRETE WORK INCIDENTAL TO MECHANICAL AND ELECTRICAL INSTALLATIONS: Contractor shall provide foundations, bases, pads, tank pads with hold-down rods, concrete envelopes, etc., for all mechanical and electrical equipment as indicated and required. Foundations shall extend at least 6" above the finished floors and to such required heights so the shafts of machines are of an approved distance

above finished floor. Foundations shall be constructed with beveled edges at all corners and finished with a smooth coat of cement-mortar. Necessary anchor bolts to be built into the foundation with proper size sleeves, shall be provided by the Contractor. Top surfaces shall be steel-troweled to true planes and shall be level unless otherwise indicated or directed. Refer to Mechanical and Electrical Drawings for details.

### 3.11 CONCRETE SIDEWALKS:

- A. Concrete sidewalks shall be constructed in the locations and to the details indicated.
- B. Sidewalks are to be 4" thick of 4000 psi concrete on an 8 inch thick compacted gravel base course. (Unless thicknesses are noted otherwise on the drawings)
- C. Provide reinforcing of w.w.f. 6x6 – w2.9 x w2.9 with a 2 inch minimum cover.
- D. Surface to have a 1:50 pitch for drainage. Concrete shall be struck off with a wood screed and then floated with a wood float and broom to produce an even, gritty surface.
- E. The surface shall drain so that no water stands on the walks.
- F. Sidewalks shall be cut into equal strips not exceeding 6 feet in length by separation plates 1/8" to 3/16" in thickness for full depth of slab.
- G. Expansion joints of premoulded non-extruding filler 1/4" thick, 3-1/2" high, and its top 1/2" below sidewalk surface. Cover joint surface of P.M.J.F. with sealant equal to Tremco "Tremflex-S/L". Provide expansion joints at not more than 25' apart.
- H. All edges of slabs and all joints shall be edged with a 1/4" radius edging tool.
- I. Sidewalks shall be cured by covering with wetted burlap kept damp for 7 days or other approved method.

### 3.12 CONCRETE EQUIPMENT PADS:

- A. Concrete equipment pads are to be constructed in the locations, to the sizes and details indicated on the drawings.
- B. Pads are to be 1'-4" thick of 4000 psi concrete on a 12 inch thick compacted gravel base course. (Unless thicknesses are noted otherwise on the drawings)
- C. Provide reinforcing as shown on drawings with a 3 inch minimum cover.
- D. Surface to have a 1:50 pitch for drainage. The surface shall drain so that no water stands on the surface.
- E. Concrete shall be struck off with a wood screed and then floated with a wood float and broom to produce an even, gritty surface.
- F. All exposed corners of slabs shall be edged with a 3/4" chamfer.
- G. Concrete pads shall be cured by covering with wetted burlap kept damp for 7 days or other approved method.

END OF SECTION

## **DIVISION 4**

## **SECTION 04 22 23**

### **REINFORCED MASONRY**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

###### **A. Related Documents:**

The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

###### **A. This Section includes unit masonry assemblies consisting of the following:**

1. Concrete masonry units.
2. Mortar and grout.
3. Reinforcing steel.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Miscellaneous masonry accessories.

###### **B. Products furnished, but not installed, under this Section include the following:**

1. Adjustable masonry anchors welded to structural steel frame.
2. Dovetail slots for masonry anchors

###### **C. Products installed, but not furnished, under this Section include the following:**

1. Steel lintels for unit masonry.
2. Flashing reglets in masonry joists

##### **1.03 RELATED SECTIONS**

###### **A. Related Sections include the following:**

1. Section 03 31 00 - Cast-in-Place Concrete
2. Section 05 50 00 - Miscellaneous Metal Work
3. Section 07 92 13 – Joint Sealants

##### **1.04 PERFORMANCE REQUIREMENTS**

###### **A. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days.**

Determine compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1. For Concrete Unit Masonry: f'm = 1500 psi.

###### **B. Masonry Grout: 2000 psi compressive strength at 28 days.**

##### **1.05 SUBMITTALS**

###### **A. Comply with provisions of Section 01 33 00.**

###### **B. Product Data: For each different masonry unit, accessory, and other manufactured product specified.**

###### **C. Shop Drawings: Show fabrication and installation details for the following:**

1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

###### **D. Samples for Verification: For the following:**

1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.

2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
  3. Weep holes/vents in color to match mortar color.
  4. Accessories embedded in the masonry.
- E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- G. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
1. Each type of masonry unit required.
    - a. Include size-variation data for cmu, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Mortar complying with property requirements of ASTM C 270.
  3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
- H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.
    - a. Include size-variation data for cmu, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  4. Each material and grade indicated for reinforcing bars.
  5. Each type and size of joint reinforcement.
  6. Each type and size of anchor, tie, and metal accessory.
- I. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.
- J. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot-weather requirements.
- 1.06 QUALITY ASSURANCE
- A. Comply with provisions of Section 01 45 00.
  - B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.

- C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
  - D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
  - E. Preconstruction Testing Service: Engage a qualified independent testing agency to perform the following preconstruction testing:
    - 1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.
    - 2. Prism Test: For each type of wall construction indicated, per ASTM C 1314.
    - 3. Mortar Test: For mortar properties per ASTM C 270.
    - 4. Grout Test: For compressive strength per ASTM C 1019.
  - F. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- 1.07 DELIVERY, STORAGE, AND HANDLING
- A. Comply with Section 01 60 00.
  - B. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
    - 1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
  - C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
  - D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
  - E. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
  - F. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- 1.08 PROJECT CONDITIONS
- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
    - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
  - B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
  - C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
    - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
    - 2. Protect sills, ledges, and projections from mortar droppings.
    - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
    - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
    - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
  - E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
    - 1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.
- 1.09 REFERENCE STANDARDS
- A. ACI 530/ASCE 5/TMS 402: Building Code Requirements for Masonry Structures
  - B. ACI 530.1/ASCE 6/TMS 602: Specification for Masonry Structures
  - C. ASTM A82: Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
  - D. ASTM C90: Standard Specification for Load bearing Concrete Masonry Units
  - E. ASTM C144: Standard Specification for Aggregate for Masonry Mortar
  - F. ASTM C150: Standard Specification for Portland Cement
  - G. ASTM C207: Standard Specification for Hydrated Lime for Masonry Purposes
  - H. ASTM C270: Standard Specification for Mortar for Unit Masonry
  - I. ASTM C404: Standard Specification for Aggregates for Masonry Grout
  - J. ASTM C476: Standard Specification for Grout for Masonry
  - K. ASTM C780: Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
  - L. ASTM C1019: Standard Test Method for Sampling and Testing Grout
  - M. ASTM C1314: Standard Test Method for Compressive Strength of Masonry Prisms
  - N. AWS D1.4: American Welding Society Structural Welding Code – Reinforcing Steel

## **PART 2 - PRODUCTS**

- 2.01 CONCRETE MASONRY UNITS
- A. General: Provide shapes indicated and as follows:
    - 1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
  - B. Concrete Masonry Units (Decorative and Standard): ASTM C 90
    - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
    - 2. Weight Classification: Normal weight, unless otherwise indicated.
    - 3. Provide Type I, moisture-controlled units.
  - C. Finish
    - 1. Exposed faces are to be smooth faced.
- 2.02 MORTAR AND GROUT MATERIALS
- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - B. Hydrated Lime: ASTM C 207, Type S.



- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
  - D. Mortar Cement: ASTM C 1329.
  - E. Masonry Cement: ASTM C 91.
  - F. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
    - 1. White-Mortar Aggregates: Natural white sand or ground white stone.
  - G. Aggregate for Grout: ASTM C 404.
  - H. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
  - I. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of the units).
  - J. Water: Potable.
- 2.03 REINFORCING STEEL
- A. Comply with reinforcing requirements in Section 03300, Cast-in-Place Concrete.
  - B. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; Grade 60.
  - C. Epoxy-Coated Reinforcing Steel: ASTM A 615/A 615M, Grade 60; epoxy coated to comply with ASTM A 775/A 775M.
- 2.04 MASONRY JOINT REINFORCEMENT
- A. General: ASTM A 951 and as follows:
    - 1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
    - 2. Wire Size for Side Rods: W2.8 or 0.188-inch diameter.
    - 3. Wire Size for Cross Rods: W2.8 or 0.188-inch diameter.
    - 4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
  - B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c.
- 2.05 TIES AND ANCHORS, GENERAL
- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
  - B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
  - C. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153.
  - D. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- 2.06 RIGID ANCHORS
- A. General: Fabricate from steel bars as follows:
    - 1. 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.
    - 2. Finish: Hot-dip galvanized to comply with ASTM A 153.
    - 3. Fabricate wire tie sections from 0.1875-inch- diameter, hot-dip galvanized steel wire.
- 2.07 MISCELLANEOUS ANCHORS
- A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
    - 1. Headed bolts.
    - 2. Nonheaded bolts, bent in manner indicated.

- B. Post installed Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
    - 1. Type: Chemical anchors.
    - 2. Type: Expansion anchors only as noted on drawings.
    - 3. For Post installed Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
- 2.08 MISCELLANEOUS MASONRY ACCESSORIES
- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from PVC.
  - B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
  - C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
  - D. Wicking Material: Cotton or polyester rope, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity between wythes.
  - E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication.
- 2.09 MASONRY CLEANERS
- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.
  - B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
- 2.10 MORTAR AND GROUT MIXES
- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
  - C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification.
    - 1. For masonry below grade, in contact with earth, and where indicated, use Type M.
    - 2. For reinforced masonry and where indicated, use Type S.
  - D. Grout for Unit Masonry: Comply with ASTM C 476.
    - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
    - 2. Provide grout with a slump of 8 to 10 inches as measured according to ASTM C 143.
  - E. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's directions.
- 2.11 THROUGH-WALL FLASHING
- A. See Section 07 62 11 – Sheet Metal Flashing. Install per manufacturer's instructions and as indicated on drawings.

## 2.12 SOURCE QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:
  - 1. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

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

### 3.02 INSTALLATION, GENERAL

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

### 3.03 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.
- E. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

### 3.04 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in a running bond pattern unless noted otherwise. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

- C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow concrete masonry units with grout 24 inches under anchor bolt locations unless otherwise indicated.

### 3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
  1. With full mortar coverage on horizontal and vertical face shells.
  2. Bed webs in mortar.
  3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

### 3.06 CAVITIES

- A. Keep cavities clean of mortar droppings, debris, and other materials during construction. Strike joints facing cavities flush.

### 3.07 MASONRY JOINT REINFORCEMENT

- A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches. Space reinforcing a maximum of 16" on center.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.08 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
  1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
  2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
  3. Space anchors as indicated, but not more than 16 inches o.c.

### 3.09 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated or a maximum of 25 feet on center. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
  1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces.
  2. Install preformed control-joint gaskets designed to fit standard sash block.

3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

### 3.10 FLASHING

- A. General: Install embedded flashing in masonry at shelf angles, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
  1. Cut flashing off flush with face of wall after masonry wall construction is completed.

### 3.11 REINFORCED UNIT MASONRY INSTALLATION

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

### 3.12 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
  1. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar properties will be tested per ASTM C 780.
- D. Grout will be sampled and tested for compressive strength per ASTM C 1019.
- E. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.
- F. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per ASTM C 1314, and as follows:
  1. Two prisms for each type of masonry.

### 3.13 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
  - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

### 3.14 MASONRY WASTE DISPOSAL

- A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
- C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

## **DIVISION 5**

## **SECTION 05 50 00**

### **MISCELLANEOUS METAL WORK**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. Miscellaneous metal work items as described in this Specification Section.
- B. Section includes, without limitation, providing and installing:
  - 1. Shop applied ferrous metals priming paint for miscellaneous metals.
  - 2. Anchorages, brackets, supports, inserts and backing required for a complete job but not included in other sections.
  - 3. All other ferrous or non-ferrous metal work not specifically given to other Sections and necessary for a complete job, but including:
    - a. Galvanized steel framing and supports for mechanical and electrical equipment.
- C. Items To Be Furnished Only: Furnish the following items for installation by the designated Sections
  - 1. Section 03 31 00 - Cast-in-place Concrete:
    - a. Sleeves, anchors, inserts, plates and similar items.
  - 2. Section 04 22 23 – Reinforced Masonry:  
Miscellaneous metal and iron sleeves, anchors, inserts, plates and lintels to be built into masonry walls, including:
    - a. Furnishing loose bearing plates with headed anchors to support steel beams and metal deck on masonry.
    - b. Loose steel bearing and leveling plates, including bearing plates for steel joists, beams and purlins, galvanized at exterior locations and in exterior walls.
    - c. Epoxy anchors to fasten seismic clips to masonry.
    - d. Anchor bolts to fasten spandrel beams to masonry.
  - 3. Miscellaneous items
    - a. Miscellaneous steel trim, galvanized at exterior locations.
    - b. All plates, threaded rods and angles required to support suspended HVAC units from building structure.

##### **1.03 SUBMITTALS**

- A. Submit shop drawings, product data under provisions of Section 01 33 00. Include plans, elevations, sections, details, and attachments to other work. Show anchorage and accessory items.



- B. Submit samples of product as requested by the architect. Submit 8" square samples of each metal shop or factory finish (final surface treatment) required. Prepare samples on metal of same alloy and gauge to be used for the work. Label each sample to identify substrate material and finish. Provide hardware samples.
- C. Manufacturer's Data: Submit manufacturer's specifications, anchor details and installation instructions for any prefabricated products to be used in the work of this section

#### 1.04 REGULATORY REQUIREMENTS

- A. Conform to all federal, state, and local codes.

#### 1.05 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Engineering Calculations: Calculations stamped by a registered professional engineer are required for load bearing fabrications. The Structural Engineer's written approval of such calculations shall be obtained before commencing fabrication

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.

#### 1.07 FIELD MEASUREMENTS

- A. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

### **PART 2 - PRODUCTS**

#### 2.01 GENERAL FABRICATION REQUIREMENTS

- A. Welding shall conform to the applicable requirements of the American Welding Society. Welding shall be done in a manner that will prevent permanent buckling and all welds exposed in the finished work shall be ground to an architectural quality smooth appearance approved by the Architect.
- B. Exposed surfaces shall have a smooth finish and sharp, well defined lines. Sections shall be formed to shape and size with sharp lines and angles. Curved work shall be sprung evenly.
- C. Necessary rabbets, lugs and brackets shall be provided so that work can be assembled and anchored in a neat and substantial manner. Holes for bolts and screws shall be drilled. Fastenings shall be concealed where practicable.
- D. Work shall be fabricated and installed in a manner that will provide for expansion and contraction, prevent the shearing of bolts, screws and other fastenings, insure rigidity and provide close fitting of sections. Joints exposed to the weather shall be formed to exclude water.

- E. All galvanized metal shall bear a stamp indicating ASTM number and weight of zinc coating in ounces per square foot.

## 2.02 MATERIALS

- A. Materials shall conform to the latest edition of the specifications or manufacturer's standards.
  - 1. Steel Shapes ASTM A-36 Bars & Plates
  - 2. Anchor Bolts ASTM A-307 Grade A
  - 3. Structural Bolts ASTM A-325 (unless shown or indicated otherwise)
  - 4. Weld Material E70XX Welding Electrodes For manual shielded metal-arc welding, AWS A5.1 or A5.5, E60 or E70 series
  - 5. Galvanizing ASTM A-123, , or A-153 as applicable; 2.0 ounces zinc per square foot, unless otherwise indicated; provide under its section.
  - 6. Stainless Steel Type 304L, ASTM A 276
  - 7. Steel bar gratings ASTM A-569 or A-36
  - 8. Bitumastic Preservative Mil-P-15230 [Where shown and all embedded steel]
  - 9. Galvanized Sheet Steel ASTM A-526 or A-526, G-90
  - 10. Hot-Rolled Carbon Steel Bars (and Bar-Size Shapes): ASTM A-36 or A-529, grade as selected by fabricator.
  - 11. Brackets, flanges and exposed fastenings: Shall be of the same materials, color and finish as the metal to which they are applied, unless shown or specified otherwise.
  - 12. Expansion bolts at concrete: Red Head (or equal) wedge anchors.
  - 13. Expansion bolts at CMU: Hilti (or equal) epoxy/masonry anchors
- B. Hangers and suspension: Where required, provide galvanized steel Uni-strut (or equal) P1000 or assemblies of types recommended by manufacturer for application.
- C. Galvanizing Repair Paint: High zinc dust content paint, ZRC (or equal), having 95% zinc. by weight. Two coats always are required.

## 2.03 SHOP PAINTING

- A. All surfaces of ferrous metal except galvanized steel shall be given a shop coat of red lead, zinc-chromate paint or other approved rust-inhibitive primer unless otherwise specified. All surfaces which will be inaccessible for painting after erection, except contact surfaces of riveted or welded connections, shall be given two coats of paint before being assembled or erected. All marred surfaces of shop coats shall be thoroughly recoated. Field painting is specified under Section 09 91 00.

## 2.04 ANCHORING CEMENT:

- A. Anchoring non-shrink grout shall be Hallemite "Por-rok" or equal.

## 2.05 CLEANING:

- A. Clean under provisions of Section 01 70 00.
- B. The Contractor shall clean the miscellaneous metal work by removing all excess sealants, dirt and foreign materials, restoring finishes, leaving work in a good and satisfactory condition. The

Contractor shall perform the work of cleaning using methods and materials as recommended by the manufacturers of the materials used and as approved.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Review existing field conditions of areas to receive the work of this Section before proceeding with fabrication. Do not proceed with installation of metal fabrications until all unsatisfactory conditions which would impair the strength or appearance of the work have been corrected.

#### **3.02 INSTALLATION OF METAL FABRICATIONS**

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners and furnish all necessary setting drawings, diagrams, and templates where necessary for securing miscellaneous metal items to in-place construction including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required. Use galvanized bolts at exterior. Coordinate delivery of such items to project site.
- B. Cutting: Perform cutting, drilling and fitting required for installation of miscellaneous metal items. Do not cut structural members in field to facilitate fitting without written permission of the Architect for each specific condition.
- C. Fitting: Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- D. Placement: Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work. Do not field weld stainless steel or aluminum.
- F. Grouting: Set bearing plates required for support of the work of this Section level and to correct elevation using steel shims or wedges and grout solid using specified non-shrink grout.
- G. Touch-Up of Shop Primers: Touch up field welds and unprimed steel using specified shop primers and following procedures specified for shop work.
- H. Existing work: Remove and re-install or re-locate existing metal fabrications as required to complete the work. Drill, tap, or weld existing assemblies as required to complete the work and to attach existing work to new work.

### 3.03 PRODUCTS

A. Anchors and Bolts:

Anchors and bolts shall be provided where indicated and where necessary for fastening work in place. They shall be embedded in concrete and masonry as the work progresses. Sizes, kinds and spacing of anchors not indicated or specified shall be as necessary for their purpose.

B. Steel:

Steel for the support of piping and appurtenances shall be provided to the details indicated and as necessary for the complete installation.

C. Pipe Hangers and Miscellaneous Supports:

Pipe hangers and miscellaneous supports shall be provided as required.

D. Miscellaneous Framing and Supports:

1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required.
2. Fabricate miscellaneous units to sizes, shapes and profiles shown or, if not shown, of required dimensions to receive work to be supported by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
3. Equip units with integrally welded anchor straps for casting into poured concrete or building into masonry wherever required. Furnish concrete inserts if units must be installed after concrete is placed.

E. Exterior Pipe Rails

1. Pipe rails for exterior stairs and landings shall be constructed of standard galvanized steel pipe unless noted otherwise. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
2. The railing design shall be as per drawings.
3. Railing posts set in concrete shall be installed in pipe sleeves, securely anchored using non-shrink grout to minimum 4" depth. Inside dimensions of sleeve is to be not less than 1/2 inch greater than the outside dimensions of post with metal plate forming bottom closure.
4. Railings shall meet all state building, fire and accessibility code requirements for height, openings, end extensions, etc.
5. Rails attached to walls shall be anchored securely and all ends shall return to terminate against wall. Close ends of returns with prefabricated end fittings unless clearance between end of rail and wall is 1/4 inch or less.
6. Provide metal materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
7. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
8. Fabrication
  - a. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

- b. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  - c. Form work true to line and level with accurate angles and surfaces.
  - d. Cut, reinforce, drill, and tap as indicated to receive any finish hardware, screws, and similar items.
  - e. Connections: Fabricate railings with welded connections unless otherwise indicated.
  - f. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2. Obtain fusion without undercut or overlap.
    - 3. Remove flux immediately.
    - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces. Grind butt welds flush and grind or fill exposed fillet welds to smooth profile. All exposed welds are to be continuous, level and smooth to an Architectural quality finish to the satisfaction of the Architect.
  - g. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
9. Finishes
- a. All exterior railings and associated components are to be galvanized unless noted otherwise.

F. Interior Pipe Rails

- 1. Pipe rails for interior stairs and landings shall be constructed of standard steel pipe unless noted otherwise.
- 2. The railing design shall be as per drawings.
- 3. Railing posts set in concrete shall be installed in pipe sleeves, securely anchored using non-shrink grout to minimum 4" depth. Inside dimensions of sleeve is to be not less than 1/2 inch greater than the outside dimensions of post with metal plate forming bottom closure.
- 4. Railings shall meet all state building, fire and accessibility code requirements for height, openings, end extensions, etc.
- 5. Rails attached to walls shall be anchored securely and all ends shall return to terminate against wall. Close ends of returns with prefabricated end fittings unless clearance between end of rail and wall is 1/4 inch or less.
- 6. Provide metal materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- 7. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
- 8. Fabrication
  - a. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling

limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

- b. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  - c. Form work true to line and level with accurate angles and surfaces.
  - d. Cut, reinforce, drill, and tap as indicated to receive any finish hardware, screws, and similar items.
  - e. Connections: Fabricate railings with welded connections unless otherwise indicated.
  - f. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
    - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2. Obtain fusion without undercut or overlap.
    - 3. Remove flux immediately.
    - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces. Grind butt welds flush and grind or fill exposed fillet welds to smooth profile. All exposed welds are to be continuous, level and smooth to an Architectural quality finish to the satisfaction of the Architect.
  - g. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
9. Finishes
- a. All interior railings and their associated components are to be primed and painted in accordance with Specification Section 09 91 00 – Painting.

G. Metal support framing:

- 1. Provide metal framing as required to support light fixtures, piping, HVAC equipment and ductwork below hard or acoustical ceilings or as required to span across/over/under suspended equipment. Coordinate with the associated MEP contract documents.

3.04 REPAIR OF ZINC COATINGS:

- A. All zinc coatings that have been damaged in handling or transporting or in welding, riveting or bolting shall be repaired by the application of a thick paste made from galvanizing repair compound conforming to Federal Specification 0-G-93 and water. Areas to be repaired shall be cleaned thoroughly, including removal of slag on welds, before the paste is applied. Surfaces to be coated with paste shall be heated with a torch so that all metallics in the paste will be melted when applied to the heated surfaces. Extreme care shall be taken to see that adjacent zinc-coated surfaces are not damaged by torch. Molten metal shall spread uniformly over all surfaces to be coated and the excess metal wiped off.

3.05 FIELD PAINTING

- A. Specified as scheduled under Section 09 91 00 - Painting.

### 3.06 DISSIMILAR MATERIAL

- A. Where aluminum comes in contact with metals other than stainless steel, zinc, white bronze or other metals compatible with aluminum, then those surfaces shall be kept from direct contact by painting the dissimilar metal with a coating of heavy-bodied bituminous paint, a good quality caulking placed between the metals, non-absorptive tape or gasket.

END OF SECTION

## **DIVISION 6**



## **SECTION 06 16 53**

### **AIR AND MOISTURE RESISTANT SHEATHING**

#### **PART 1 - GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Wall sheathing with integral weather-resistive barrier

##### **1.2 ACTION SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Product Data: For each type of sheathing product. Include manufacturer's technical data indicating performance properties
- C. Shop Drawings: Indicating location and extent of sheathing, accessories, and assemblies. Include details of joints, corners, and penetrations.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Evaluation Reports: From ICC-ES, for wood sheathing and seam tape and flashing.
- B. Product Certifications: From manufacturer, indicating that sheathing products comply with indicated ICC-ES Acceptance Criteria.
- C. Sustainable Design Submittals:
  - 1. Product Data: For liquid applied flashing, indicating VOC content
  - 2. Laboratory Test Reports: Indicating compliance with requirement for low emitting materials for the following:
    - a. Composite wood products
    - b. Liquid flashing
  - 3. Certified Wood Certificates: Certificates indicating that manufacturer is currently certified by a FSC- accredited certification body, and chain-of-custody certificates indicating that sheathing products comply with forest certification requirements.
- D. Warranty: Sample unexecuted copy of manufacturer warranty.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Warranty: Executed copy of manufacturer warranty

##### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program, and the *2015-2019 Standards*.

- B. Wall sheathing meeting requirements for water-resistive barrier in accordance with *ICC-ES AC310 – Water-resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-resistive Barriers*

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Comply with manufacturer's written instructions for protection of sheathing products from weather prior to installation.

#### 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which sheathing manufacturer agrees to repair or replace sheathing products that demonstrate deterioration or failure under normal use due to manufacturing defects within warranty period specified, when installed according to manufacturer's instructions.

- 1. Warranty Period for Sheathing Products: 30 years from date of Substantial Completion under the provisions of Section 01 78 00.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURER

- A. Huber Engineered Woods LLC, Charlotte NC; Phone: (800) 933-9220; Website: [www.huberwood.com](http://www.huberwood.com)  
ZIP System® sheathing.
- B. Substitutions: Under provisions of Section 01 60 00.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Assembly Air Leakage: Less than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 Pa), per *ASTM E2357 – Standard Test Method for Determining Air Leakage of Air Barrier Assemblies*
- B. Water-Vapor Permeance, Facer: Minimum 12 perms (689 ng/Pa x s x sq. m), when tested in accordance with *ASTM E96/E96M – Standard Test Methods for Water Vapor Transmission of Materials*.

#### 2.3 WOOD PANEL PRODUCTS

- A. Single Source Limitations: Provide Wall sheathing with integral weather-resistive barrier by a single manufacturer.
- B. Certified Wood: Provide sheathing produced from wood obtained from forests certified by an accredited certification body.
- C. Panel Exposure: No damage from weather exposure for up to 180 days.
- D. Printed fastener spacing symbols on facer for 16-inch and 24-inch on center spacing.

## 2.4 WALL SHEATHING WITH INTEGRAL WEATHER-RESISTIVE BARRIER

- A. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural 1 sheathing with factory-laminated water-resistive barrier facer and printed fastener location symbols.
  - 1. Basis-of-Design: Huber Engineered Woods LLC; ZIP System® sheathing.
  - 2. Characteristics
    - a. Span Rating and Performance Category: Not less than 32/16; Structural 1; 1/2 Performance Category.
    - b. Edge Profile: Tongue-and-Tongue along long edges and square-edge along 4 ft edges.
    - c. Weather Barrier Facer: Medium-density, phenolic-impregnated sheet material qualifying as an ASTM D779 Grade D weather-resistive barrier in accordance with *ICC-ES AC38 – Water-Resistive Barriers*

## 2.5 FASTENERS

- A. Fasteners, General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.
  - 1. Corrosion Resistant
- B. Nails, Brads, and Staples: Conform with *ICC-ES AC116 - Acceptance Criteria for Nails and Spikes* and *ICC-ES AC201 Acceptance Criteria for Staples*
- C. Power-Driven Fasteners: *ICC-ES ESR-1539 - Power Driven Staples and Nails for Use in Engineered and Non-Engineered Connections* or *ICC-ES NER-272 - Power Driven Staples and Nails for Use in All Types of Building Construction*

## 2.6 ACCESSORY PRODUCTS

- A. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting *ICC-ES AC148 – Acceptance Criteria for Flexible Flashing Materials*, and tested as part of an assembly meeting performance requirements.
  - 1. Basis-of-Design: Huber Engineered Woods; ZIP System™ flashing tape.
  - 2. Characteristics
    - a. Adhesive type: Acrylic
    - b. Thickness: 0.012 inch (0.3 mm).
    - c. Tensile Strength: 938 psi
    - d. Elongation: 400-800 percent
    - e. Complies with *AAMA 711 – Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration* and *ICC-ES AC148 – Acceptance Criteria for Flexible Flashing Materials*,
- B. Liquid-Applied Flashing Membrane: Gun-grade, cold-applied, silyl-terminated polymer (STP) liquid flashing membrane compatible with sheathing/weather barrier, self-adhering seam and flashing tape, and tested as part of an assembly meeting performance requirements.
  - 1. Basis-of-Design: Huber Engineered Woods; ZIP System™ Liquid Flash.
  - 2. Characteristics
    - a. Composition: Single component silyl-terminated polymer (STP)

- b. Application Temperature Range: Between 35 Deg F (2 Deg C) and 110 Deg F (43 Deg C) surface and ambient.
  - c. VOC Content: 30 g/L
  - d. Hardness, Shore A: 40 to 45 in accordance with *ASTM C661 – Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer*
  - e. Tensile Strength: 75 psi in accordance with *ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers*
  - f. Elongation at Break: 225 percent in accordance with *ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers*
- C. Self-Adhering Flexible Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive; tested as part of an assembly meeting performance requirements.
- 1. Basis-of-Design: Huber Engineered Woods; ZIP System™ stretch tape.
  - 2. Characteristics
    - a. Adhesive type: Acrylic
    - b. Thickness: 0.042 inch (1.067 mm).
    - c. Tensile Strength: 225 psi
    - d. Elongation: 800-1200 percent
    - e. Complies with *AAMA 711 – Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration* and *ICC-ES AC148 – Acceptance Criteria for Flexible Flashing Materials*

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine framing spacing and alignment to determine if work is ready to receive sheathing. Proceed with sheathing work once conditions meet requirements.

#### **3.2 SHEATHING INSTALLATION**

- A. General: Install sheathing panels in accordance with manufacturer's written instructions, requirements of applicable Evaluation Reports, and requirements of authorities having jurisdiction.
  - 1. Do not bridge expansion joints; allow joint spacing equal to spacing of structural supports.
  - 2. Install panels with laminated facer to exterior. Stagger end joints of adjacent panel runs. Support all panel edges.
  - 3. Panel Edge Spacing: In accordance with sheathing panel manufacturer's recommendations.
  - 4. Attach sheathing panels securely to substrate with manufacturer-approved fasteners in compliance with the following:
    - a. *ICC-ES ESR-1539 - Power Driven Staples and Nails for Use in Engineered and Non-Engineered Connections* or *ICC-ES NER-272 - Power Driven Staples and Nails for Use in All Types of Building Construction*
    - b. *ICC IBC - International Building Code Table 2304.9.1 Fastening Schedule.*

### 3.3 SEAM AND PENETRATION TREATMENT

- A. Assembly continuity: Coordinate sheathing installation with flashing and joint sealant sequencing and installation and with adjacent building air and moisture barrier components to provide complete, continuous air- and moisture- barrier.
- B. Tape panel seams, penetrations, and facer defects or cracks with self-adhering seam tape, ZIP System™ Flashing Tape, to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-ES applicable to tape application.
- C. Flash penetrations, gaps, and cracks with liquid-applied flashing membrane, ZIP System™ Liquid Flash, to form continuous weathertight surface. Apply according to manufacturer's written instructions. Follow manufacturer's recommendation for integration with self-adhering seam tape, ZIP System™ Flashing Tape.
- D. Tape window and doors openings and radius penetrations with self-adhering flexible flashing tape, ZIP System™ Stretch Tape, to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-AC applicable to tape application.

### 3.4 CLEANING

- A. Clean under provisions of Section 01 70 00.

### 3.5 PROTECTION OF FINISHED WORK

- A. Protect finished product and work under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 06 20 10**

### **CARPENTRY AND MILLWORK**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. All labor and materials, equipment and installation of all work required to complete the construction and installation of all work required to this trade as indicated on the drawings and as herein specified.

##### **1.03 RELATED SECTIONS**

- A. Section 09 91 00 – Painting
- B. Section 12 32 16 – Plastic Laminate Casework

##### **1.04 REFERENCES**

- A. American Plywood Association
- B. American Woodwork Institute

##### **1.05 SUBMITTALS**

- A. Submit shop drawings, product data and samples under provisions of Section 01 33 00.

##### **1.06 QUALITY ASSURANCE**

- A. Work shall comply with all local and state building and fire codes.
- B. Material and workmanship of all woodwork shall conform to the Premium grade requirements of the AWI Quality Standards.
- C. Rough Carpentry Lumber: Visible grade stamp, of agency certified by National Forest Products Association (NFPA).

##### **1.07 REGULATORY REQUIREMENTS**

- A. All materials are to conform to the minimum requirements of the State Building Code or as indicated in this specification, whichever is stronger or stricter.

## 1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Protect all materials from weather. Do not store in damp or wet areas. Stack lumber and plywood, and provide air circulation within stacks.

## 1.09 FIELD MEASUREMENTS

- A. Verify all field dimensions at the site prior to fabrication.

## 1.10 COORDINATION

- A. Coordinate work with other trades and under provisions of Section 01 31 00.

# **PART 2 - PRODUCTS**

## 2.01 MATERIALS

- A. Framing Lumber
  - 1. Moisture content when delivered to the project shall not exceed 19 percent.
  - 2. Wood studs, blocking, bridging, nailing pieces, shall be Douglas Fir, Coast Region construction grade "J" and "P" or Southern Pine No. 1. All structural load bearing lumber shall be of quality to provide 1200 psi units fiber stress.
  - 3. Mark of treating company certifying type of treatment applied on fire retardant treated and pressure preservative treated lumber.
- B. Plywood shall be of the types and grades listed below:
  - 1. Exposed exterior plywood to be American Plywood Association A-C, Group 1, Exterior, in thickness as noted on the drawings. Where thickness is not indicated, plywood shall be 3/4" thick.
  - 2. Exposed interior plywood to be American Plywood Association A-C, Group 1, Exposure 1, in thickness as noted on the drawings. Where thickness is not indicated, plywood shall be 3/4" thick.
  - 3. Each panel of plywood shall be identified with a stamp as to type, grade and species by the grade trademark of the American Plywood Association.  
Mark of treating company certifying type of treatment applied on fire retardant treated and pressure preservative treated plywood.
  - 4. All sheathing plywood shall be in accordance with Chapter 23 of the State of Rhode Island Building Code.
- C. Floor Underlayment
  - 1. Provide hardwood underlayment under flooring in all areas noted on the drawings.
  - 2. Hardwood underlayment panels are to be 5.5 mm as manufactured by Traxx Corp. (or equal) Model: Certiply.
  - 3. Sanded, solid surface requires less preparation.
  - 4. Constructed with exterior grade glue
  - 5. 5 Ply Construction with Birch hardwood.

6. Fasteners are to be nails as recommended by the manufacturer.
  7. Fasteners are to be installed per the manufacturer's recommended nailing pattern.
  8. Install in accordance with manufacturer's instructions.
  9. Upon completion of installation, patch all voids, chipped edges, gouges and gaps with a patching compound approved by the flooring material manufacturer.
- D. Interior and Exterior Woodwork for Paint Finish
1. Quality: Wood shall be free from knots, pitch or sap streaks, molded and executed as detailed and noted on the drawings.
  2. Species: Wood shall be clear, kiln-dried close-grained hardwood unless otherwise indicated.
- E. Interior Woodwork for Transparent Finish
1. Quality: Wood shall be free from pitch or sap streaks, molded and executed as detailed and noted on drawings.
  2. Species: All wood shall be red oak unless otherwise indicated.
- F. Wood Treatment
1. Wood preservative used to treat the wood materials shall be alkaline copper quaternary (ACQ).
  2. Treat wood materials requiring pressure impregnated preservatives to FS TT-W-571, Table 3.
  3. Deliver treated materials cut to required sizes. Minimize field cutting.
  4. Re-dry wood after pressure treatment to maximum 19 percent moisture content.
  5. Use stainless steel fasteners where installed in pressure treated wood.
- G. Plastic Laminate
1. Manufacturers
    - a. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following:
      1. Wilsonart Corporation
      2. Formica
      3. Arborite
    - b. Substitutions: Under provisions of Section 01 60 00.
  2. Counter tops and backsplashes:
    - a. Standard High Pressure Decorative Laminate - General Purpose Type: Wilsonart Type 107, having the following physical characteristics:
      1. Sheet thickness: 0.048 inch nominal.
      2. Exceeding performance requirements of NEMA LD 3 current revision Grade HGS.
      3. Surface burning characteristics in accordance with ASTM E 84; unbonded.
  3. Laminate on shelving and other surfaces:
    - a. Standard High Pressure Decorative Laminate - Vertical Surface Type: Wilsonart Type 335, having the following physical characteristics:
      1. Sheet thickness: 0.028 inch nominal.
      2. Exceeding performance requirements of NEMA LD 3 current revision Grade VGS and VGP.
      3. Surface burning characteristics in accordance with ASTM E 84; unbonded.
  4. Matte finish, unless otherwise indicated.
  5. Colors as selected by Architect from standard manufacturer's colors and patterns.



6. Adhesives: Do not use adhesives that contain urea formaldehyde.
- H. Counter Brackets – Surface Mounted
1. Manufacturer: Rakks manufactured by the Rangine Corporation
  2. Surface mounted Rakks models as follows:
  3. Provide the following models and sizes as required unless otherwise noted on drawings:  
EH-1209: 12" x 9" (12" vertical) on counters between 11" and 13" deep  
EH-1212: 12" x 12" on counters between 13 1/2" and 18" deep  
EH-1818: 18" x 18" on counters between 18 1/2" and 25" deep  
EH-1824: 18" x 24" (18" vertical) on counters between 25 1/2" to 30" deep
  4. Finish to be selected by Architect from manufacturer's standard colors. Off-White Powder Coat.
  5. Fasteners in wall are to match color of bracket.
  6. Provide wood blocking in stud walls as required.
  7. Max distance between brackets to be 32 inches.  
Also provide a bracket at the end of countertops that are not attached to a side wall.
  8. Size bracket as required to coordinate with shelf depth as noted on the drawings.
  9. Provide 5/8" dia. rubber grommet option in all vertical legs of each bracket.
- I. Shelving Brackets and Standards – Adjustable
1. Manufacturer: Knap & Vogt (K&V)
  2. 187LL series brackets and 87 series standards.
  3. Finish to be selected by Architect from manufacturer's standard colors.
  4. Provide wood blocking in stud walls as required.
  5. Max distance between standards to be 32 inches.
  6. Size bracket as required to coordinate with shelf depth as noted on the drawings.
  7. Provide 1" x 18" plastic laminate covered MDF shelves full width of closet. Plastic laminate on all six surfaces of shelf. Minimum of five shelves per closet if quantity not indicated on drawings.
- J. Plastic Countertop Grommets
1. Unless noted otherwise on the drawings all grommets to be Model XG3, 3" Diameter, Flip-Top Grommet Set as Manufactured by Doug Mockett & Company.
  2. Grommet cap and liner set includes liner and cap with cord slot. Cap features Flip-Top tab which closes and covers cord slot when grommet is not in use.
  3. Color selected by Architect from manufacturer's standard colors.
  4. See drawings for quantities and locations.

### **PART 3 - EXECUTION**

#### **3.01 CONSTRUCTION**

- A. Rough Carpentry
1. General: Carefully lay out, cut, fit and rout all framing, blocking and other items of carpentry in such a manner as to minimize shrinkage and insure stability. Perform all carpentry work required for building in work of other trades and work to the details indicated and as required by field conditions.
  2. Provide fire retardant treated wood products as shown and as follows:

At exposed or semi-exposed wood in fire rated assemblies and in spaces having limited flame spreads for exposed combustibles. Where blocking is concealed in fire rated assemblies and all areas as required by code.

3. Includes: Rough carpentry shall consist of the installation of sleepers, blocking, nailers, curb nailers, furring, joists, studding, rafters, stringers, centers, rough flooring, grounds, screeds, and such other items of rough carpentry as may be required for proper construction and to complete the work. Absence of illustration, detail or specification will not relieve the Contractor from responsibility or carrying out the work.
4. Lumber and other rough work shall be properly framed closely fitted, accurately set to the required lines and levels and rigidly secured in place.  
Joists and rough stair stringers shall be set with the crown edge up, and the bottom edges shall be free from pronounced defects.  
Leveling of sills, etc., on masonry or concrete shall be done, as required and grouted with cement mortar.  
Studs and joists shall be sized to give true surfaces for finish.  
Nailing and spiking shall be done in a thorough manner with nails of ample size, spikes larger than 20d being used where practicable.  
Special framing or construction, not explicitly shown on drawings or specified, shall be provided as required to complete the work in the best and most workmanlike manner.
5. Mechanical equipment clearances: Members shall be framed to allow for passage of pipes or ducts as required to avoid cutting of structural members. No members shall be cut, notched or bored for the passage of such pipes without permission of the Architect, and all members damaged by cutting shall be reinforced as directed by the Architect.
6. Preservative treated lumber: All wood in direct contact with concrete, masonry, soil or gravel shall be preservative treated wood, ground contact grade with a 40 year warranty. Wood shall be free from large or loose knots, shakes, checks and warp. Apply two coats of same preservative used in original treatment to all sawn or cut surfaces of treated lumber, in accordance with AWP A M4.  
Use stainless steel fasteners where installed in the pressure treated wood.
7. Studs: Studs shall be no less than 2"x4", spaced not over 16 inches on center, unless otherwise shown. Studs shall be doubled around all openings. Corners shall be thoroughly spiked together and made solid. All bearing partitions shall be provided with double top and bottom plates. Partitions shall have one row of horizontal bridging for the full width of studding, cut in and securely nailed. Studs shall be framed as shown or required for the proper installation of trim, plumbing, and other work to be concealed. Studding shall be installed for the support of all fixtures and accessories as required.
8. Furring and Grounds: Shall be minimum 1" x 3" strips, as shown on drawings or as required to match the condition, spaced maximum 16" on center and continuous at all vertical edges of framed openings. Furring shall be secured to concrete, brick or masonry units by power driven fasteners. Face of furring and grounds shall form a true, even plane for installation of materials thereon. Species shall be Fir or Southern Pine, at Contractor's option.
9. Joists: Except where otherwise shown, all joists shall have bearings of not less than 4 inches. Where possible, joists shall be lapped and spiked together at bearings and spiked to studs where the same occurs. Openings shall be framed with headers and trimmers. Headers carrying more than one tail-joist shall be tripled. Metal double cross bridging shall be provided at the center of span of all floor and ceiling joists and as indicated.
10. Subfloor is to be 7/8" Weyerhaeuser Edge Gold oriented strand board floor panels or equal with tongue and groove edge. Glue and nail the flooring to joists in accordance with

manufacturer's instructions. Use solvent based glue. Leave 1/8" gap along all ends and edges to allow for expansion.

11. Roof framing
  - a. Members shall be assembled, fitted and set to exact slopes as shown on the drawings. Tops of rafters shall be brought to a true plane. Ridge members, where shown, shall be straight and true intersections of roof planes of depth equal to the cut on the rafters. Rafters on plates and ridges shall be framed with close joints. Blocking shall be placed between rafters where necessary to form nailers for roof sheathing. Rafters are to be well spiked to wall plates and ridges.
  - b. Provide all required cants, crickets, curbs and other carpentry items required for proper installation of roofing and equipment.
12. Trim
  - a. Trim shall be mitered and jointing shall be tight and formed to conceal shrinkage. All mortise, tongue-and-groove and shiplap joints shall be set in neutral white caulking compound. Interior woodwork shall be back primed and painted before installation.
  - b. Interior trim shall be milled, fabricated and erected as shown on the drawings. All finishes shall be machine-sanded at the mill and sand-papered and primed at the job.

Wood used for trim is to be any close-grained hardwood.

All interior trim including base, chair rails, ceiling mouldings, casings, window stools and aprons shall be of stock designs. All joints shall be made in an approved manner to conceal shrinkage and shall be tight, straight, plumb and level, in perfect alignment and closely fitted. Joints shall be secured with finish nails set for putty stopping. Window and door trim shall be in single lengths. Base shall be in long lengths. Mouldings shall be mitered at corners and coped at angles. These joints shall be made at the mill.
13. Plastic Laminate Countertops and Backsplash/sidesplash
  - a. Countertop in dry areas shall consist of a layer of plastic laminate adhered to 3/4" medium density fiberboard (MDF) with backer sheet.
  - b. Countertop in wet areas shall consist of a layer of plastic laminate adhered to 3/4" water resistant medium density fiberboard (MDF) (Medex or equal) with backer sheet.
  - c. Backsplashes and sidesplashes shall be installed as indicated on drawings.
  - d. Plastic laminate adhesive shall be selected in accordance with manufacturer's recommendations for specific substrate used.
  - e. Front edge and exposed side edges of countertop are to be 3 mm thick PVC unless noted otherwise on drawings.

Top and side exposed edges of backsplashes and sidesplashes are to be 3 mm thick PVC unless noted otherwise on drawings.

The 3 mm PVC is to be solid, high-impact, purified, color-thru, acid resistant, machine-applied with hot melt adhesives, trimmed, length-radiused for uniform appearance, buffed and corner-radiused for consistent design.

Submit sample to be approved by Architect.
14. Plastic Laminate Shelving where noted on drawings:

Plastic laminate is to be adhered to a MDF substrate, 3/4" thick unless noted otherwise.

Laminate is to be on all six sides.
15. Temporary Enclosures and Protection: Temporary enclosures of doors, windows and other exterior openings shall be provided when necessary to meet conditions specified. Maintain

in good repair and remove when no longer required. Door and window frames shall be protected from traffic and from mortar drippings.

B. Blocking

1. Blocking layout and size: Continuous and solid, fire retardant 3/4 inch plywood or fire retardant 2x4 or larger where additional support is required.
2. Provide blocking in addition to any indications on the drawings in locations as follows:
  - a. Millwork attached to walls or ceilings.
  - b. All standing and running trim
  - c. Equipment attached to walls or ceilings.
  - d. Fin-tube radiation heating.
  - e. At grab bars.
  - f. Toilet Room accessories.
  - g. Handrail brackets.
  - h. Wall hung lavatories.
  - i. At cabinets and casework.
  - j. At shelving and counter brackets.
  - k. At all door wall stops.
  - l. At window shades, blinds or drapes brackets or hardware and FF&E work.
  - m. Mid points of all walls.
  - n. Between joists at all points requiring support.
  - o. As required to support light fixtures.
  - p. At exterior items or fixtures mounted or attached where insulating sheathing, or cement, vinyl, PVC, or wood-lapped board siding or trim is used.
  - q. Set in between studs parallel to and flush to top stair carriages.
  - r. Sheathing and flooring unsupported butt joints
3. Attach blocking as follows:
  - a. In metal stud partitions: Screw attach through stud flanges.
  - b. At masonry: With oval head toggle bolts and washers or with epoxy tube and sleeve systems.
  - c. At concrete: With expansion shield bolts.
  - d. At steel: With flat head bolts/nuts or approved power actuated fasteners.

C. Provide wood firestopping as follows:

1. At ceiling lines and at 8'-0" height if ceiling is higher.
2. As required to close of all framing spaces connecting floors.
3. As required by code.

- D. Plywood backer panels:
1. Material: APA C-D Plugged Exposure 1 with exterior glue
  2. Fire retardant.
  3. Coatings: Fire retardant paint, six sides, applied before installation.
  4. Coating color: As shown or directed, if not, black.
  5. Thickness: As indicated, if not, 3/4 inch.
  6. Provide and install fire retardant plywood backer panels for surface mounted electric panel boards, meter mounts, protection cabinets, motor control panels and the like. Boards shall be rigidly built and securely fastened to wood-furred strapping at walls in approved manner. See Electrical Drawings for locations of devices which require mounting on backerboards. Provide plywood backings for Telephone and Protection (Security) panels.
- E. Construction Hardware
1. Furnish and install all bolts, nuts, expansion shields, lag screws, toggle bolts, wood screws, nails, flat cap metal nailing discs, staples, power driven anchors and other rough hardware as required.
  2. Rough hardware items shall be of appropriate type and proper capacity and size as required for each specific application.
  3. All fasteners used on exterior work shall be hot dip galvanized or stainless steel.
  4. Concrete and masonry anchors: Where anchors are not included in concrete or masonry construction sections, anchors shall be galvanized machine screws or bolts with standard expansion-shield type concrete anchors, Phillips "Red Head" Masonry Anchors or approved equal, of sizes and types as required.
  5. Fasteners used at treated wood: Fasteners meeting manufacturers approval and requirements if not listed use stainless steel.

### 3.02 CLEANING

- A. Clean work under provisions of 01 70 00.

### 3.03 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 06 65 10**

### **CELLULAR (PVC) FABRICATIONS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Cellular PVC Trim Boards for corner boards, soffits, fascias, door pilasters, frieze boards, rake boards, architectural millwork and door/window trim and additional items as shown on drawings.

##### **1.02 RELATED SECTIONS**

- A. Section 06 20 10 - Carpentry and Millwork – Wood Blocking
- B. Section 07 46 33 – Vinyl Siding
- C. Section 07 62 11 – Sheet Metal Flashing

##### **1.03 REFERENCES**

- A. ASTM D792 - Density and Specific Gravity of Plastics by Displacement.
- B. ASTM D570 - Water Absorption of Plastics.
- C. ASTM D638 - Tensile Properties of Plastics.
- D. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- E. ASTM D1761 - Mechanical Fasteners in Wood.
- F. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight.
- G. ASTM D256 - Determining the Pendulum Impact Resistance of Plastics.
- H. ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
- I. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- J. ASTM E84 - Surface Burning Characteristics of Building Materials.
- K. ASTM D648 - Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- L. ASTM D3679 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding.

##### **1.04 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Submit product data, manufacturer's catalogs and SPEC-DATA product Sheet for specified products.
- C. Samples: Submit three material samples representative of the texture, thickness and widths shown and specified herein.

##### **1.05 MOCK-UP**

- A. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.
4. Approved mock-up may remain as part of the work.

#### 1.06 QUALITY ASSURANCE

- A. Regulatory Requirements: Perform work in accordance with all federal, state and local codes and laws.
- B. Allowable Tolerances:
  1. Variation in component length:  $-0.00 / +1.00$ "
  2. Variation in component width:  $\pm 1/16$ "
  3. Variation in component thickness:  $\pm 1/16$ "
  4. Variation in component edge cut:  $\pm 2^\circ$
  5. Variation in Density  $-0\% + 10\%$
- C. Workmanship, Finish, and Appearance:
  1. Cellular PVC that is homogeneous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square, and top and bottom surfaces shall be flat with no convex or concave deviation.
  2. Uniform surface free from cupping, warping, and twisting.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Trim materials should be stored on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

#### 1.08 WARRANTY

- A. Provide Warranty under provisions of Section 01 78 00.
- B. Provide manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following:
  1. Azek Building Products
  2. Fypon LLC
  3. Versatex
- B. Basis of Design: Azek Building Products
- C. Substitutions: Under provisions of Section 01 60 00.

## 2.02 MATERIALS

- A. Material: Expanded rigid poly vinyl chloride material with a small-cell microstructure and density of .55 grams/cm<sup>3</sup>.
1. Finish to be manufacturer's standard factory finish white.
  2. Exposed surface texture to be Traditional (smooth)
- Material shall have a minimum physical and performance properties specified as follows.
- B. Performance and physical characteristic requirements:

| PROPERTY                        | UNITS                 | VALUE                      | ASTM Method |
|---------------------------------|-----------------------|----------------------------|-------------|
| <b><u>PHYSICAL</u></b>          |                       |                            |             |
| Density                         | g/cm <sup>3</sup>     | 0.55                       | D 792       |
| Water Absorption                | %                     | 0.15                       | D 570       |
| <b><u>MECHANICAL</u></b>        |                       |                            |             |
| Tensile Strength                | psi                   | 2256                       | D 638       |
| Tensile Modulus                 | psi                   | 144,000                    | D 638       |
| Flexural Strength               | psi                   | 3329                       | D 790       |
| Flexural Modulus                | psi                   | 144,219                    | D 790       |
| Nail Hold                       | Lbf/in of penetration | 35                         | D 1761      |
| Screw Hold                      | Lbf/in of penetration | 680                        | D 1761      |
| Staple Hold                     | Lbf/in of penetration | 180                        | D 1761      |
| Gardner Impact                  | in-lbs                | 103                        | D5420       |
| Charpy Impact (@23°C)           | ft-lbs                | 4.5                        | D256        |
| <b><u>THERMAL</u></b>           |                       |                            |             |
| Coefficient of Linear Expansion | in/in/°F              | 3.2 x 10-5                 | D 696       |
| Burning Rate                    | in/min                | No burn when flame removed | D 635       |
| Flame Spread Index              | --                    | 20                         | E 84        |
| Heat Deflection Temp 264 psi    | °F                    | 150                        | D 648       |
| Oil Canning (@140°F)            | °F                    | Passed                     | D 648       |

## 2.03 ACCESSORY PRODUCTS

- A. Fasteners hidden from view: All types of fasteners that work well with wood will work as well or better with AZEK™.
- Fasteners to be stainless steel.
- Fasteners from a nail gun work well, t-head finish nails are preferred.
- B. Exposed fasteners: All fasteners exposed to view are to use the FastenMaster Cortex Concealed Fastening System for PVC trim (or equal) consisting of Torx TTap drive system screws and color-matching plugs. Install in accordance with manufacturer's instructions.



- C. Adhesives:
  - 1. Bonding AZEK™ to AZEK™, solvent based adhesive systems used for rigid PVC pipe work very well. Latex adhesives provide more working time.
  - 2. Bonding AZEK™ to Various Substrates, numerous standard construction adhesives work well. In general, contact cement, epoxy, rubber based and urethane adhesives are acceptable. Test a particular adhesive for suitability.
- D. Sealants:
  - 1. Ensure proper sealants are used as they comply with the following:
    - a. Urethane, polyurethane or acrylic sealants without silicone.
    - b. Latex sealants complying with ASTM C834, Type P.
    - c. Manufacturer approved sealants, subject to confirmation at time of construction, include:
      - 1) Pecora Corporation; AC-20+.
      - 2) Sonneborn; Sonolac.
      - 3) Tremco; Tremflex 834.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Manufacturers instructions: Comply with manufacturer's product catalog installation instructions and product technical bulletin instructions.
- B. Cutting: Sheets and boards can be cut using standard saws and carbide blades used for wood.
- C. Drilling: Drilling can be accomplished using twist drills recommended for metals.
- D. Milling: Milling can be accomplished using standard milling machines of various types. Relief Angle 20° to 30°; Cutting speed to be optimized with the number of knives and feed rate.
- E. Routing: Routing can be accomplished using standard carbide tipped routers used in woodworking.
- F. Where two pieces of trim join at a 90 degree angle (corner boards, etc.) the trim is to be mitered at a 45 degree angle.
- G. All adjoining PVC materials are to be glued together using the specified adhesive.
- H. Edge Finishing: Various sanding, grinding or filing tools. Do not allow excessive frictional heat to build up.
- I. Nail Location: Standard nailing patterns are recommended. You can fasten closer to the edge than with wood.
- J. Linear Thermal Expansion and Contraction: When properly fastened, allow for 1/8" movement for each 18' board. When butting boards together, glue the butt joint with PVC cement. This will eliminate any separation at the joint. The gap can be accommodated at the ends of the run.

#### **3.02 STANDING AND RUNNING TRIM INSTALLATION**

- A. Install cellular PVC trim to comply with manufacturer's written instructions.
- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths available. Do not use pieces less than 24 inches long except where necessary.
  - 1. Use scarf joints for end-to-end joints.
  - 2. Stagger end joints in adjacent and related members.
  - 3. Use 2 fasteners per every framing member for trim boards applications. For trimboards 12" or wider and sheets, provide additional fasteners.
  - 4. Fasteners must be installed no more than 2" from the end of each board.

5. Do not rip 3/8" and 1/2" sheet product into trim pieces.
6. Glue to a substrate and mechanically fasten.

C. Adhesives:

1. Glue PVC trim to trim joints such as window surrounds, long fascia runs, etc. with recommended cellular PVC cement, to prevent joint separation.
2. Secure glue joint with fastener on each side of the joint to allow adequate bonding time.
3. Surfaces to be glued: Smooth, clean and in complete contact with each other.

D. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

### 3.03 CLEANING

- A. Clean work under provisions of Section 01 70 00.

### 3.04 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01 70 00.

END OF SECTION

## **DIVISION 7**

## **SECTION 07 21 16**

### **FIBERGLASS BLANKET INSULATION**

#### **PART 1 - GENERAL**

##### 1.01 SUMMARY

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### 1.02 WORK INCLUDED

- A. Fiberglass blanket insulation.

##### 1.03 RELATED SECTIONS

- A. Section 09 81 16 - Sound Attenuation Insulation

##### 1.04 REFERENCES

- A. FS HH-I-521 - Insulation Blankets, Thermal (Mineral Fiber, for Ambient Temperatures).

##### 1.05 SUBMITTALS

- A. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- B. Submit product data for each type, identify products used in this project.
- C. Sustainable Material Submittal:
  - 1. Product Data for Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
    - a. Include statement indicating costs for each product having recycled content.
  - 2. Product Data for Credit MR 5: Identify each regional material along with the location of its harvest, extraction, or manufacture.

##### 1.06 REGULATORY REQUIREMENTS

- A. Conform to all applicable Federal, State and local codes and laws.

##### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.

#### **PART 2 - PRODUCTS**

##### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following:
  - 1. Owens Corning

- 2. Johns Manville
- 3. CertainTeed
- B. Basis of Design: Owens Corning
- C. Substitutions: Under provisions of Section 01 60 00.

## 2.02 MATERIALS

- A. Blanket Insulation: Must meet ASTM C-665 as noted below:
  - 1. Unfaced insulation
    - a. Owens Corning Un-faced Type I (Blankets without membrane coverings)
  - 2. Faced insulation (where face of insulation is exposed and facing is required to be rated Class A.)
    - a. Owens Corning PSK faced: Type II (Blankets with polypropylene membrane covering) Class A or Owens Corning FSK faced: Type III (Blankets with foil membrane covering) Class A.
  - 3. Faced insulation (where face of insulation is directly covered with a gypsum or plywood board and facing is not required to be Class A.)
    - a. Kraft-faced fiberglass insulation.
  - 4. Blanket insulation to be formaldehyde – free and include a minimum of 20% Post Consumer material and 5% Pre-Consumer recycled material.
  - 5. Thermal Resistance Value (R-Value)
    - a. Thickness or R-Value as indicated on drawings.
    - b. Minimum R-Values shall meet the minimum requirements stipulated by the State Building Code.
  - 6. Tape: Polyester self-adhering type; 2 inches wide.
  - 7. Per ASTM-E-84 the maximum flame-spread and smoke-developed indexes are to be 25 and 50, respectively. Must pass ASTM E 136 for combustion characteristics.
  - 8. Simpson Strong Tie Insulation Supports (or equal), 14 guage carbon steel spring wire, length as required to coordinate with joist spacing.

## **PART 3 - EXECUTION**

### 3.01 PREPARATION

- A. Verify adjacent materials are dry and ready to receive installation.
- B. Verify mechanical and electrical services within walls have been installed and tested.

### 3.02 INSTALLATION

- A. Install batt insulation in accordance with manufacturer's instructions.
- B. Install batt insulation in spaces without gaps or voids.
- C. Trim insulation neatly to fit spaces.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- E. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members. Tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.
- F. For metal-framed wall cavities support faced blankets by taping flanges of insulation to flanges of metal studs.  
Where cavity heights exceed 72 inches, support unfaced blankets mechanically with adhesively attached, spindle-type anchors. Use adhesive recommended by manufacturer, secure insulation with self locking washer and bend or remove remaining spindle point.
- G. Install polystyrene insulation baffles between all roof rafters where connecting to the wall to assure an unrestricted air way between the insulation and the roof sheathing.  
See Specification Section 07 21 13.
- H. Provide and install kraft-faced fiberglass batt insulation in basement with membrane facing warm side of building space, inserted tightly into floor joist space without voids or gaps. The batt insulation is to be held in place with metal insulation supports at 24 inches on center. Install the supports per manufacturer's instructions, inserted between joists as required to secure insulation in place with tips firmly embedded into the wood. Size supports as required to coordinate with joist spacing.

### 3.03 CLEANING

- A. Clean under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 07 26 16**

### **UNDER-SLAB VAPOR BARRIER**

#### **PART 1 – GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.
- B. Products Supplied Under This Section
  - 1. Vapor Barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.

##### **1.02 RELATED SECTIONS**

- A. Division 3 - Concrete Construction

##### **1.03 REFERENCES**

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
  - 2. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
  - 3. ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- B. American Concrete Institute (ACI)
  - 1. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
  - 2. ACI 302.1R-15: Guide to Concrete Floor and Slab Construction.

##### **1.04 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Quality Control / Assurance
  - 1. Summary of test results: ASTM E1745.
  - 2. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
  - 3. Manufacturer's samples and literature.
  - 4. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
  - 5. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.
  - 6. Vapor barrier manufacturer must warrant in writing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

## 1.05 COORDINATION

- A. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.  
Kayla Cataldo, Northeast Regional Manager | Stego Industries | [kaylacataldo@stegoindustries.com](mailto:kaylacataldo@stegoindustries.com)  
Cell: (617) 605-4590

## 1.06 WARRANTY

- A. Provide compliance with the designated ASTM E1745 classification.
- B. No manufacturing defects in the product for, at least, the Life of the Building.

## **PART 2 – PRODUCTS**

### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following:
  - a. Basis of Design: Stego Wrap 15 mil Vapor Barrier by Stego Industries LLC
  - b. Approved Alternate: Vaporguard by Reef Industries, Inc.
  - c. Approved Alternate: VaporFlex 15mil by Layfield Construction Products
- B. No additional substitutions allowed.

### 2.02 MATERIALS

- A. 15 mil Vapor Barrier:  
Extremely low permeance vapor barrier.
  - 1. Vapor Barrier must have the following qualities
    - a. Thickness of Barrier (plastic) ACI 302.1R Not less than 15 mils
    - b. Water Vapor Barrier ASTM E-1745 Meets or exceeds Class A
    - c. Water Vapor Permeance Maintain permeance of less than 0.01 Perms [grains/(ft<sup>2</sup> · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
    - d. Water Vapor Transmission Rate ASTM F 1249 0.0036
    - e. Puncture Resistance ASTM D 1709 2266 grams
    - f. Tensile Strength ASTM D 882 70.6 lbf/in

### 2.03 ACCESSORIES

- A. Seams:
  - 1. Stego Tape
- B. Sealing Penetrations of Vapor barrier:
  - 1. Stego Mastic
  - 2. Stego Tape



- C. Perimeter/terminated edge seal:
  - 1. Stego Crete Claw (textured tape)
  - 2. Stego Term Bar
  - 3. StegoTack Tape (double-sided sealant tape)
  - 4. One-sided seaming tape is not a recommended method of sealing at the terminated edge.
- D. Penetration Prevention:
  - 1. Beast Foot by Stego Industries LLC
  - 2. Beast Form Stake by Stego Industries LLC
- E. Vapor Barrier-Safe Hand Screed System
  - 1. Beast Screed by Stego Industries, LLC

### **PART 3 – EXECUTION**

#### **3.01 PREPARATION**

- A. Ensure that subsoil is approved by architect
  - 1. Level and tamp or roll aggregate, sand or tamped earth base, compacted.
- B. Contractor shall use a screeding system that does not puncture the vapor barrier.

#### **3.02 INSTALLATION**

- A. Install Vapor Barrier:
  - 1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
    - a. Install a vapor barrier as specified herein under all concrete slabs-on-grade and other locations as noted in the Construction Documents.
    - b. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
    - c. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
      - 1. Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly-placed concrete, per manufacturer's instructions.
    - d. Overlap joints 6 inches and seal with manufacturer's seam tape.
    - e. Apply sealing accessories to a clean and dry vapor barrier.
    - f. Seal all penetrations (including pipes) with manufacturer's pipe boot per manufacturer's instructions.
    - g. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
    - h. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot (or equals) as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.

- i. For a vapor barrier-safe, fixed-elevation concrete screeding application, install Beast Screed (or equal) per manufacturer's instructions prior to placing concrete.

### 3.03 CLEANING

- A. Clean under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 07 31 13**

### **FIBERGLASS ARCHITECTURAL ROOF SHINGLES**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Granular surfaced shingle roofing.
- B. Moisture shedding underlayment, eave, valley and ridge.
- C. Associated metal flashings.

##### **1.02 REFERENCES**

- A. ANSI/ASTM B209 - Aluminum Alloy Sheet and Plate.
- B. ANSI/ASTM D226 - Roofing and waterproofing
- C. ANSI/ASTM E108 - Standard Test Method for Fire Resistance.
- D. ANSI/ASTM D1922 - Propagation tear resistance of plastic film and thin sheeting by pendulum method.
- E. ANSI/ASTM D3018 - Standard Specification for class A Asphalt Shingles.
- F. ANSI/ASTM D3161 - Standard Test Method for Wind Resistance of Asphalt Shingles (Organic or Fiberglass)
- G. ANSI/ASTM D3462 - Standard Specification for Asphalt Shingles. (Fiberglass)
- H. ANSI/ASTM D2822 - Asphalt Roof Cement.
- I. SMACNA MANUAL - Architectural Sheet Metal Manual.

##### **1.03 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Shop Drawings: Indicate metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- C. Product Data: Provide data indicating material characteristics, performance criteria and limitations.
- D. Manufacturer's Certificate: Certify that roof shingles meet or exceed:
  - 1. ASTM E108 Class A Fire Resistance
  - 2. ASTM D3161 Wind Resistance
  - 3. ASTM D1922 Tear Strength

- 4. ASTM D3018 Type 1
- 5. ASTM D3462 Standard for Asphalt Shingles. (Must have Independent certification)
- E. Manufacturer's Installation Instructions
- F. Samples: Submit samples indicating the full color range from the manufacturer's standard colors.

#### 1.04 QUALITY ASSURANCE

- A. Perform this work in accordance with the Asphalt Roofing Manufacturers Association Residential Asphalt Roofing Manual. Copies may be obtained at the:  
Asphalt Roofing Manufacturers Assoc.
- B. Maintain one copy on site at all times.
- C. Manufacturer: Company specializing in manufacturing the products specified in this section with a minimum of five years of documented experience.
- D. Installer: Company specializing in performing the work of this section with a minimum of five years of verifiable documented experience. Contractor must be certified by the shingle manufacturer.
- E. Use only trained workmen skilled in the installation of this type of work. The foreman shall have a minimum of five years of verifiable documented experience.
- F. Upon request furnish the name, location and contact person of previous roofing installations to the owner and the Architect.

#### 1.05 REGULATORY REQUIREMENTS

- A. Conform to Code for ASTM D3018 Class A, UL 790 Fire resistance and UL 58 Wind Uplift for shingle types specified.
- B. Conform to Code for ASTM D3462 Tear resistance.
- C. Conform to insurance requirements identified by owner or its representative.
- D. Provide certificate of compliance from ASTM and UL indicating approval of specified products.
- E. Submit evidence of applicable insurance requirements.
- F. Conform to all applicable Federal, State and local codes and laws.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products under the manufacturer's recommendation and under provisions of Section 01 60 00.
- B. Deliver materials in their original, unopened containers, dry, undamaged, sealed and labels intact.
- C. Stand roll materials on end.
- D. Store other materials flat, elevated from ground or roof deck, protected with waterproof covers as necessary to keep the materials dry.
- E. Protect materials from damage. Do not use materials damaged in handling or storage. Replace damaged materials at no additional cost to the Owner.
- F. When storing materials on the roof, and during application, the roofing contractor shall ensure that overloading of the deck and structure does not occur.

#### 1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not install roofing materials during inclement weather.
- B. Do not install ice and water protection and shingles when ambient temperature is below 50 degrees Fahrenheit.
- C. Do not install roofing materials to damp or frozen deck.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during the same day.
- E. Any damaged or deteriorated deck or flashing substrate which is discovered shall be promptly reported to the owner or their designated representative.

#### 1.08 WARRANTY

- A. Upon completion of the roof system and after passing a final inspection performed by the roofing manufacturer and the owners representative. The manufacturer's Warranty will be furnished for the work of this section as follows:
  - 1. ROOF SHINGLE: 50 Year warranty
- B. Warranty Extension: Manufacturer of shingle will provide a Surestart-Plus warranty with 5-Star 10 Protection to cover labor, materials, tear-off, disposal and workmanship in the event of a materials defect during the first thirty (30) years after completion of application of shingles.
- C. Provide fifteen (15) year, 110 mph wind-resistance warranty
- D. Provide 15-year StreakFighter™ warranty.
- E. Provide 15 year Algae Resistant warranty.

- F. Vents: AIR VENT Inc.: Provide the manufacturer's limited warranty.
- G. Ridge Vents: Lifetime limited warranty, 5 year CertainTeed SureStart protection or equal.

#### 1.09 EXTRA MATERIALS

- A. Furnish under provisions of Section 01 78 00.
- B. Provide one bundle of shingles packaged as required for long term storage.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Basis of Design: Shingles  
CertainTeed Corporation  
Style: Landmark Pro AR  
Color: As selected by Architect from manufacturer's standard colors.
- B. Basis of Design: Ridge Vent  
CertainTeed Corporation  
Style: CertainTeed Ridge Vent, 9" Filtered Class A Fire-rated
- C. Basis of Design: Soffit and flashing vent.  
Air Vent Inc
- D. Substitutions: Under provisions of Section 01 60 00.

#### 2.02 MATERIALS

- A. ROOF SHINGLES
  - 1. Roof shingle shall conform to ASTM D 3018 Type I – Self-Sealing; UL Certification of ASTM D 3462, ASTM D 3161/UL997 80 mph Wind Resistance and UL Class A Fire Resistance; glass fiber mat base; ceramically coated, colored algae resistant granules across entire face of the shingle; two-piece laminated shingle.  
Minimum weight of 250 lb. per square.  
Provide associated Starter Shingles.
  - 2. Color selected by Architect from manufacturer's standard colors.
- B. RIDGE VENTS
  - 1. 9" Filtered Class A Fire-rated, manufactured by CertainTeed or equal.
    - a. Flame retardant polypropylene shingle-over continuous ridge vent, 16 square inches of net free area per linear foot.
    - b. Accommodates roof pitches from 3/12 to 12/12.
    - c. Class A fire rated
    - d. Install shingles to cap the ridge vent.
- C. CONTINUOUS SOFFIT VENT
  - 1. Continuous aluminum soffit vent manufactured by AIR VENT Inc. or equal.

- a. Louvered aluminum, 2" wide, 9 square inches of net free area per linear foot.
  - b. Color selected by Architect from manufacturer's standard colors.
- D. DRIP EDGE:
- 1. Aluminum, ASTM B209, pre-formed, 1/2 inch extension for drip break back for 1 inch vertical fascia, minimum 3 inch railing on roof surface.
  - 2. Color selected by Architect from manufacturer's standard colors.
- E. GABLE EDGE:
- 1. Aluminum, ASTM B209, pre-formed, 1 inch vertical fascia, minimum 3 inch railing on roof surface.
  - 2. Color selected by Architect from manufacturer's standard colors.
- F. SHEET MATERIALS
- 1. Underlayment: DiamondDeck by CertainTeed, or equal, is a synthetic polymer-based scrim-reinforced underlayment. Low-slope application minimum 2" per foot. Between slopes of 2" per foot up to 4" per foot apply two layers of DiamondDeck in "shingle-fashion" as described in the installation instructions.
  - 2. Eave and valley protection (Ice and Water Shield): WinterGuard by CertainTeed or equal: A sheet barrier of self adhering, rubberized asphalt membrane shingle underlayment having a high traction surface and internal reinforcement. The material must have a warranty equal or greater in duration to that of the shingles being applied.
- G. GUTTERS AND DOWNSPOUTS: See specification section 07 71 23.

## 2.03 ACCESSORIES

- A. Nails: Standard round wire type, (hot dipped zinc coated steel) with a minimum 7/16 head diameter and 0.104 inch shank diameter, (minimum 7/8 inch long) or of sufficient length to penetrate through roof sheathing and into the substrate. (a minimum of 1/2 inch).
- B. Plastic Cement: ASTM D2822 asphalt type with mineral fiber components, free of toxic solvents and asbestos, capable of setting within 24 hours at temperature of 75 degrees F and 50% RH. #19 cold cement manufactured by Karnak.
- C. Lap Cement: Fiberated cutback asphalt type, recommended for use in application underlayment, free of toxic solvents and asbestos: #16 double coverage cement manufactured by Karnak.

## 2.04 FLASHING MATERIALS

- A. Sheet flashings: Lead coated copper
- B. Bituminous Paint: Acid and alkali resistant type (color black).
- C. Nails: Standard round wire type, (hot dipped zinc coated steel) with a minimum 7/16 head diameter and 0.104 inch shank diameter, (minimum 7/8 inch long) or of sufficient length to penetrate through roof sheathing and into the substrate. (a minimum of 1/2 inch).

## 2.05 FLASHING FABRICATION

- A. Form flashings to protect roofing materials from physical damage and to shed water
- B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
- C. Hem exposed edges of flashings minimum 1/4 inch on underside.
- D. Apply bituminous paint on concealed surfaces of flashings.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. Any damages caused by the contractor's operations shall be repaired to the satisfaction of the owner at the contractor's expense.
- B. The roofing contractor shall carefully examine the roof area in regards to dimensions, and type of substrate and conditions that may affect proper execution of the work. Any variations shall be reported to the owner's representative and the Architect prior to the bid. No claims for extra costs shall be allowed because of lack of full knowledge of existing conditions.
- C. Verify existing site conditions.
- D. Verify that roof openings, curbs, pipes, sleeves, ducts and vents through roof are solidly set, and wood cant strips, wood nailing strips, and reglets are properly set and in place.
- E. Beginning of roof project means installer accepts existing conditions.

### 3.02 PROTECTION

- A. Schedule and execute all work without exposing the building interior to the effects of inclement weather. Protect the existing building, contents, and its inhabitants against all risks associated with this work.
- B. Provide suitable barricades to protect the general public.

### 3.03 PREPARATION

- A. Verify deck is clean and smooth, free of depressions, waves, or projections.
- B. Fill Knot holes and surface cracks with a latex filler at areas of bonded eave protection.
- C. Broom clean deck surfaces under eave protection and underlayment.



### 3.04 INSTALLATION - PROTECTIVE UNDERLAYMENT

- A. Place underlayment over entire roof surface and install in accordance with manufacturer's instructions. Nail in place. No staples allowed. The roof slope is as noted on the drawings.
- B. Install protective underlayment perpendicular to slope of roof.
- C. Weather lap and seal watertight with plastic cement, items projecting through mounted on roof.

### 3.05 INSTALLATION - EAVE ICE DAM PROTECTION

- A. Place eave edge and gable edge metal flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 2 on center.
- B. Apply the self adhering, rubberized asphalt membrane eave ice dam protection under No.15 roofing felt at all eaves in accordance with manufacturer's instructions.
- C. Extend eave ice dam protection membrane from the eave's edge up the slope a minimum of 3 feet inside the exterior wall line of the building unless noted otherwise as a greater dimension on the drawings.

### 3.06 INSTALLATION - VALLEY PROTECTION

- A. Place one layer of self adhering, rubberized asphalt membrane, centered over valleys extending 18 inches both sides of valley. Lap joints minimum of 6 inches. Valley protection shall be applied in accordance with manufacturer's instructions.
- B. In valleys, the roof shingles are to be installed using the closed-cut method. Cut edge must be sealed with roof cement.

### 3.07 INSTALLATION - RIDGE AND SOFFIT VENTS

- A. Install ridge and soffit vents in accordance with manufacturer's written instructions.

### 3.08 INSTALLATION - METAL FLASHINGS

- A. Weather lap joints a minimum of 2 inches and seal weather tight with plastic cement.
- B. Secure in place with nails at 2 inches on center. Conceal fastenings.
- C. Flash and seal work projecting through or mounted on roofing with plastic cement to make weather tight.
- D. Flashing metal shall be corrosion resistant.

### 3.09 INSTALLATION - ROOF SHINGLES

- A. Install shingles in accordance with manufacturer's instructions. The roof slope is as noted on the drawings.
- B. Place shingles in straight coursing pattern with weather exposure as recommended by the manufacturer to produce double thickness over entire roof area and as required to meet the warranty. Provide double course of shingles at eaves and gables.
- C. Project first course of shingles 3/4 inch beyond fascia boards.
- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Cap Hips and ridges with individual shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.
- F. Install shingles using "Hurricane Nailing" of six nails per shingle.

### 3.10 FIELD QUALITY CONTROL

- A. Field inspection by manufacturer's representative will be performed under provisions of Section 01 43 00.
- B. Field inspections of the work will also be performed by the Owners designated representative and or the Architect.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

### 3.11 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01 70 00.
- B. Do not permit traffic over finished roof surface.

END OF SECTION

## **SECTION 07 46 33**

### **VINYL SIDING**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Solid vinyl siding.
- B. Vinyl trim.

##### **1.2 RELATED SECTIONS**

- A. Section 06 10 53 - Carpentry: Framing and Sheathing.
- B. Section 06 16 53 - Air & Moisture Resistant Sheathing
- C. Section 07 92 13 - Joint Sealant.

##### **1.3 REFERENCES**

- A. ASTM D7793 – Standard Specification for Insulated Vinyl Siding
- B. ASTM D 3679 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding.
- C. ASTM D 4477 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Soffit.
- D. ASTM D 5206 - Standard Windload Resistance Test.
- E. ASTM E 84 - Standard test Method for Surface Burning Characteristics of Building Materials.
- F. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- G. ASTM D7254 – Standard Specification for Polypropylene (PP) Siding

##### **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Maintenance and care requirements.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Provide installer with not less than three years of experience with products specified.
- B. Meet all federal, state and local codes and laws.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.
  - 4. Accepted mock-ups shall be comparison standard for remaining work.

#### 1.6 PERFORMANCE REQUIREMENTS

- A. PVC Fire Resistance: Provide vinyl siding products that meet or exceed the following ratings:
  - 1. Flame Spread Index < 25, smoke development rating <450, per ASTM E 84.
  - 2. Fire endurance classification of 1 hour, per ASTM E 119 in a wall assembly.
- B. Siding Fire Resistance: Provide thermoplastic polyolefin siding products that meet or exceed the following ratings:
  - 1. Flame Spread Index <200 per ASTM E-84.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products under provisions of Section 01 60 00.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store on a flat surface under cover, stacked no more than 12 boxes high. Do not store in location where temperatures may exceed 130 degrees F.

#### 1.8 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.

#### 1.9 WARRANTY

- A. Provide manufacturer's standard limited lifetime warranty.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. CertainTeed Corporation, Siding Products Group, P.O. Box 860, Valley Forge, Pennsylvania 19482. ASD. Tel: (800) 233-8990; Email: [ctsiding@certainteed.com](mailto:ctsiding@certainteed.com); Web: [www.certainteed.com](http://www.certainteed.com).
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

### **2.2 MATERIALS**

- A. Polymer Siding:  
Provide products made of molded polypropylene as specified in this section and manufactured to comply with requirement of ASTM D 7254
  - 1. Provide elongated nailing slots on nailing flanges to allow movement
  - 2. Provide products that meet weathering requirements of ASTM D 7254
  - 3. In accordance with ICC – ES Acceptance Criteria AC366
  - 4. Provide panel thermometer allowing for proper spacing in various temperatures
- B. Fasteners: Aluminum nails, alloy 5056 or 6110, having minimum tensile strength 63,000 pounds per square inch.
- C. Air infiltration barrier: Specified in Section 07 27 19.
- D. Joint Sealant: Specified in Section 07 92 13.

### **2.3 VINYL SIDING AND TRIM**

- A. CertainTeed, Cedar Impressions T5 Straight Edge Sawmill Shingles:
  - 1. Design: Triple 5 inch (127 mm) shingle; sawmill finish.
  - 2. Lock: Certilock Molded Perimeter Lock.
  - 3. Width: 15 inch (381 mm)
  - 4. Length: 5 feet (1.52 m) plus or minus .025 inch (6 mm).
  - 5. Average Thickness: 0.100 inch (2.54 mm).
  - 6. Panel Projection: 3/4 inch (19 mm).
  - 7. Panel Exposure: 5 inches (127 mm) plus or minus .062 inch (1.57 mm).
  - 8. Maximum Warp (per 2 panels): 0.250 inch (6 mm).
  - 9. Panel Thermometer: Monitors panel temperature to help ensure accurate installation
- B. CertainTeed, Single 7" Vertical Board & Batten:
  - 1. Design: Single 7 inch (178 mm) vertical; rough cedar finish
  - 2. Width: 7 inch (178 mm).
  - 3. Length: 10 feet (3.05 m).
  - 4. Average Thickness: 0.052 inch (1.32 mm).
  - 5. Panel Projection: 1/2 inch (12.7 mm).
  - 6. Panel Exposure: 7 inch (178 mm) plus or minus .025 inch (6 mm).
  - 7. Maximum Warp (per 2 panels): 0.250 inch (6 mm).

- C. Vinyl Trim:
  - 1. J-Trim: Channel, 1-3/4 inches nailing leg, 3/4 inch forward leg, 7/8 inch channel width.
  - 2. Finishing Trim: 1-1/2 inches nailing leg, 3/4 inch forward leg.
  - 3. Starter Strip: Single-row nailing hem with elongated nailing holes 1-1/4 inches long 1-5/8 inches on center, 1/4 inch base projection; white color.
- D. All colors to be selected by Architect from manufacturer's premium and standard colors.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared. Verify dimensions and acceptability of substrate
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### **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 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Installation of Air & Moisture Resistant Sheathing is specified in Section 06 16 53.
- C. Attach vinyl products to substrate for weathertight installation; ensure that horizontal components are installed true to level, that vertical components are installed true to plumb.
- D. Stagger lap joints in horizontal siding in uniform pattern as successive courses of siding are installed.
- E. Allow space between both ends of siding panels and trim for thermal movement. Overlap horizontal panel ends one-half the width of factory pre-cut notches.
- F. Refer to Manufacturer's Installation Manual for latest installation recommendations
- G. Install joint sealers that are specified in Section 07 92 13.

#### **3.4 CLEANING**

- A. Clean under provisions of Section 01 70 00.
- B. Clean dirt from surface of installed products, using mild soap and water.
- C. After completing installation, remove from project site excess materials and debris resulting from installation of vinyl products.

### 3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

## **SECTION 07 62 11**

### **SHEET METAL FLASHING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.2 SECTION INCLUDES**

- A. Sheet metal work.
- B. Custom sheet metal assemblies.

##### **1.3 RELATED SECTIONS**

- A. Section 04 22 23 - Reinforced Masonry
- B. Section 06 65 10 - Cellular (PVC) Fabrications
- C. Section 07 31 13 - Architectural Roof Shingles
- D. Section 07 92 13 - Joint Sealants

##### **1.4 PERFORMANCE REQUIREMENTS**

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Conform to the following requirements:
  - 1. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

##### **1.5 SUBMITTALS**

- A. Comply with Division 1 General Requirements and submit for approval:
  - 1. Product Data: Manufacturer's literature including installation instructions, use restrictions and limitations.
  - 2. Shop drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide large scale plans, elevations, and details of profiles, joints, seams, anchorages, connections and accessory items. Include statement that materials are physically compatible.
    - a. Field Measurements: Take accurate field measurements before fabrication and indicate same on shop drawings.
    - b. Include attachment details. Identify both shop- and field-assembled work.
    - c. Identify material, thickness, weight, and finish for each item.
    - d. Include details for:
      - 1. Forming, including profiles, shapes, seams, and dimensions.



2. Joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments.
3. Termination points and assemblies.
4. Expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
5. Counterflashings.
6. Connections to adjoining work.
3. Samples: Submit final samples of selected products. Include samples showing full variation of color and finish expected. Size: 144 square inches or more.
  - a. Sheet Metal Flashing: including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
  - b. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: In required profile. Include fasteners and other exposed accessories.
  - c. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations: Obtain materials of a uniform quality, including color for exposed work, from single manufacturer for each component.
  1. Standards: Comply with applicable requirements, recommendations and details of SMACNA Architectural Sheet Metal Manual.

## 1.7 PRODUCT REQUIREMENTS

- A. Comply with product requirements, delivery storage and handling provisions of Division 1 and the following:
  1. Ensure materials are not adversely affected by galvanic action, or excess differential thermal movement.
  2. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
  3. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
  4. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

## 1.8 PROJECT CONDITIONS

- A. Protection: During construction, cover work with waterproof sheeting at end of each day's work. Prevent the intrusion liquid water and the build up of water vapor pressure within assemblies.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining of work be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such.

## **PART 2 - PRODUCTS**

### **2.1 FLASHING & SHEET METAL**

- A. Stainless-Steel Sheet: ASTM A 240/A or ASTM A 666, Type 304/Type 316, dead soft, fully annealed; with smooth, flat surface. Provide thicknesses shown, if not as follows:
  - 1. Not otherwise indicated: 0.019 inch.
  - 2. Counterflashing and the like: 0.032 inch.
  - 3. Apron, step flashing, backers: 0.016 inch.
- B. Sheet Aluminum: ASTM B 209, alloy 3003-H14, 0.050 inch thickness minimum. Use for brake metal. All aluminum exposed to view is to have a Kynar 500 factory finish meeting AAMA 2605.

### **2.2 MISCELLANEOUS MATERIALS**

- A. Components include:
  - 1. Fasteners: Match material being fastened for both type of material and finish.
  - 2. Isolation Coating: SSPC paint 12.
  - 3. Slip Sheet: 5 lb. rosin building paper.
  - 4. Plastic Underlayment: 6 mil carbonated polyethylene film, FS L-P-512.
  - 5. Reglets: Metal units of type and profile indicated or required which are compatible with flashings used.
  - 6. Solder: ASTM B 32, as required.
  - 7. Accessories: Provide all clips, cleats, straps, anchors and similar items necessary to properly complete the work. Provide accessories that are compatible with sheet metal materials used and which are of sufficient size and gage to perform as intended.
  - 8. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
  - 9. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
  - 10. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
  - 11. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

### **2.3 FABRICATION**

- A. Shop fabricate work to the greatest extent possible. Fabricate work to be truly straight, plumb, level and square, and to provide the best possible watertight, weatherproof performance with expansion provisions in running work.
- B. Provide work to sizes, shapes, and profiles indicated on approved shop drawings. Comply with referenced standards. Minimize oil-canning, buckling, tool marks and other defects.
- C. Make work with uniform, watertight joints. Make seams as inconspicuous as possible.

- D. Isolate dissimilar materials with isolation coating or other permanent separation acceptable to the Architect.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine and verify conditions as follows:
  - 1. Verify substrates and underlying work is within tolerances specified.
  - 2. Verify structural components are properly placed.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 TOLERANCES**

- A. For exposed work, the following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Document and shall not be added to allowable tolerances indicated for other work.
  - 1. Allowable Variation from True Plumb, Level, and Line: +/- 1/8" in 20'-0"
  - 2. Allowable Variation from True Plane of Adjacent Surfaces: +/- 1/16"

#### **3.3 INSTALLATION**

- A. Install flashing in continuous uninterrupted manner to accomplish 'intent' complete with all transitions, laps, splices, folds, seams necessary to ensure the diversion of water to the exterior. Work in close coordination with installation of exterior masonry, roofing, window, joint sealer, louver, and the like.
  - 1. Apply materials within manufacturer's requirements for temperature and weather conditions.
  - 2. Do not apply to wet or frozen substrates.
  - 3. Do not allow contamination with dust or dirt.
  - 4. Seal completely at edges, perimeter and penetrations.
- B. Strictly comply with manufacturer's instructions and recommendations and standard details and recommendations of SMACNA, except where more restrictive requirements are specified in this section. Locked and sealant locked joints as indicated on the Drawings.
- C. Securely anchor work, but allow for thermal movement and building movement. Use concealed fasteners to the greatest extent possible. Install work to be permanently weatherproof and watertight. Provide continuous cleats at all edge conditions.
- D. Provide reglets where indicated and where required. Coordinate installation with related and adjacent work.
- E. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.

- F. Fasteners: Use fastener sizes that penetrate wood or sheathing substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and for other substrates not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- G. Provide flashing at every obstruction to the downward flow of water. Design and install flashing to control and divert water to the exterior. Form at least 4" high end pans above lintels and similar conditions to extend the entire length of the lintel where possible. Flashing shall extend 4" minimum beyond end of lintel before it is panned (dammed).

#### 3.4 CLEAN UP & PROTECTION

- A. Adjust work to conform to specified tolerances and appear uniform, straight and correct. Touch-up damaged coatings and finishes to eliminate evidence of repair.
  - 1. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.
  - 2. Clean exposed surfaces using materials and methods recommended by manufacturer of material or product being cleaned. Remove and replace work that cannot be successfully cleaned.

**END OF SECTION**

## **SECTION 07 71 23**

### **GUTTERS AND DOWNSPOUTS**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. Provide labor, material, and equipment necessary for furnishing a complete installation of a commercial gutter and downspout system.

##### **1.03 RELATED SECTIONS**

- A. Section 07 31 13 -Architectural Roof Shingles
- B. Section 07 92 13 - Joint Sealants

##### **1.04 REFERENCES**

- A. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

##### **1.05 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Each type of product specified. Submit manufacturer's detailed technical product data, installation instructions and recommendations, dimensions of individual components, profiles, and finishes
- C. Shop Drawings: Show fabrication and installation of commercial gutter system including fully dimensioned roof plans, expansion joint locations, sections and details of components and other related trims.
- D. Finish & Color Selection: Furnish manufacturer's technical data for specified finish and color chart showing full range of colors available.

##### **1.06 QUALITY ASSURANCE**

- A. Obtain all components and related accessories from one single source manufacturer.
- B. Follow manufacturer's printed instructions for installing commercial gutter system. Follow primary roofing manufacturer's printed instructions for installing associated roof material for flashing gutter system to roof.

## 1.07 DELIVERY, STORAGE & HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. All products delivered shall be stored in a clean dry location prior to installation.
- C. Products furnished with strippable protective masking shall not be exposed to direct sunlight for more than 30 minutes without removing masking.
- D. Do not install finished materials with scars or abrasions.

## 1.08 PROJECT CONDITIONS

- A. Coordinate work of this Section with adjoining work for proper sequencing to ensure protection from inclement weather and to protect materials and their finish against damage.
- B. Do not install commercial gutter system during inclement weather. When installing in cold climates, warm adhesives, caulks, and primers to at least 50 degrees Fahrenheit prior to application.

## **PART 2 - PRODUCTS**

### 2.02 MATERIALS

- A. Gutters: Provide seamless gutters.  
Manufactured in a uniform section with matching corner units, end caps, outlet tubes, and other accessories as required for a complete system.  
Elevate back vertical edge at least 1 inch higher front edge.  
Furnish expansion joints and expansion-joint covers fabricated from same metal as gutters.
  - 1. Fabricate from the following exposed metal:
    - a. Formed Aluminum: 0.032 inch
  - 2. Gutter Profile: Style D (rectangular) according to SMACNA's "Architectural Sheet Metal Manual."
  - 3. Gutter size: 6" width at top.
  - 4. Corners: Factory mitered and mechanically clinched and sealed watertight.
  - 5. End caps to be 0.024" gauge
  - 6. Gutter Supports: Internal concealed straps manufactured from 0.125" x 1.00" aluminum or approved hangers.
  - 7. Support Bracket: Shall be manufactured from 0.125" x 1.00" aluminum, factory punched for fasteners. (Optional)
  - 8. Gutter Accessories: Provide continuous leaf guard. Manufacturer: LeafFilter (or approved equal)
- B. Downspouts: Plain rectangular complete with machine-crimped elbows, manufactured from the following exposed metal.
  - 1. Formed Aluminum: 3" x 4" and 0.027 inch thick.
  - 2. Finish to match gutter.
  - 3. Downspouts to be one continuous unit without joints.
  - 4. Outlets: At all downspout locations provide aluminum outlets to connect liner to downspout.

5. Wall Brackets: Provide wall brackets at 60" maximum spacing (minimum 2 brackets). Brackets shall be manufactured from 0.125" x 1.00" aluminum, finished to match downspout.

## 2.03 ACCESSORIES

- A. Nails: Aluminum nails of 5056 or 6110 alloy having a minimum tensile strength of 63,000 psi. All nails shall have a suitable etch finish to remove greases and provide additional holding power.
- B. Liner Expansion Joint: Provide manufacturer's elastomeric expansion joints with cover plates at 40' intervals or as shown on shop drawings.
- C. Sealant: Shall be polyurethane or silicon based water-proofing type, compatible with aluminum gutter, downspout, and abutting dissimilar materials for intended application.
- D. All accessories designed for use with the gutters and downspouts are to have the same finish.

## 2.04 FINISHES

- A. Exterior coating to be a High Performance Coating, two-coat, shop applied, 70% Polyvinylidene Fluoride (PVDF) coating based on Elf Arkema Chemicals, Inc. Kynar 500 or Ausimont U.S.A., Inc. Hylar 5000 resin, meeting AAMA 2605 specification.  
Color as selected by Architect from manufacturer's standard colors.
- B. Interior coating to be a corrosion inhibiting finish.

# **PART 3 - EXECUTION**

## 3.01 PREPARATION

- A. Verify governing, dimensions at building; examine, clean and repair, if necessary, any adjoining work on which this work is in any way dependent for its proper installation.

## 3.02 INSTALLATION

- A. Install gutter using hangers so that movement is not restricted.
- B. Gutter hangers shall be installed a maximum of 32" on center and nailed to the roof sheathing or fascia board at rafter locations. Nails shall be 1-1/2" aluminum screw shank nails.
- C. Gutters shall not have seams in lengths 40 feet and under.
- D. Provide expansion joints on all sides of a hip roof and on runs of more than forty feet in length.
- E. Pitch gutters down toward downspouts at 1/16" per foot minimum.
- F. Dissimilar materials shall receive a protective coating as required.
- G. Gutters shall support a minimum of 50 pounds per linear foot installation.

- H. Install interior straps by fully engaging them into gutter's hemmed edge, complete by securely riveting.
- I. Rivet and seal liner joints with high grade exterior sealant.
- J. All downspouts shall empty onto the finish grade unless otherwise indicated on the drawings to empty into a storm drainage system.  
If downspouts empty into a storm drainage system, provide connecting boots of the proper material and style required to coordinate with site work components.  
Downspouts emptying onto grade are to include concrete splash blocks at each outlet.

### 3.03 CLEANING

- A. Clean work under provisions of Section 01 70 00.
- B. Clean all aluminum surfaces
- C. All scrap materials shall disposed off-site.

### 3.04 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01 70 00.

END OF SECTION



## **SECTION 07 84 13**

### **FIRESTOPPING**

#### **PART 1 – GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 RELATED SECTIONS**

- A. Division 21 – Fire Suppression
- B. Division 22 - Plumbing
- C. Division 23 – Mechanical
- D. Division 26 – Electrical

##### **1.03 DESCRIPTION OF WORK**

- A. The work of this Section consists of the provision of all plant, materials, labor and equipment and the like necessary or required for the complete execution of all firestopping and smoke seal work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

NOTE – Firestopping is defined as a material, or combination of materials, to restore the integrity of fire rated walls and floors by maintaining an effective barrier against the spread of flame, smoke and toxic gases.

1. Provide firestopping and smoke seals as indicated on the drawings and as required to maintain full and continuous smoke and fire barrier between zones.  
  
Seal all penetrations between floor/ceiling plane with expanding foam. No fiber insulation packing is permitted.  
  
Cope and seal around all structural elements to insure smoke and fire barriers.
2. Provide firestopping of all openings in floors and walls both empty and those accommodating penetrating items such as cables and wires, cable trays, conduits, pipes, ducts, etc.; coordinate with Divisions 21, 22, 23 and 26.
3. Provide firestopping at joints between curtain walls and floor or roof openings and balance of openings between exterior walls and connecting floor assemblies at each floor.
4. Pack expansion joints in fire rated walls and floors;
5. Provide firestopping of openings at each floor level in shafts or stairwells.

#### 1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. E 814 – Standard Method of Fire Tests of Through Penetration Fire Stops.
  - 2. E 119 – Methods of Fire Tests of Building construction and Materials.
  - 3. E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Underwriters Laboratories, Inc. (UL)
  - 1. UL 1479 – Fire Tests of Through Penetration Fire Stops.
  - 2. UL 263 – Fire Tests of Building Construction and Materials.
  - 3. UL 723 – Surface Burning Characteristics of Building Materials.
  - 4. UL “Fire Resistance Directory” current year.
- C. Factory Mutual (FM) Approval Guide, current year.
- D. Building code of the jurisdiction of the work.
- E. National Fire Protection Association
  - 1. NFPA 101 – Life Safety Code.
  - 2. NFPA 70 – National Electrical Code.

#### 1.05 QUALITY ASSURANCE

- A. Firestopping materials shall conform to both Flame (F) and Temperature (T) ratings as tested by nationally accepted test agencies per ASTM E 814 or UL 1479 fire tests.

The F rating and T rating must be a minimum of 1 hour but not less than the fire resistance rating of the assembly being penetrated.

The fire test shall be conducted with a minimum positive pressure differential of 0.03 inches of water column.
- B. Firestopping shall be performed by a Specialty Contractor trained or approved, in writing, by firestop material manufacturer.

Said specialist shall be as defined in the conditions.

Equipment used shall be in accordance with firestop material manufacturer's written installation instructions.
- C. Materials shall conform to all applicable governing codes.
- D. All materials used in the work shall be certified “asbestos free” and shall be free from any and all solvents or components that require hazardous waste disposal or, that after curing, dissolve in water.
- E. All materials shall comply with the interior finish flame spread and smoke developed requirements for the area in which they are installed. Coordinate with governing codes.

## 1.06 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Certification of specification compliance of all materials.
- C. Manufacturer's printed product data and drawings indicating product characteristics, performance, detail applications and limiting criteria.

Submittal shall include applicable UL and/or FM assembly numbers for each material and proposed installation.

- D. Manufacturer's installation instructions for each type of firestop required by the project.
- E. Manufacturer's approval of nominated installer of firestopping and smoke seal products.
- F. Mockups:
  - 1. Prepare job mockup of the material proposed for use in the project as directed by Architect.  
Approved markups shall be left in place as part of the finished project and will constitute and standard for remaining work, including aesthetics.
- G. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

## 1.07 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Deliver all materials to be used in the work of this section to the project site in original sealed containers with manufacturer's brand and name, lot numbers, UL labeling, mixing and installation instructions clearly identified thereon.
- C. Store all materials in accordance with manufacturer's directions.

All materials shall be dated with shelf life and shall be removed from the project site at the contractor's expense if date is expired.

## 1.08 PROJECT CONDITIONS

- A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
- B. Coordinate work required with work of other trades; firestopping shall, where practical, precede gypsum board or other applied sheet finishing operations.
- C. Where firestopping is installed at locations which will remain exposed in the finished work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as required against damage from other construction operations.

- D. Adhesive and sealants use in the building interior [i.e., inside the exterior moisture barrier] shall not exceed VOC content limits of:
  - 1. Provisions of 01 81 10 Environmental Impact of Materials.
  - 2. Aerosol Adhesives: Green Seal Standard GC-36.

#### 1.09 PREINSTALLATION CONFERENCE

- A. A preinstallation conference shall be scheduled in accordance with Section 01 31 00 by the contractor with this specialty contractor and all other specialty contractors, subcontractor and the like to establish procedures to maintain optimum working conditions and to coordinate the work of this section with related and adjacent work.

#### 1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements, and comply with the following:
  - 1. Coordinate work of this section with similar work being performed by certain trades for their own work.
  - 2. All firestop work not performed by trades shall be performed under this section.
  - 3. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
  - 4. Notify the Architect at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
  - 5. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until the Architect and building inspector, if required by authorities having jurisdiction, have examined each installation.

### **PART 2 – PRODUCTS**

2.01 SPECIFICATION STANDARD: For purposes of establishing standards of quality and levels of performance and not for the purposes of limiting competition, the basis of this specification is upon units as manufactured by one of the following and their respective model suitable for the intended application.

- A. Bio Fireshield, Inc.; Damonmill Square, Concord, MA 01742.
  - 1. Novasit K-10 Firestop Mortar
  - 2. K-2 Firestop Mortar
  - 3. Biotherm Firestop Sealants and Caulk
  - 4. Firestop Sleeve
  - 5. Firestop Pillows
  - 6. Biostop 500 Intumescent Caulk
- B. IPC Corp.
  - 1. KBS Mortar Seal
  - 2. Flamesafe Sealants and Caulk
  - 3. FPS 1000 Putty and 1077 Putty Pads
  - 4. Firestop Kits – FSK200
  - 5. KBS Seal Bags
  - 6. Quelpyre Tapes and Blankets

- C. Dow Corning
  - 1. Firestop Sealant #2000
  - 2. Firestop Foam #2001
- D. 3M Corporation
  - 1. Fire Barrier Caulk, CP-25WB
  - 2. Fire Barrier MPS-2 Putty and 4S Putty Pads
  - 3. Fire Barrier Intumescent Wrap Strip #FS-195
- E. Nelson Firestop Products
  - 1. FSP Firestop Putty
  - 2. CMP Firestop Compound
  - 3. CLK Firestop Sealant
  - 4. PLW intumescent Pillow
  - 5. PCS Preformed Collar for Plastic Pipe Penetrations
  - 6. MPS Multi-Plug
  - 7. MCT Multi-Cable Transit
  - 8. EMCT Multi-Cable Transit and Plug
  - 9. CTG Firestop Coating
  - 10. CPS Composite Sheet
- F. Tremco, Inc.
  - 1. Fyre-Sil and Fyre-Sil SL
  - 2. Fyre-Shield
  - 3. THC-900/901
  - 4. Dymeric, Dymonic Sealant Systems
  - 5. Compatible forming systems.
- G. General Electric
  - 1. Pensil 100 Sealant
  - 2. Pensil 200 Foam
  - 3. Pensil 300 Joint Sealant
  - 4. Pensil 500 Putty
  - 5. Compatible forming systems.
- H. U.S. Gypsum Company
  - 1. U.S.G. "Thermafiber" unfaced safin insulation with third party wrap, 3.5 pcf density, UL R-10905 label.
  - 2. U.S.G. "Firecode" compound.
- I. Hilti Corporation
  - 1. Hilti CP 645 insulated firestop sleeve to replace existing pipe insulation

## 2.02 ACCESSORY ELEMENTS

- A. Forming, damming materials shall be mineral fiber board or other suitable material recommended by nominated system manufacturer.

- B. Primers, sealant and solvent cleaners shall be as recommended by the nominated system manufacturer.
- C. Metal Systems – 20 gauge phosphatized, electrogalvanized steel plate or galvanized steel clips.

### **PART 3 – EXECUTION**

#### **3.01 INSPECTION AND ACCEPTANCE**

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the work of this contract, any defects affecting installation.
- B. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

#### **3.02 PREPARATION**

- A. The surface shall be dry, clean, and free of all foreign matter.
- B. Do not apply firestopping to surfaces previously painted or treated with a sealer, curing compound, water repellant or other coatings unless tests have been performed to ensure compatibility of materials.
- C. Provide primers as required which conform to manufacturer's recommendations for various substrates and conditions.
- D. Mask where necessary to protect adjoining surfaces.
- E. Remove excess material and stains on surfaces as required.

#### **3.03 INSTALLATION – GENERAL SYSTEMS**

- A. Install in strict accordance with manufacturer's printed instructions.
- B. Ensure that anchoring devices, backup materials, clips, sleeves, supports and other materials used in the actual fire test are installed.
- C. Install firestopping with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal.
- D. Tool or trowel exposed surfaces. Remove excess firestop material promptly as work progresses and upon completion.
- E. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance ratings. Combustible damming materials must be removed after appropriate curing. Incombustible damming materials may be left as a permanent component of the firestopping systems.

3.04 FIRESTOPPING CONSTRUCTION AT BUILDING EXTERIOR PERIMETERS, INTERIOR WALLS, SHAFTS, ETC.

- A. Install material of proper size on continuous plates or clips as required for proper support in order to safe-off area between exterior walls, interior walls and shafts and floor slabs, said walls and roof areas leaving NO VOIDS.
- B. Firestopping is required at all juncture conditions whether or not clips, angles or other structural elements exist either intermittently or continuously.
- C. Attach plates and clips to floor levels and other breaks and extend through framing to sheathing or other solid strata.
- D. Where metal decking flutes, either parallel or perpendicular to walls, occur and are open, same shall be fully packed and sealed with proper firestopping system.
- E. Where firestopping is accomplished after installation of drywall or other applied sheet finish, all spaces between penetrations and finish shall be filled to the thickness of said sheet finish with intumescent caulk.
- F. At all linear openings, fill voids with a minimum of 6 inches of minimum 3.5 lb./cu. ft. density safing insulation as specified in Part 2 herein and cover entire surface with UL listed firestop sealant of one of nominated manufacturers identified in Part 2 herein.

3.05 PENETRATION SEALS

- A. Penetrations are defined as conduits, cables, wires, piping, ducts or other elements passing through one through one or both outer surfaces of fire rated walls, floors or partitions and shall be firestopped on both sides of penetration in accordance with requirements set forth in Paragraph 1.04 of this Section.
- B. Where sleeves are used, same shall be as specified in Part 2 herein; in event that sleeves are not used, core openings and caulk penetrating items with intumescent system the full length of penetration and seal on both sides with intumescent caulk.
- C. Residual openings within square or rectangular holes shall be filled with compounds applicable for substrate encountered and all penetrations sealed on both sides with caulk.
- D. Where existing pipes penetrate new partition, replace existing pipe insulation with new insulated firestop sleeve and seal perimeter of remaining opening on both sides with caulk.

3.06 FIELD QUALITY CONTROL

- A. Contractor shall immediately notify the Architect if the firestopping systems herein specified cannot meet the requirements of the specification.
- B. Contractor shall examine firestops to ensure proper installation and full compliance with this specification.
- C. All areas of work must be accessible until inspection by the applicable code authorities.

- D. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

### 3.07 CLEANING

- A. When finished work will be visible, clean adjacent surfaces in accordance with manufacturer's printed instructions.
- B. If visible in the finished work, remove temporary dams after initial cure of firestops.
- C. Correct staining and discoloring on adjacent surfaces.
- D. Remove all debris and excess materials entirely from site and leave work in a neat and clean condition.

END OF SECTION



## **SECTION 07 92 13**

### **JOINT SEALANTS**

#### **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. Silicone joint sealants.
- 2. Urethane joint sealants.
- 3. Acoustical joint sealants.

- B. Related Sections:

- 1. Division 09 Section "Gypsum Board" for sealing perimeter joints.

##### 1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

- 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- 2. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

##### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.

- B. Product Data: For each joint-sealant product indicated.

- C. Sustainable Design Submittals:

- 1. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.

- D. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

- E. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.
- F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- H. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- C. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.

#### 1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.7 WARRANTY

- A. Warranty Period: Two years from date of Substantial Completion. Provide under the provisions of Section 01 78 00.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers as listed below
- B. Substitutions: Under provisions of Section 01 60 00.

### **2.2 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full standard range.

### **2.3 SILICONE JOINT SEALANTS**

- A. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. (for plumbing fixtures & tile – white & clear)
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Corning Corporation; 786 Mildew Resistant.
    - b. GE Advanced Materials - Silicones; Sanitary SCS1700.
    - c. Tremco Incorporated; Tremsil 200 Sanitary.
- B. Single-Component, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT, G, A and O. (for roofing projects)
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dowsil 795 Silicone structural Sealant.
    - b. GE Advanced Materials: SilPruf SCS - 2000
    - c. Tremco Incorporated; Spectrem 2
    - d. Pecora 864 Silicone

### **2.4 URETHANE JOINT SEALANTS**

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. (for metal panel systems, masonry, stone, window & door perimeters – most versatile sealant)
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Pecora Corporation; Dynatrol I-XL.
    - b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
    - c. Tremco Incorporated; Dymonic 100

## 2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Pecora Corporation; AC-20 FTR.
    - b. USG Corporation; SHEETROCK Acoustical Sealant.

## 2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings Rods: ASTM C 1330, Type C, Closed Cell, provide backing rods of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.7 MISCELLANEOUS MATERIALS

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

# **PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

## 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
  3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form

smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- B. Clean under provisions of Section 01 70 00.

### 3.5 PROTECTION

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

### 3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints of exterior openings where indicated.
    - c. Tile control and expansion joints.
    - d. Vertical joints on exposed surfaces of interior unit masonry, concrete walls and partitions.
    - e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - f. Openings around all penetrations through partitions and perimeter of partitions designated as smoke partitions.
    - g. Other joints as indicated.
  2. Urethane Joint Sealant: Single component, nonsag, Class 35
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full standard range.

- B. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated.
  2. Joint Sealant: Mildew resistant, single component, nonsag, mildew resistant, acid curing.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full standard range.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    - a. Construction joints in cast-in-place concrete.
    - b. Control and expansion joints in unit masonry.
    - c. Joints in dimension stone cladding.
    - d. Joints in exterior insulation and finish systems.
    - e. Joints between metal panels.
    - f. Joints between different materials listed above.
    - g. Perimeter joints between materials listed above and frames of doors, windows and louvers.
    - h. Control and expansion joints.
    - i. Other joints as indicated.
  2. Silicone Joint Sealant: Single component, Type S, Grade NS, Class 50.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full standard range.
- D. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Location:
    - a. Acoustical joints where indicated.
    - b. Other joints as indicated.
  2. Joint Sealant: Acoustical
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full standard range.

END OF SECTION

## **DIVISION 8**



## **SECTION 08 12 13**

### **STEEL DOOR FRAMES**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 WORK INCLUDED**

- A. Steel door frames.

##### **1.03 RELATED WORK**

- A. Section 08 13 13 - Steel Doors
- B. Section 08 13 33 - Stile and Rail Wood Doors
- C. Section 08 71 00 – Door Hardware
- D. Section 09 91 00 - Painting: Field painting of frames.

##### **1.04 REFERENCES**

- A. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- B. ANSI/SDI-100 - Standard Steel Doors and Frames
- C. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.

##### **1.05 QUALITY ASSURANCE**

- A. Conform to requirements of the DHI, SDI-100, and ANSI/SDI-A250.11.

##### **1.06 REGULATORY REQUIREMENTS**

- A. Conform to State Building Code and State Fire Code.

##### **1.07 SUBMITTALS**

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Indicate frame configuration, anchor types and spacings, location of cutouts for hardware, reinforcement, and finish.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

- D. Sustainable Design Submittal:
  - 1. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content.
  - 2. Identify each regional material along with the location of its harvest, extraction, or manufacture.

#### 1.08 DELIVERY, STORAGE AND PROTECTION

- A. Protect products under provisions of Section 01 60 00.
- B. Protect frames with resilient packaging sealed with heat shrunk plastic.
- C. Break seal on-site to permit ventilation.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Basis of Design: Steelcraft
- B. Other acceptable manufacturers offering equivalent products.
  - 1. Ceco Door
  - 2. De La Fontaine
- C. Substitutions: Under provisions of Section 01 60 00.

#### 2.02 METAL FRAMES

- A. TYPES
  - 1. Exterior and Basement frames: Steelcraft Model F14-4 (14 gage galvanized steel with 2" face for 1-3/4" doors)
  - 2. Interior frames: Steelcraft Model F16-4 (16 gage cold rolled steel with 2" face for 1-3/4" doors.)
- B. FABRICATION
  - 1. All frames in new partitions shall be furnished as a welded unit with mitered corners. Miter and entire connection is to be continuous fully welded. Welds are ground and finished smooth.
  - 2. Knocked-down field assembly frames may only be used at existing drywall and interior masonry partitions with permission from the Architect.
  - 3. Fabricate frames with hardware reinforcement plates welded in place as required to coordinate with hardware schedule. Provide mortar guard boxes, 22 gage.
  - 4. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
  - 5. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

6. Fabricate frames for masonry wall coursing with a 4 inch head member (unless indicated otherwise).
7. Frames shall be furnished with a minimum of six wall anchors and two base anchors of manufacturer's standard design. Jamb anchors shall be as required to coordinate with the adjacent wall construction.
8. Provide a temporary spreader bar securely fastened to the bottom of each frame.
9. Cold-rolled steel frame material is to contain a minimum of 20 % Pre-Consumer recycled content and 45% Post-Consumer recycled content.  
Galvanized steel frame material is to contain a minimum of 5 % Pre-Consumer recycled content and 20% Post-Consumer recycled content.
10. Anchors
  - a. Quantity: Minimum 3 anchors per jamb.
  - b. Jambs over 8'-0" in height: 1 additional anchor for each 2'-0" or fraction thereof.
  - c. Construction: 18-gage steel strap or 3/16" diameter wire, adjustable or "T" shaped.
  - d. Floor anchors: Welded inside each jamb. Up to 2 inch adjustable permitted subject to compliance with standards.

## 2.03 FINISH

- A. After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities.
- B. Frames shall be thoroughly cleaned and phosphatized.
- C. All surfaces exposed to view shall receive a factory applied single coat of rust inhibiting prime paint baked-on in accordance with ANSI A224,1.
- D. The finish coats of paint shall be field applied by others in accordance with the painting section of these specifications.
- E. Where wall anchors utilizing exposed screw heads are used to install door frames, the exposed screws are to be covered with epoxy resin filler (Bondo or equal) and sanded smooth to match flush with the surrounding face.

## **PART 3 - EXECUTION**

### 3.01 INSTALLATION OF FRAMES

- A. Install frames in accordance with ANSI/SDI A250.11.
- B. Install the frames plumb, rigid, and in true alignment and fasten them so as to retain their position.

### 3.02 CLEANING

- A. Clean in accordance with Section 01 70 00.

END OF SECTION

## **SECTION 08 13 13**

### **STEEL DOORS**

#### **PART 1 - GENERAL**

##### 1.01 WORK INCLUDED

- A. Steel doors.

##### 1.02 RELATED WORK

- A. Section 08 12 13 - Steel Door Frames
- B. Section 08 71 00 – Door Hardware
- C. Section 08 71 50 – Weatherstripping
- D. Section 08 81 00 – Glass and Glazing
- E. Section 09 91 00 - Painting: Field painting of doors and frames.

##### 1.03 REFERENCES

- A. DHI - Door Hardware Institute: The Installation of commercial steel doors and steel frames, insulated steel doors in wood frames and builder's hardware.
- B. ANSI/SDI-100 - Standard Steel Doors and Frames

##### 1.04 QUALITY ASSURANCE

- A. Conform to requirements of SDI-100.

##### 1.05 REGULATORY REQUIREMENTS

- A. Conform to State Building Code and State Fire Code.

##### 1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 31 00.
- B. Indicate door elevations, internal reinforcement, closure method, and cut outs for glazing.
- C. Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- D. Sustainable Design Submittal:
  - 1. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content.
  - 2. Identify each regional material along with the location of its harvest, extraction, or manufacture.

## 1.07 DELIVERY, STORAGE AND PROTECTION

- A. Protect products under provisions of Section 01 60 00.
- B. Protect doors with resilient packaging sealed with heat shrunk plastic.
- C. Break seal on-site to permit ventilation.

## **PART 2 - PRODUCTS**

### 2.01 MANUFACTURERS

- A. Basis of design: Steelcraft
- B. Other acceptable manufacturers offering equivalent products.
  - 1. Ceco Door
  - 2. De La Fontaine
- C. Substitutions: Under provisions of Section 01 60 00.

### 2.02 HOLLOW METAL DOORS

- A. TYPES
  - 1. Exterior and Basement doors: SDI Grade III, extra heavy duty, Model 2 (seamless and 16 gage) (Steelcraft LW door series)
- B. MATERIALS
  - 1. Exterior and Basement doors:
    - a. Faces: 16 gage, A60 galvanized steel in accordance with ASTM A525. (A60 coating is .6 oz. of zinc per square foot of steel total coverage)
    - b. Channels to be 16 gage and perimeter welded to panels.
    - c. Core shall be foamed-in-place polyurethane insulation, "R" factor 11.1, compression strength 3600 PSI.
    - d. Top cap required.
- C. FABRICATION
  - 1. All doors shall be custom made, of the types and sizes shown on approved shop drawings, and shall be fully welded seamless construction with no visible seams or joints on their faces or vertical edges. Inverted end channel on bottom welded to both face sheets. Door thickness shall be 1-3/4" unless noted otherwise.
  - 2. All doors shall be strong, rigid and neat in appearance, free from warpage or buckle. Corner bends shall be true and straight and of minimum radius for the gage of metal used.

3. Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door seam. All such welds shall be ground and smoothed to make them invisible and provide a smooth flush surface.
4. The vertical edge profiles on single acting swing doors shall be beveled 1/8" in 2".
5. All hardware furnished by the hardware contractor for single-acting doors shall be designed for beveled edges as specified above.
6. Hardware reinforcements:
  - a. Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware in accordance with the approved hardware schedule and templates provided by the hardware contractor. Where surface-mounted hardware (or hardware, the interrelation of which is to be adjusted upon installation-such as top and bottom pivots, floor closers, etc.) is to be applied, doors shall have reinforcing plates only: all drilling and tapping shall be done by the installer.
  - b. Minimum gages for hardware reinforcing plates shall be as follows:
    1. Hinge and pivot reinforcements 7 gage.
    2. Concealed or surface mounted closers - 14 gage.
    3. Lock face, flush bolts and all other surface mounted hardware - 16 gage.
7. Galvanized steel door material is to contain a minimum of 5 % Pre-Consumer recycled content and 20% Post-Consumer recycled content.

D. ACCESSORIES

1. Glass mouldings and stops:
  - a. Where specified or scheduled, doors shall be provided with hollow metal mouldings to secure glazing by others in accordance with glass opening sizes and glass type shown on approved shop drawings.
  - b. Fixed mouldings shall be securely welded to the door on the security side.
  - c. Loose stops shall be not less than 20 gage steel, with mitered corner joints, secured to the framed opening by cadium or zinc-coated countersunk screws. Snap-on attachments will not be permitted.

2.04 FINISH

- A. After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities.
- B. Doors shall be thoroughly cleaned and phosphatized.
- C. All surfaces exposed to view shall receive a factory applied single coat of rust inhibiting prime paint baked-on in accordance with ANSI A224,1.

- D. The finish coats of paint shall be field applied by others in accordance with the painting section of these specifications.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION OF DOORS**

- A. Install doors in accordance with DHI.
- B. Install doors plumb and in true alignment in a prepared opening and fasten them to achieve the maximum operational effectiveness and appearance.

#### **3.02 TOLERANCES**

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
- B. Clearances:  
Provide 1/8 inch at heads, jambs, and between pairs of doors.  
Provide 3/4 inch maximum from bottom of door to top of decorative floor finish or covering unless otherwise indicated.

#### **3.03 ADJUSTING AND CLEANING**

- A. Adjust hardware for smooth and balanced door movement.
- B. Clean in accordance with Section 01 70 00.

END OF SECTION

## **SECTION 08 14 33**

### **STILE AND RAIL WOOD DOORS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Architectural interior stile and rail wood doors.

##### **1.2 RELATED SECTIONS**

- A. Section 08 12 13 – Metal Frames.
- B. Section 08 71 00 – Door Hardware.

##### **1.3 REFERENCES**

- A. Window and Door Manufacturers Association:
  - 1. I.S.6-A-13 – Industry Standards for Architectural Wood Stile & Rail Doors.
  - 2. TR-8 UV Cured Acrylated Polyester Urethane

##### **1.4 SUBMITTALS**

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer's product data.
- C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating door construction, dimensions, tolerances, materials, panels, hardware and finish.
- D. Samples:
  - 1. Doors: Submit manufacturer's construction samples of doors showing materials and finish.
  - 2. Color: Submit manufacturer's door finish samples, showing range of color variation.
- E. Manufacturer's Certification: Submit manufacturer's certification that doors comply with specified requirements and are suitable for intended application.
- F. Cleaning Instructions: Submit manufacturer's cleaning instructions for doors.
- G. Warranty: Submit manufacturer's standard warranty.

##### **1.5 QUALITY ASSURANCE**

- A. Identifying Label: Each door shall bear identifying label indicating:
  - 1. Door manufacturer.
  - 2. Order number.
  - 3. Door number.



## 1.6 DELIVERY, STORAGE, AND HANDLING

### A. Delivery:

1. Deliver doors to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

### B. Storage:

1. Store doors in accordance with manufacturer's instructions.
2. Store doors in clean, dry area indoors, protected from damage and direct sunlight.
3. Store doors flat on level surface.
4. Do not store doors directly on concrete.
5. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.
6. Store doors between 50 and 90 degrees F (10 and 32 degrees C) and 25 to 55 percent relative humidity.
7. Do not subject doors to sudden changes in temperature or relative humidity.

### C. Handling:

1. Handle doors in accordance with manufacturer's instructions.
2. Protect doors and finish during handling and installation to prevent damage.
3. Handle doors with clean hands or clean gloves.
4. Lift and carry doors. Do not drag doors across other doors or surfaces.

## 1.7 WARRANTY

- A. Warrant interior doors for a limited lifetime in interior use against warpage, delamination, and defects in materials and workmanship.
- B. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

## **PART 2 PRODUCTS**

### 2.1 MANUFACTURER

#### A. Acceptable Manufacturers

1. VT Industries - Eggers Collection (Basis of Design)
2. Masonite
3. Supa Doors, Inc.

#### B. Substitutions: Under provisions of Section 01 60 00.

#### C. Supply all wood doors from same manufacturer.

## 2.2 STILE AND RAIL WOOD DOORS

- A. Architectural Interior Stile and Rail Wood Doors
  - 1. Wood Panels: VT Industries - Eggers Collection Model E101
- B. Compliance: WDMA I.S.6-A-13, custom grade.
- C. Design:
  - 1. Panel Type: Raised Membrane Pressed
- D. Non-Rated Doors: Eggers Collection.
  - 1. Door Thickness: 1-3/4 inches.
  - 2. Stile Width: 6 inches, unless otherwise noted.
  - 3. Mullion Width: 5 inches, unless otherwise noted.
  - 4. Rails:
    - 1. Top Rail Width: 6 inches, unless otherwise noted.
    - 2. Lock Rail Width: 5 inches, unless otherwise noted.
    - 3. Cross Rail Width: 5 inches, unless otherwise noted.
    - 4. Bottom Rail Width: 10 inches.
  - 5. Panels:
    - 1. Raised Panel Thickness: 1-1/8 inches.
  - 6. Veneers:
    - 1. Species: Select White Birch
    - 2. Cut: Plain sliced

## 2.3 DOOR CONSTRUCTION

- A. Stile Edge: Matching wood edge.
- B. Inner Stile and Rail:
  - 1. Non-Rated Doors: Specified wood veneer pressed over particleboard.
- C. Panels:
  - 1. Non-Rated Doors: Specified wood veneer pressed over composite wood core.
- D. Stile and Rail Joints: Doweled construction.
- E. Hinges: Factory drill pilot holes.
- F. Sticking Used with Panels: Ovolo.

## 2.4 HARDWARE

- A. Factory machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.

## 2.5 FINISH

- A. Stile and Rail Doors: Manufacturer's factory finish.
- B. Factory Finish: factory finish.
  - 1. Prime for opaque finished doors.
- C. Top and Bottom Rails: Factory sealed only if door is finished

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Examine locations to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.
- C. Ensure frames are plumb, level, square, and within tolerance.

### 3.2 PREPARATION

- A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

### 3.3 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Install doors at locations indicated on the Door Schedule and Drawings.
- C. Install doors plumb, level, and square.
- D. Install door hardware as specified in Section 08 71 00.

### 3.4 ADJUSTING

- A. Adjust doors to swing freely, without binding in frame.
- B. Adjust hardware to operate properly.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- D. Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

### 3.5 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.

- B. Do not use harsh cleaning materials or methods that could damage finish.

### 3.6 PROTECTION

- A. Protect installed doors from damage during construction.

END OF SECTION

## **SECTION 08 52 16**

### **CLAD WOOD WINDOWS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Wood and composite material-framed windows, with fiberglass sash components, of the following types: double-hung, awning and fixed.

##### **1.2 REFERENCES**

- A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.
- B. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA 450 - Voluntary Performance Rating Method for Muller Fenestration Assemblies.
  - 2. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
  - 3. AAMA 614 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Plastic Profiles.
  - 4. AAMA 615 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Plastic Profiles.
  - 5. AAMA 624 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Fiber Reinforced Thermoset Profiles.
  - 6. AAMA 625 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performance Organic Coatings on Fiber Reinforced Thermoset Profiles.
  - 7. AAMA 902 - Voluntary Specification for Sash Balances.
  - 8. NAFS - North American Fenestration Standard/Specification for windows, doors and skylights.
- C. Manufacturer's Product Installation Guides.
- D. ASTM International (ASTM):
  - 1. ASTM C1036 - Standard Specification for Flat Glass.
  - 2. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
  - 3. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - 4. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
  - 5. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

6. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
  7. ASTM F2090 - Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms.
- E. Insulating Glass Certification Council (IGCC): Insulating Glass Unit Certification.
  - F. Forest Stewardship Council (FSC): FSC Chain-of-Custody Certification.
  - G. International Standards Organization (ISO): ISO 14021 - Environmental Labels and Declarations -- Self-Declared Environmental Claims (Type II Environmental Labeling).
  - H. 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 at Normal Incidence.
  - I. U.S. Environmental Protection Agency (EPA): ENERGY STAR.
  - J. Window and Door Manufacturers Association (WDMA):
    1. WDMA Hallmark Certification Program for Manufacturers.
    2. WDMA I.S.4 - Industry Specification for Preservative Treatment for Millwork.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meetings: Conduct pre-installation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Thermal Transmittance Test (Conductive U-Value)
  1. Operable unit
    - a. With ventilators closed and locked, test unit in accordance with NFRC - 102.
    - b. Conductive thermal transmittance (U-Value) shall not be more than 0.45 BTU/hr•ft<sup>2</sup>•°F when glazed with 1" insulated – 1/4" clear, 1/2" air, 1/4" clear low emissivity glass.
  2. Fixed unit
    - a. Test unit in accordance with NFRC - 102.
    - b. Conductive thermal transmittance (U-Value) shall not be more than 0.34 BTU/hr•ft<sup>2</sup>•°F when glazed with 1" insulated – 1/4" clear, 1/2" air, 1/4" clear low emissivity glass.
- B. Solar Heat Gain Coefficient
  1. All glazing is to have a SHGC of 0.40 or less as determined by NFRC - 200.
- C. Structural Performance Requirements:
  1. Comply with requirements of NAFS.

## 1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: For each type of product required.
- C. Shop Drawings: Showing methods of installation, plans, sections, elevations and details of walls, specified loads, flashings, vents, sealants, and interfaces with all materials not supplied by the window manufacturer, and identification of proposed component parts and finishes.
- D. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of material required.
- E. Certificates: Signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- F. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
- G. Manufacturer Instructions: Manufacturer installation, storage, and other instructions.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Member in good standing of Insulating Glass Certification Council (IGCC).
  - 2. Hallmark Certified Manufacturer and member in good standing of the Window and Door Manufacturers Association (WDMA).
  - 3. Capable of demonstrating an extended history of window and door design, production and innovation.
- B. Installer Qualifications:
  - 1. Minimum five years' experience in the commercial installation of products required for the Project.
  - 2. Experience on at least five projects of similar size, type and complexity as the Project.
  - 3. An entity utilizing workers competent in techniques required by manufacturer for product types and applications indicated.

## 1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Deliver materials to Project in manufacturer's original unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials and accessories protected from exposure to harmful environmental conditions and at temperature and humidity conditions

recommended by manufacturer off ground, under cover and not exposed to weather and construction activities.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's transferrable, non-prorated limited warranty.
  - 1. Warranty Period, Glass: 20 years, non-impact
  - 2. Warranty Period, Non-Glass Parts: 10 years.
  - 3. Warranty Period, Exterior Coating, Fading and Corrosion: 10 years.

## **PART 2 - PRODUCT**

### 2.1 COMPOSITE WINDOWS

- A. General: Provide windows complying with the performance requirements indicated and tested according to NAFS.
- B. Basis-of-Design Product:  
Subject to compliance with requirements provide Andersen Corporation:  
Andersen A-Series windows.
- C. Substitutions under provisions of Section 01 60 00.

### 2.2 MATERIALS

- A. Construction:
  - 1. Exterior Frame: Extruded composite profile consisting of 40 percent reclaimed pre-consumer wood fiber and 60 percent thermoplastic polymer, by weight.
  - 2. Exterior Sash: Pultruded fiberglass.
  - 3. Interior Exposed Frame: Preservative treated solid lumber (WDMA I.S.4), kiln dried and suitable for painted finish.
  - 4. Interior Exposed Sash: Preservative treated solid lumber (WDMA I.S.4), kiln dried and suitable for painted finish.
- B. Wood Species: Pine
- C. Interior Finish:
  - 1. Color: Painted. Color selected by Architect from manufacturer's standard colors. Factory-applied before assembly.
- D. Exterior Finish:
  - 1. Painted Frame: Factory electrostatically-applied acrylic enamel, in compliance with AAMA 615/AAMA 625.  
Color selected by Architect from manufacture's standard colors.
  - 2. Painted Sash: Factory electrostatically-applied acrylic enamel, in compliance with AAMA 615/ AAMA 625.  
Color selected by Architect from manufacture's standard colors.



## 2.3 WINDOW

- A. Window Type and Performance Requirements: Double-hung, awning and Sash-set fixed.
  - 1. Double-hung Performance Class LC and Grade, Non-Impact-Resistant: PG50
  - 2. Awning Performance Class LC and Grade, Non-Impact-Resistant: PG50
  - 2. Sash-set Fixed Performance Class LC and Grade, Non-Impact-Resistant: PG50
- B. Weatherstrip:
  - 1. Type and Material for Double-Hung: Slip coated foam filled polypropylene at head and jambs, UV resistant polyethylene with urethane filling at sill.
  - 2. Type and Material for Awning: Flexible tubular vinyl.
- C. Attachment Flange Type: Extruded vinyl.
- D. Hardware:
  - Double-hung
    - 1. Double-hung Sash Hardware Style and Material: Traditional, forged metal.
    - 2. Sash Lift Type: Hand lift.
    - 3. Sash Lock and Sash Lift Finish: Selected by Architect from manufacturer's entire line of colors.
    - 4. Balance Type and Material: Spring-loaded block and tackle, galvanized steel.
    - 5. Window Opening Control Device: Provide device to restrict operable sash to less than 4 inches maximum clear opening, releasable in compliance with ASTM F2090. Color selected by Architect.
  - Awning
    - 1. Operator Gear Type and Material: Rotary, die-cast coated carbon steel and stainless steel components.
    - 2. Hinge Type and Material: 200 and 300 series stainless steel.
    - 3. Classic Series Operator Cover Material and Finish: Polycarbonate, integral color
    - 4. Crank Handle Type and Material: Die-cast zinc, painted.
    - 5. Sash Lock Type and Material: Lever, die-cast zinc.
    - 6. Vent Limitation Hardware: Provide fixed vent limiters to limit sash travel less than 4".
- E. Divided Lights:
  - 1. Full Divided Light: Permanent exterior and interior attachment, spacer between glass panes.
    - a. Style: Contoured profile.
    - b. Width: 3/4 inch (19 mm)
    - c. Pattern: As shown on Drawings
    - d. Exterior Color: Match window
    - e. Interior Wood Finish: Match window
- F. Insect Screens:
  - 1. Type: Conventional full.
    - a. Frame Material: Aluminum.
    - b. Painted Finish and Color: Factory-applied baked-on silicone polyester enamel, color to match exterior frame.
    - c. Insect Screen Material: Aluminum

- G. Mullions: Laminated veneer lumber configured to be structurally sound and designed in accordance with AAMA 450.

## 2.4 GLAZING

- A. Glass Units: Provide insulating glass units certified through Insulating Glass Certification Council as conforming to the requirements of IGCC and ASTM E2190
  - 1. Manufacturer Designation: Andersen High-Performance Low-E4 Glass.
  - 2. Glazing Configuration: Dual-pane
  - 3. Tint: Gray
  - 4. Seal and Spacer Type: Dual sealed insulating glass units with polyisobutylene primary seal, silicone secondary seal and stainless steel spacers.
  - 5. Glass Type: Fully tempered glass, ASTM C1048

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Verify that all substrate conditions are suitable for installation in compliance with manufacturer's recommendations.
- B. Do not begin installation until substrates have been properly prepared and any conditions not in compliance with manufacturer's recommendations have been corrected.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's product recommendations, including but not limited to the Andersen installation instructions. Comply with Drawings and Shop Drawings for installing windows, hardware, accessories, and other components.
- B. Install windows plumb, level and square. Anchor windows securely to structure in correct orientation to flashing and adjacent construction as indicated. Comply with product installation instructions for proper flashing integration into wall system. Install windows so as to drain water penetration to the exterior.
- C. Adjust sashes, insect screens, ventilators, hardware and accessories as applicable for correct fit. Adjust weatherstrip for smooth operation and weather-tight closure. Install fiberglass batt insulation densely packed into gap, full depth, between window frame and face of building opening.

### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for observation of product installation in accordance with manufacturer's recommendations.

### 3.4 FIELD QUALITY CONTROL TESTING

- A. Testing Agency: Engage a qualified testing agency to perform field tests and inspections and prepare test reports.
  - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
  - 1. Testing Methodology: Testing Standard shall be per AAMA 502: *Voluntary Specification for Field Testing of Newly Installed Fenestration Products* including reference to ASTM E 1105 for Water Penetration Test.
    - a. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure. No water penetration shall occur as defined in AAMA 502.
  - 2. Testing Extent: A maximum of 50 percent of all installed windows are to be tested. The Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for water penetration with representatives from the window manufacturer, Contractor and Owner or Architect present.
  - 3. Test Reports: Shall be prepared according to AAMA 502.

### 3.5 CLEANING

- A. Remove protective films and non-permanent labels prior to 90 days after installation.
- B. Remove excess sealant, soiling, dirt and other substances. Clean window frame and glass surfaces. Avoid damaging coatings and finishes.
- C. Touch-up, repair or replace glass or other window components broken, scratched or damaged during construction prior to Substantial Completion.
- D. Remove and lawfully dispose of construction debris from Project site.

### 3.6 PROTECTION

- A. Protect installed windows and finish surfaces from damage during construction until completion of Project and acceptance by Owner.

END OF SECTION

## **SECTION 08 71 00**

### **DOOR HARDWARE**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SUMMARY**

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Section 08 12 13 - Steel Door Frames
  - 2. Section 08 13 13 - Steel Doors
  - 3. Section 08 13 33 - Stile and Rail Wood Doors
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC - International Building Code.
  - 3. NFPA 80 - Fire Doors and Windows.
  - 4. NFPA 101 - Life Safety Code.
  - 5. NFPA 105 - Installation of Smoke Door Assemblies.
  - 6. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series
  - 2. UL10C – Positive Pressure Fire Tests of Door Assemblies

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes. Submit under provisions of Section 01 33 00.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  - 3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
  - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Operating and Maintenance Manuals: Provide manufacturer's operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- D. Warranties and Maintenance: Special warranties specified in this Section.

### 1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material,

design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
  - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- D. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
- E. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
  - 1. Where indicated to comply with accessibility requirements, comply with the State Building Code and the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
    - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
      - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
    - c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
  - 2. NFPA 101: Comply with the following for means of egress doors:
    - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
    - b. Thresholds: Not more than 1/2 inch high.
  - 3. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
    - a. Test Pressure: Positive pressure labeling.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, arrange for manufacturers' representatives to hold a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- C. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- D. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

## 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Field verify all dimensions and locations prior to shop drawing submittal.

## 1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturers, agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner, this includes all labor required to repair or replace product. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
  - 1. Ten years for extra heavy duty cylindrical (bored) locks and latches.
  - 2. Seven years for heavy duty cylindrical (bored) locks and latches.
  - 3. Ten years for manual door closers.

## 1.8 MAINTENANCE

- A. Maintenance Tools and Instructions: Provide a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, removal and replacement of door hardware.

## **PART 2 - PRODUCTS**

### 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
  - 1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3.
    - a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements.  
The hardware schedule is based on the following manufacturers:
      - 1. Locks, passage & privacy sets-Sargent
      - 2. Continuous hinge - Roton by Hager Hinge Co.
- B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and



in accordance with the procedures and time frames outlined in AIA Document A701 – Instructions To Bidders and Division 01, Section 01 60 00, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges, full mortise unless otherwise indicated.
1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'-0": provide 4-1/2" x 4-1/2" standard hinges.
  3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    - a. Exterior Doors: Provide continuous gear hinges.
    - b. Interior Doors: Standard weight, steel, 5 knuckle, ball bearing hinges unless Hardware Sets indicate heavy weight.
  4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
    - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
      - 1) Doors out-swinging into corridors.
  5. Acceptable Manufacturers:
    - a. Bommer Industries (BO).
    - b. Hager Companies (HA).
    - c. Ives (IV).
    - d. McKinney Products (MK).
    - e. Stanley Hardware (ST).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable.

Factory cut hinges for door size. Color of hinge to be selected by Architect from manufacturer's standard colors.

1. Basis of Design: Roton by Hager Hinge Co. (RO)
2. Acceptable Manufacturers:
  - a. Roton by Hager Hinge Co. (RO)
  - b. Bommer Industries (BO).
  - c. Ives (IV).
  - d. McKinney Products (MK).
  - e. Pemko Manufacturing (PE).
  - f. Stanley Hardware (ST).

## 2.3 DOOR OPERATING TRIM

- A. Flush Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified manual flush bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Provide dust-proof strikes for all bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, etc.) as required for appropriate installation and operation.

1. Acceptable Manufacturers:
  - a. Burns Manufacturing (BU).
  - b. Door Controls International (DC).
  - c. Ives (IV).
  - d. Rockwood Manufacturing (RO).
  - e. Trimco (TC).

- B. Kickplates shall be 10" high x 2" less than nominal door width, .050" thick stainless steel with 4 beveled edges.. Install on push side of door. All fasteners used for attachment are to be of anti-theft design.

1. Acceptable Manufacturers:
  - a. Burns Manufacturing (BU).
  - b. Hiawatha, Inc. (HI).
  - c. Ives (IV).
  - d. Rockwood Manufacturing (RO).
  - e. Trimco (TC).
  - f. Hager Companies (HA).

## 2.4 CYLINDERS AND KEYING

- A. Locks shall be grandmaster keyed as directed by the Owner and Architect.
- B. Supply two keys for each lock and 5 master keys for each master key grouping.
- C. Provide all keys of nickel silvermetal only.

- D. Hardware consultant shall meet with owner/architect to determine specific keying requirements and functions of locks.
- E. Cylinders to be high security interchangeable core 6-pin.

## 2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified cylindrical (bored) locksets **and be tested by an independent third party testing agency to meet a minimum of 10 million cycle tests** furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt. Locks are to be non-handed and fully field reversible.
  - 1. Locksets to incorporate a free-wheeling lever design with a lifetime warranty against lever sag and spring breakage on all locking functions.
  - 2. Basis of Design: Sargent Manufacturing (SA) – 10 Line.
  - 3. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) – CL3300 Series.
    - b. Schlage (SC) – ND Series.
  - 4. Lever shall be "L" and L Rose or equal from acceptable manufacturers.
  - 5. Cylinders: Sargent high security interchangeable core 6-pin or equal.
- B. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Security Grade 1 certified mortise locksets **and be tested by an independent third party testing agency to meet a minimum of 10 million cycle tests** furnished in the functions as specified in the Hardware Sets. Lock chassis fabricated of heavy gauge steel, zinc dichromate plated, with through-bolted application. Furnish with solid cast levers, standard 2 3/4" backset, and 3/4" throw anti-friction stainless steel latch. Deadbolts, where specified, are to be full 1" throw made of one-piece hardened stainless steel. Locks are to be non-handed and fully field reversible.
  - 1. Basis of Design: Sargent Manufacturing (SA) – 8200 Series.
  - 2. Acceptable Manufacturers:
    - a. Corbin Russwin Hardware (RU) – ML2000 Series.
    - b. Schlage (SC) – L8000 Series.
  - 3. Sargent 8200 series with "L" levers and 2" Dia. "LN" rosettes or equal subject to provisions of Section 01 60 00.  
**OR**  
Corbin Russwin ML2000 series with "NSA" (Newport) levers and 2-1/4" Dia. rosettes or equal subject to provisions of Section 01 60 00.

4. Cylinders: Sargent 7300 series high security interchangeable core 6-pin.

## 2.6 DOOR CLOSERS

### A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  - a. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
  - b. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
  - c. Closers shall not be installed on exterior or corridor side of doors; where possible, install the closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.
5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for a complete installation.

### B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers **and be tested by an independent third party testing agency to meet a minimum of 5 million cycle tests**, with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units and high impact, non-corrosive plastic covers standard.

1. Acceptable Manufacturers:
  - a. Corbin Russwin Hardware (RU) – DC8000 Series.
  - b. LCN Closers (LC) - 4040XP Series.
  - c. Sargent Manufacturing (SA) - 351 Series.
  - d. Norton Door Controls (NO) - 7500 Series.

## 2.7 DOOR STOPS

- A. General: Door stops to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic.
  - 1. Acceptable Manufacturers:
    - a. Ives (IV).
    - b. Rockwood Manufacturing (RO).
    - c. Trimco (TC).

## 2.8 DOOR SILENCERS

- A. All new interior metal door frames shall be provided with door silencers, 3 per single door and 2 for pair of doors.

## 2.9 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.10 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Hardware in General: US26D Dull Chrome
- E. Flat goods - US32D - Satin Stainless Steel
- F. Continuous hinges - clear anodized aluminum or dark bronze anodized (selected by Architect)s

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### **3.2 PREPARATION**

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

### **3.3 INSTALLATION**

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
  - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean work under provisions of 01 70 00.
- B. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- C. Clean adjacent surfaces soiled by door hardware installation.
- D. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.8 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should 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 and functionality.

### 3.9 COMPLETE HARDWARE INSTALLATION

- A. The following schedule listings cover typical openings. The Contractor shall be responsible for complete examination of the drawings and shall provide all hardware required. Any hardware necessary but not specifically mentioned herein shall be of the like quality, weight, design and finish as similar openings or items specified herein.

- B. Provide silencers on all new metal frames. Three on single leaf door frames, two on pairs of doors and four on double egress.
- C. Provide wall stops at all new door frame openings located in new partitions.

### 3.10 HARDWARE SCHEDULE:

#### HW-1 Exterior Single Doors - with Outside Key

- 1 Continuous geared hinge      Roton 780-111 HD (or equal)
- 1 Lockset                              10G05 (Sargent lockset)
- 1 Closer with Cush-n-stop
- 1 Kickplate

#### HW-2 Galvanized Steel Pair Doors with Inactive Leaf

- 2 Continuous Geared Hinges      Roton 780-111 HD (or equal)
- 1 Set manual Flush Bolts on inactive leaf
- 1 Deadbolt                              Sargent 487 deadlock (or equal)
- Heavy Duty Flush Pull              Rockwood D89 (or equal)
- 2 Closers with hold-open

#### HW-3 Interior Single Doors with Storeroom Lock and Closer

- Butts
- 1 Lockset              10G04 (Sargent)
- 1 Closer
- 1 Stop
- 3 Silencers

#### HW-4 Single Private Toilet Room Doors with Mortise Privacy set & Indicator.

- Butts
- 1 Privacy set      ML2030 NSA-LL M34 M19V by Corbin Russwin  
                         **OR** 49-8265 (OCC/VAC indicator) (Sargent Mortise)
- 1 Closer
- 1 Kickplate
- 1 Wall Stop
- 3 Silencers

#### HW-5 Interior Pairs Closet Doors

- Butts
- 2 Door Pulls              Hager Model 5N (or equal)
- 1 Magnetic Catch              IVES Model 327 to hold both doors (or equal)
- 2 Stops
- 3 Silencers

END OF SECTION



## **SECTION 08 71 50**

### **WEATHERSTRIPPING**

#### **PART 1 - GENERAL**

##### 1.01 SECTION INCLUDES

- A. The furnishing and installation of all door weatherstripping, sound and smoke proofing.

##### 1.02 RELATED SECTIONS

- A. 08 12 13 - Steel Door Frames
- B. 08 13 13 - Steel doors

##### 1.03 DESIGN REQUIREMENTS

- A. All work not shown or specified but required to complete the installation shall be provided.
- B. Provide and install weatherstripping on all new exterior doors.

##### 1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Shop drawings: Indicate various styles with model numbers and manufacturer.
- C. Provide samples if asked for by Architect.

##### 1.05 QUALIFICATIONS

- A. Installer: Products specified under this section shall be installed by competent tradesmen experienced in this work.

##### 1.06 REGULATORY REQUIREMENTS

- A. Work shall satisfy requirements of government agencies having jurisdiction.
- B. All thresholds to comply with the state building code and ANSI A117.1.

##### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.

##### 1.08 FIELD MEASUREMENTS

- A. Field verify all dimensions prior to installation.

## 1.09 WARRANTY

- A. Provide one year warranty under provisions of Section 01 78 00.

## **PART 2 - PRODUCTS**

### 2.01 MANUFACTURERS

- A. Pemko
- B. Other acceptable manufacturers offering equivalent products.
  - 1. Accurate Metal Weatherstrip Co., Inc.
  - 2. Zero International, Inc.
- C. Substitutions: Under provisions of Section 01 60 00.

### 2.02 MATERIALS

- A. Exterior and interior outswinging metal doors with metal jamb weatherstripping.
  - 1. Head and jambs: 316DPK
  - 2. Sweep: 315DN
  - 3. Threshold: 252X3AFG (thermal break)
  - 4. Astragal: 18041DP
- B. Door Top Rain Guard (only at exterior doors)
  - 1. 346D (Full width of opening)

## **PART 3 - EXECUTION**

### 3.01 INSTALLATION

- A. Weatherstripping shall be applied in accordance with manufacturers specifications. Thresholds shall be set in elastic cement and held in place with rawl plugs and aluminum screws.

### 3.02 DISSIMILAR MATERIALS

- A. Where aluminum surfaces come in contact with metals other than stainless steel, zinc, white bronze or other metals compatible with aluminum, aluminum surfaces shall be kept from direct contact with such parts by (a) painting the dissimilar metal with a coating of heavy bodied bituminous paint, (b) a good quality caulking placed between aluminum and dissimilar metal, or (c) a non-absorptive tape or gasket.

### 3.03 ADJUSTMENTS

- A. Adjust weatherstripping as required to provide proper weatherproofing.
- B. Gaskets and/or caulking shall be provided as required for a proper installation.

3.04 CLEANING

- A. Clean work under provisions of Section 01 70 00.

3.05 SCHEDULE

- A. Apply weatherstripping and door top rain guard to all exterior doors.
- B. Apply weatherstripping to interior basement door.

END OF SECTION

## **SECTION 08 81 00**

### **GLASS AND GLAZING**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

1.02 SCOPE: Provide all glass and glazing work complete in accordance with the Specifications and Drawings.

##### **1.03 RELATED SECTIONS**

- A. Section 08 12 13 – Steel Door Frames
- B. Section 08 13 13 - Steel Doors
- C. Section 08 13 33 - Stile and Rail Wood Doors

##### **1.04 REFERENCES**

- A. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. ASTM E84 - Surface Burning Characteristics of Building Materials.
- C. FS DD-G-451 - Glass, Float or Plate, Sheet, Figured (Flat, for Glazing, Mirrors and Other Uses).
- D. FS DD-G-1403 - Glass, Plate (Float), Sheet, Figured, and Spandrel (Heat Strengthened and Fully Tempered).
- E. SIGMA No. 64-7-2 - Specification for Sealed Insulating Glass Units.
- F. FGMA - Glazing Manual.

##### **1.05 SUBMITTALS**

- A. Submit product data under provisions of Section 01 33 00.
- B. Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Provide data on glazing sealant. Identify colors available.
- D. Submit samples under provisions of Section 01 33 00.
- E. Submit samples of each type glass and each type glazing material.

- F. Submit sealed glass unit manufacturer's certificate under provisions of Section 01 33 00 indicating units meet or exceed specified requirements.

#### 1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site under provisions of Section 01 60 00.
- B. Store and protect products under provisions of Section 01 60 00.

#### 1.07 WARRANTY

- A. Provide ten year warranty under provisions of Section 01 78 00.
- B. Warranty: Include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following (unless noted from a different manufacturer below):
  - 1. Viracon
  - 2. Vitro Architectural Glass
  - 3. Guardian
- B. Substitutions under provisions of Section 01 60 00.

#### 2.02 GLASS MATERIALS

- A. Safety Glass:  
FS DD-G-1403; Kind ft., 1/4" Type 1, tempered. (Listed in door schedule as "TEMP".)
- B. Forced Entry Resistant Insulated Glass (Listed in door schedule as "FERG".)
  - 1. 1" insulated - 1" thick (1/4" tempered Crystal Gray tinted glass, Guardian (low iron) glass with SN68 Low-E (#2), 5/16" airspace, 7/16" School Guard SG5 laminated glass), hermetically sealed.
    - a. Manufacturer: School Guard Glass (or equal)
    - b. U-Value: .30
    - c. SHGC: .23
    - d. Attack Rating: 5-aal rated for 12 minutes.  
ASTM F1233 Class 1.4
    - e. Install in accordance with glass manufacturer's installation specifications. Must be installed with wet structural glazing technique outlined in manufacturer's installation specifications.

## 2.03 ACCESSORIES

### A. Glazing Compound, Tape and Sealant:

1. Compound - Tremco Glazing Compound or approved equal.
2. Tape - Tremco Polyisobutylene #440 or approved equal.
3. Sealant - Tremco Mono Sealant or approved equal.

### B. Setting Blocks and Spacers shall be provided of resilient types and materials as recommended by the manufacturer of the glass or glazing materials.

## 2.04 MANUFACTURER'S LABELS:

Manufacturer's labels showing strength, grade, thickness, type and quality will be required on each piece of glass. Labels must remain on glass until it has been set and inspected. Glazing materials shall be delivered to the site in unopened original containers bearing manufacturer's label specifying the quality, brand, trade name and directions for use. Thinners or additives shall not be used for glazing materials unless specifically recommended by the manufacturer.

Safety glass must bear a permanent visible mark indicating such.

## **PART 3 - EXECUTION**

### 3.01 INSTALLATION:

#### A. General: Surfaces of rabbets, glass edges and stops or beads shall be clean, dry, free from dust, oil, rust and loose paint. Metal surfaces shall be wiped clean with solvent recommended by the manufacturer. Glazing materials shall not be applied in temperature below 40 degrees F. or during damp or rainy weather. Glass shall be set without springing or forcing. Glazing compound shall be applied in accordance with the recommendations of the manufacturer. Centered position and compound thickness shall be maintained. Setting blocks at the sills and centering shims inside and out on all four sides of glass shall be provided.

#### B. All glass shall be installed in accordance to the recommendations of the Flat Glass Jobber's Association Glazing Manual and the glass manufacturer.

#### C. Glazing in Metal Frames: Glazing shall be of the snap-in type and shall have no exposed fasteners except that glazing in metal frames shall be of the applied type. Glazing shall not be done until frames have been set and adjusted. Glass shall be of proper size, rest on setting blocks and the entire perimeter of the glass shall be bedded in glazing compound. Edge and face clearances shall be maintained uniform and spacers shall be provided. Glazing compound shall fill rabbet solidly with the snap-in bead in place. After bead is in place surplus glazing compound shall be removed from both sides of glass at an angle, so as not to undercut.

### 3.02 CLEANING: Glass shall be cleaned on both sides of surplus glazing material. Glazing materials shall not be disturbed with scrapers. Acid solutions or water containing caustic soaps shall not be used. Broken and cracked glass and glass not complying with the specifications shall be replaced.

3.03 GLASS SCHEDULE: (See plans for locations)

| <u>LOCATION</u>             | <u>GLASS</u>                           |
|-----------------------------|----------------------------------------|
| Interior Doors<br>Non Rated | Safety Glass                           |
| Exterior Steel Doors        | Forced Entry Resistant Insulated Glass |

END OF SECTION

## **DIVISION 9**



## **SECTION 09 21 16**

### **STEEL FRAMED DRYWALL SYSTEMS**

#### **PART 1 - GENERAL**

- 1.1 SCOPE: Provide all necessary materials for construction of drywall systems.
- 1.2 RELATED SECTIONS:
  - A. Division 06 Carpentry Section for wood framing, blocking and furring.
  - B. Division 09 Painting Section for paint applied to gypsum board surfaces.
  - C. Section 05 50 00 - Miscellaneous Metal Work
- 1.3 DELIVERY AND STORAGE OF MATERIALS:
  - A. Deliver, store, and handle under provision of Section 01 60 00.
  - B. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure to the elements. Damaged or deteriorated materials shall be removed from the premises. Stack gypsum panels flat to prevent sagging.
- 1.4 ENVIRONMENTAL CONDITIONS:
  - A. In cold weather and during gypsum panel joint finishing, temperatures within the building shall be maintained within the range of 55 degrees to 70 degrees F. Adequate ventilation shall be provided to carry off excess moisture.
  - A. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
- 1.5 SUBMITTALS
  - A. Submit under provisions of Section 01 33 00.
  - B. Product Data: Submit product data on all materials and accessories.

#### **PART 2 - PRODUCTS**MANUFACTURERS

- A. Provide manufacturer and product specified under the Materials paragraph below.
- B. Substitutions: Under provisions of Section 01 60 00.

2.2 MATERIALS: See drawings for size and location of materials.

- A. Non-Structural Studs: Cold-formed galvanized steel C-studs as per ASTM C 645, ProSTUD products manufactured by ClarkDietrich Building Systems.
  - 1. Unless noted otherwise on the drawings, provide the following:
    - Minimum 25 gage for interior non-load bearing partitions, maximum 10'-0" high and 20 gage for above 10'.
    - Provide 20 gage for interior load bearing partitions.
    - Provide 20 gage for jamb and lintel components.
  - 2. Flange Size: 1 1/4 inch.
  - 3. Web Depth: As specified on Drawings.
- B. Non-Structural Track: Cold-formed galvanized steel runner tracks, drywall track, in conformance with ASTM C 645, ProTRAK as manufactured by ClarkDietrich Building Systems.
  - 1. Flange Size: 1-1/4 inch
  - 2. Web Depth: Track web to match and coordinate with stud web size.
- C. Metal Furring (Hat) Channel manufactured by ClarkDietrich Building Systems: 7/8" depth by 10' or 12' length, (20 gauge at ceilings) (25 gauge at walls), meet or exceed ASTM C645.
- D. Z Furring Channel manufactured by ClarkDietrich Building Systems available in 1", 1-1/2", 2", 2 1/2" depths by 10' length with 1 1/4" wide flange, meet or exceed ASTM C645.  
See drawings for size and gage.
- E. Provide 1-1/2" Cold-Rolled Channels.
- F. Galvanized Hanger Wire (12-ga)
- G. 18-ga. Galvanized Tie Wire.
- H. Faceboards - 48" wide USG Sheetrock Brand  
Firecode Type X gypsum board  
Provide lengths as required.  
Thickness to be as indicated on drawings. If not indicated on drawings, board to be 5/8" thick.
- I. Fasteners - USG Screws: 3/8" Type S, pan head; 1/2" Type S-12, pan head; 5/8" Type S-12 low-profile head; 1", 1-1/4", 1-5/8", 1-7/8", 2-1/4" Type S, bugle head; 1", 1-5/8", 2-1/4" Type S or S-12, trim head; 1-1/2" Type G, bugle head; 1-1/4" Type W, bugle head; 1'-1/4" annular ring drywall nail.
- J. USG Trim No. (200-A)(401)(402)(P-1)(801-A)(801-B).
- K. USG Corner Bead - (No. 103 DUR-A-BEAD) (No. 104 DUR-A-BEAD)(No.800) Metal Corner Reinforcement.
- L. USG Control Joint No. 093
- M. Joint Treatment (select a United States Gypsum Company Joint System)

Standard Gypsum Finish = Joint Treatment: Sheetrock Brand All Purpose Joint Compound.  
Provide a Level 4 gypsum board finish. (Coat gypsum only at joints and fasteners)  
This finish is to be used typically everywhere except where otherwise noted on the drawings.

- N.     USG Acoustical Sealant
- O.     Adhesive  
      -(for double-layer applications and column fireproofing) Durabond joint Compound or USG Ready-Mixed Joint Compound (All Purpose) (Taping)  
      -(for adhesive application) Drywall Stud Adhesive.

### **PART 3 - EXECUTION**

#### **3.1     PARTITION INSTALLATION**

- A.     STUD SYSTEM ERECTION: Attach steel runners at floor and ceiling to structural elements with suitable fasteners located 2" from each end and spaced 24" o.c.  
      To suspended ceilings, use toggle bolts or hollow wall anchors spaced 16" o.c.

Position studs vertically, with open side facing in same direction, engaging floor and ceiling runners, and spaced 16" o.c. When necessary, splice studs with 8" nested lap and two positive attachments per stud flange. Place studs in direct contact with all door frame jambs, abutting partitions, partition corners and existing construction elements. Where studs are installed directly against exterior walls and a possibility of water penetration through walls exists, install asphalt felt strips between studs and wall surfaces.

Anchor all studs for shelf-walls and those adjacent to door and window frames, partition intersections, corners and freestanding furring to ceiling and floor runner flanges with USG Metal Lock Fastener tool or screws. Securely anchor studs to jamb and head anchors of door or borrowed light frames by bolt or screw attachment. Over metal door and borrowed light frames, place horizontally a cut to length section of runner, with a web flange bend at each end, and secure to strut-studs with two screws in each bent web. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over door frame header. When attaching studs to steel grid system, structural adequacy of grid to support end reaction of wall must be determined.

All steel stud partitions are to extend from floor to underside of roof or floor deck above.

- B.     As occurring:  
      Install Sound Attenuation Insulation after gypsum panels are applied to the resilient channel (if occurring) and before panels are applied to other side of studs. Insert the sound insulation in the stud cavity, by bowing the blanket slightly. After inserting, make a vertical cut between the studs. Slit the blanket with a sharp utility or hook-bill knife to ease the pressure of the blanket against the gypsum panels when they are installed. Butt ends of blankets closely together and fill all voids. Seal perimeter of gypboard and all penetrations with acoustical sealant to complete the requirements for a sound retardant partition.

### 3.2 APPLYING INTERIOR GYPSUM BOARD

#### A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
  - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

#### B. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On ceilings, apply gypsum board indicated for base layers before applying face layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

#### C. Gypsum Panel Attachment

Screw spacing that follows is for non-rated construction. For fire-rated construction, obtain screw spacing from manufacturer's fire test report.

For single-layer panel application, space screws 16" o.c. in field and along abutting end joints.

For double-layer screw attachment, space screws 24" o.c. in base layer and 16" o.c. in face layer. Apply both layers of gypsum panels vertically with joints in face layer offset from base layer joints by at least one stud. On tall walls, offset end joints also. For 1/2" and 5/8" panels, use 1" screws for base layer and 1-5/8" screws for face layer.

### 3.3 WALL FURRING INSTALLATION

- #### A. METAL FURRING (HAT) CHANNEL INSTALLATION:
- Attach metal furring channels horizontally, spaced 24" o.c. to interior of masonry or concrete surface with hammer set or power driven fasteners or concrete stub nails staggered 24" o.c. on opposite flanges. Where furring channel is installed directly to exterior wall and a possibility of water penetration through walls exists, install asphalt felt protection strip between furring channel and wall.

Apply gypsum panels parallel to channel. Position all edges over furring channels in parallel application; all ends over framing in perpendicular application with joints staggered in successive courses. Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together. Fasten panels to channels with 1" Type S Screws spaced 16" o.c.

- B. Z FURRING CHANNEL INSTALLATION: Erect insulation vertically and hold in place with Z-furring channels spaced 24" o.c. Except at exterior corners, attach narrow flanges of furring channels to wall with concrete stub nails or power driven fasteners spaced 24" o.c. At exterior corners, attach wide flange of furring channel to wall with short flange extending beyond corner. On adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with a standard width insulation panel and continue to regular manner. At interior corners, space second channel no more than 12" from corner and cut insulation to fit. Hold mineral fiber insulation in place until gypsum panels are installed with 10" long staple field fabricated from 18 ga. tie wire and inserted through slot in channel. Apply wood blocking around window and door opening and as required for attachment of fixtures and furnishings.

Apply gypsum panels parallel to channels with vertical joints occurring over channels. Use no end joints in single-layer application. Attach gypsum panels with 1" Type S Screws spaced 16" oc. in field of panels and at edges, and with 1-1/4" Type S Screws spaced 12" o.c. at exterior corners. For double-layer application, apply base layer parallel to channels, face layer either perpendicular or parallel to channels with vertical joints offset at least one channel. Attach base layer with screws 24" o.c. and face layer with 1-5/8" screws 16" o.c.

#### 3.4 ACCESSORY APPLICATION

- A. JOINT SYSTEM: Finish all face panel joints and internal angles with a United States Gypsum Company Joint System installed according to manufacturer's directions. Spot exposed fastened on face layers and finish corner bead, control joints and trim as required, with at least three coats of joint compound, feathered out onto panel faces and sanded smooth.
- B. CORNER BEAD: Reinforce all vertical and horizontal exterior corners with corner bead fastened with 9/16" galvanized staples 9" o.c on both flanges along entire length of bead.
- C. METAL TRIM: Where assembly terminates against masonry or other dissimilar material, apply metal trim over panel edge and fasten with 9/16" galvanized staples 9" o.c.
- D. SCREWS: Power drive at least 3/8" from edges or ends of panel to provide uniform dimple 1/32" deep.
- E. CONTROL JOINTS: Break panel behind joint and back by double framing members (and 2" wide gypsum panel strip). Apply acoustical sealant to fill gap and attach control joint to face layer with 9/16" galvanized staples spaced 6" o.c. on both flanges along entire length of joint. Provide a full height control joint where a wall or partition extends in a continuous straight plane for more than 30 linear feet or where indicated on the drawings.

### 3.5 ASSOCIATED METAL FRAMING

- A. Provide metal framing as required to support light fixtures, piping, HVAC equipment and ductwork below gypsum board ceilings or as required to span across/over/under suspended equipment. Coordinate with the associated MEP contract documents.  
See Section 05 50 00 - Miscellaneous Metal Work for additional information.

### 3.6 CLEANING

- A. Clean project under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 09 51 23**

### **ACOUSTICAL CEILING SYSTEMS**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including the General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. The furnishing and installation of acoustical and suspension ceiling systems.

##### **1.03 RELATED SECTIONS**

- A. Division 23 - Mechanical
- B. Division 26 - Electrical

##### **1.04 REFERENCES**

- A. Federal Specification SS-S-118B acoustical tile and panel properties.
- B. AMA 1-11 - Sound transmission
- C. ASTM C423 - Sound absorption
- D. ASTM C635 - Metal suspension system properties
- E. ASTM C636 - Acoustical ceiling system installation procedures
- F. UL - Underwriters Laboratories, Inc.

##### **1.05 SYSTEM DESCRIPTION**

- A. Acoustical material and suspension systems, including all necessary hangers, hanger wires, grillage, splines, and supporting hardware, shall be furnished and installed as required to create a completed ceiling system.

##### **1.06 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Include manufacturer's specifications of materials and installation instructions.
- C. Samples: Submit two 6" x 12" samples of panels and two of the metal suspension system.

- D. Test reports: Submit data indicating the following ratings:
  - NRC (Noise reduction coefficient)
  - CAC (Ceiling Attenuation Class)
  - Light reflectance.
  - Flame spread
  - Smoke developed

#### 1.07 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01 78 00.
- B. Submit cleaning and maintenance data including procedures for stain removal and cleaning.

#### 1.08 QUALITY CONTROL

- A. Work shall be performed in accordance with Section 01 45 00.
- B. Schedule and hold a pre-installation meeting prior to start of work on this section as stipulated in Specification Section 01 31 00 to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.  
To attend: Architect, Owners Representative, General Contractor, Approved Installer.

#### 1.09 QUALIFICATIONS

- A. Installer: Company specializing in installing suspended acoustical ceilings with minimum of three years documented experience.

#### 1.10 REGULATORY REQUIREMENTS

- A. Conform to the manufacturer's recommendations to achieve the fire resistive ratings as listed by Underwriters Laboratories, Inc. (Class A)

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Storage shall be in building, closed to the weather with temperatures ranging from 60°F to 85°F at not more than 70% relative humidity.

#### 1.12 ENVIRONMENTAL REQUIREMENTS

- A. Do not install acoustical ceiling system when building. Interior temperature is below 60°F, above 90°F or above 70% relative humidity.
- B. These conditions shall be maintained 24 hours prior to, during and after installation.

#### 1.13 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on drawings. Any inconsistencies shall be reported to the architect prior to installation.



#### 1.14 SEQUENCING

- A. Installation of panels may commence only after an inspection of all electrical, mechanical and plumbing work has been completed.

#### 1.15 COORDINATION

- A. Coordinate work under provisions of Section 01 31 00.

#### 1.16 WARRANTY

- A. Provide 10 year warranty for the standard acoustical ceiling system under provisions of Section 01 78 00.

#### 1.17 EXTRA MATERIALS

- A. Furnish under provisions of Section 01 78 00.
- B. Provide minimum of 4 panels or 1% of the total of each type of panel installed. (which ever is greater) The additional panels shall be properly packaged for long term storage.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Acoustical panels
  - 1. Armstrong
  - 2. Other acceptable manufacturers offering equivalent products.
    - a. USG
- B. Suspension System
  - 1. Armstrong
  - 2. Other acceptable manufacturers offering equivalent products.
    - a. Chicago Metallic Corp.
    - b. USG
- C. Substitutions: Under provisions of Section 01 60 00.

## 2.02 MATERIALS (as listed on finish schedule)

### A. Acoustical Panels

1. Type "ACT" - Acoustical ceiling tile
  - a. Fine Fissured  
(ACT as noted on finish schedule):  
Square Lay-in (Model No. 1728: 24"x24")
    1. Water felted mineral fiber panel with white vinyl paint finish.
    2. Square Lay-in, 5/8" thick
    3. Light reflectance = 0.85
    4. Flame spread = 25 or less
    5. Smoke developed = 50 or less
    6. Class A fire rating per ASTM E1264
    7. NRC = 0.55
    8. CAC = 35
    9. Total recycled content: minimum 50%

### B. Suspension Systems

1. Standard Exposed Grid (Coordinate with ACT tile)
  - a. Prelude XL (Coordinate with ACT tile acoustical panels)
    1. Hot dipped galvanized steel with white baked polyester paint finish.
    2. Intermediate duty main runners and cross tees with 15/16" flange face.
    3. Wall angles shall be straight edge and corner caps shall be of same materials and finish.
    4. Suspend with galvanized steel wire.
    5. Total recycled content: minimum 25%

### C. Accessories

1. Retention Clips
  - a. Provide Retention Clips (Armstrong model 414) at all ceiling tiles in an area of 5'-0" x 5'-0" directly in front of Office 100 exterior door.
  - b. Minimum of four bearing down on each ceiling tile panel.

## 2.03 COLORS

- A. All colors to be selected from manufacturer's standard colors.

## 2.03 SIZE

- A. All ceiling panels shall be 2'x2' unless otherwise noted.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that all components in the ceiling plenum are installed. The building shall be in proper condition to receive the acoustical materials and suspension system before any of the material shall be installed. The acoustical material shall be installed under conditions of normal occupancy. All wet work shall be completed, dry, and the building fully enclosed.

#### **3.02 PROTECTION**

- A. Protect existing elements surrounding the work of this section from damage or disfigurement.

#### **3.03 INSTALLATION**

- A. Install all acoustical materials and suspension systems in strict accordance with the manufacturer's instructions.
- B. Main runners shall be installed on 24 inch centers and suspended by hanger wire spaced not more than 48 inches on center along the main runners.
- C. Cross tees shall be 24 inches in length and shall be spaced 24 inches on center along the main runner to form 2'x2' modules as scheduled on the drawings.
- D. Install wall moldings at intersection of suspended ceiling and all vertical surfaces.
- E. Miter corners where wall moldings intersect or install corner caps.
- F. The acoustical panels shall not be used to support any other materials except fiberglass thermal/sound control insulation installed in the thickness, density and manner specified by the manufacturer.

#### **3.04 ASSOCIATED METAL FRAMING**

- A. Provide metal framing as required to support light fixtures, piping, HVAC equipment and ductwork below acoustical ceilings or as required to span across/over/under suspended equipment. Coordinate with the associated MEP contract documents. See Section 05 50 00 - Miscellaneous Metal Work for additional information.

#### **3.05 CLEANING**

- A. Clean under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 09 65 00**

### **RESILIENT FLOORING**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 WORK INCLUDES**

- A. Installation of resilient flooring and accessories as indicated.

##### **1.03 RELATED SECTIONS**

- A. Section 03 31 00 - Cast in place concrete
- B. Section 09 21 16 - Steel Framed Drywall System
- C. Section 12 32 16 - Plastic Laminate Casework

##### **1.04 REFERENCES**

- A. ASTM E84 - Surface Burning Characteristics of Building Materials.
- B. FS L-F-1641 - Floor Covering, Translucent or Transparent Vinyl Surface, with Backing.
- C. FS L-F-475 - Floor Covering, Vinyl Surface (Tile and Roll), with Backing.
- D. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.
- E. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic.

##### **1.05 SUBMITTALS**

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Provide product data on specified products, describing physical and performance characteristics sizes, patterns and colors available.
- C. Submit samples under provisions of Section 01 33 00.
- D. Submit two samples 3 x 3 inches in size, illustrating the full range color and pattern for each floor material specified.
- E. Submit 6 inch long samples of base material for each color specified.
- F. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

- G. Sustainable Building Material Submittal:
  - 1. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content.
  - 2. Identify each regional material along with the location of its harvest, extraction, or manufacture.

#### 1.06 OPERATION AND MAINTENANCE DATA

- A. Submit cleaning and maintenance data under provisions of Section 01 78 00.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-finishing.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle work to site under provision of Section 01 60 00.

#### 1.08 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F air temperature at flooring installation areas for three days prior to, during, and 24 hours after installation of materials.

#### 1.09 EXTRA MATERIALS

- A. Furnish under provisions of Section 01 78 00.
- B. Provide 12 sq. ft. of each color and pattern of floor material and 6 lineal feet of base of each material required for Project, for maintenance use.
- C. Clearly identify each box.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Rubber base and edge guards, Rubber Floor Treads & Risers & Landing Floor Tiles  
Subject to compliance with requirements of this Specification Section, provide products listed herein from the following:
  - 1. Basis of Design: Johnsonite/Tarkett
  - 2. Other acceptable manufacturers offering equivalent products.
    - a. Flexco
    - b. Roppe
- B. Substitutions: Under provisions of Section 01 60 00.

## 2.02 MATERIALS

- A. Rubber base: 4" high x rolled length, 1/8" thick with ribbed back. Seams will only be allowed on walls longer than 40'.
- B. Edge guards or Adaptors: Beveled type, matte finish; color as selected by Architect.  
Johnsonite Model EG-G, H or J. Provide edge guards at all exposed edges.  
Johnsonite Model CTA-A or CTA-D. Provide adaptors at all dissimilar materials (i.e. vinyl tile and carpet).
- C. Rubber stair treads with integrated risers:
  - 1. Raised square surface pattern (VIRTRS), solid color integrated stair tread and riser, 2" height hinged Square Nose, tapering .210" to .113", 20" overall width including 13" tread depth with 7" integrated riser, tread length full width.
  - 2. Color to be manufacturer's standard solid as selected by Architect.  
The leading edge of all treads and at the nosing of both main and intermediate landings are all to have a full width, 2" wide co-extruded contrasting solid color insert in standard color as selected by Architect.
  - 3. Material Characteristics
    - a. Manufactured from a homogeneous composition of 100% synthetic rubber.
    - b. Complies with requirements for ASTM F 2169 Standard Specification for Resilient Stair Treads, Type TS, Class 1 and 2, Group 1 and 2.
    - c. Hardness: ASTM D 2240 – Not less than 85 Shore A.
    - d. Abrasion Resistance: ASTM D 3389 – less than 1 gram weight loss.
    - e. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish- Coated Flooring of 0.6 or greater.
    - f. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm<sup>2</sup> or greater, Class I.
    - g. Integrated tread and riser with 2" wide co-extruded contrasting color insert.
    - h. Limited Commercial Warranty: 5 years
  - 4. Install in accordance with manufacturer's instructions. Install so as tread nosing is scribed to meet riser below to produce a flush face.
- D. Rubber floor tiles:
  - 1. Hammered texture, 1/8" gauge rubber floor tile 24" x 24".
  - 2. Color to be manufacturer's standard solid as selected by Architect.
  - 3. Material Characteristics
    - a. Classification specify: ASTM F1344, Type I-A, homogeneous solid color rubber tile.
    - b. Hardness (ASTM D2240): = 85 Shore A
    - c. Abrasion Resistance (ASTM D3389): Passes
    - d. Thickness Tolerance (ASTM F386): Passes
    - e. Resistance to Chemicals (ASTM F925): Passes
    - f. Static Load Resistance (ASTM F970): 250 psi
    - g. Resistance to Heat (ASTM F 1514):  $\Delta E = 8$
    - h. Size/Squareness Tolerance (ASTM F2055): Passes
    - i. Dimensional Stability (ASTM F2199): Passes
    - j. Static Coefficient of Friction (ASTM D 2047): = 0.8 SCOF
    - k. Flamability (ASTM E648, Critical Radiant Flux): Class 1 (= 0.45 W/cm)
    - l. Limited Commercial Warranty: 5 years

## 2.03 COLORS SELECTION

- A. All colors shall be selected by the Architect from the manufacturer's standard color selections.

## 2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; mix with water to produce cementitious paste. "Armstrong" S-180 Latex underlayment.
- B. Primers and Adhesives: Low VOC; types recommended by flooring manufacturer for specific materials and as required to maintain product warranty.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. When requested by the Architect, schedule and hold a pre-installation meeting prior to start of work on this section as stipulated in Specification Section 01 31 00 to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.  
To attend: Architect, Owners Representative, General Contractor, Approved Installer.
- B. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft., and are ready to receive work.
- C. Documented moisture testing must be conducted on ALL concrete substrates, regardless of the grade level and age using both of the following methods.
  - 1. Test method ASTM F-1869 result is to be 5.0 lb. MVTR or lower.
  - 2. Test method ASTM F-2170 result to be less than 75 % RH.
  - 3. Concrete is to exhibit negative alkalinity, carbonization, or dusting.
- D. Beginning of installation means acceptance of existing substrate and site conditions.

### 3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
- C. Prohibit traffic from area until filler is cured.
- D. Vacuum clean substrate.

### 3.03 INSTALLATION - BASE MATERIAL

- A. Fit joints tight and vertical.

- B. Miter internal corners. At external corners, use premolded units. At exposed ends use premolded units.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.
- E. Install straight and level to variation of plus or minus 1/8 inch over 10 feet.
- F. Provide coved base at all hard surface flooring and straight base at all carpet.
- G. Provide base at the toekick of all casework.  
The color and type shall match adjacent wall base in the room unless selected otherwise by the Architect.

#### 3.04 INSTALLATION – RUBBER FLOOR TILES

- A. Install in accordance with manufacturers' instructions.
- B. Mix floor tiles from container to ensure shade variations are consistent.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Install with minimum 1/2 full size tile width at room or area perimeter.
- F. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- G. Install edge guards at unprotected or exposed edges, and where flooring terminates.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Clean finished floor thoroughly in accordance with manufacturer's instructions. The floor will be maintained as a No Polish, No Buffing finish.

#### 3.05 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.

#### 3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean surfaces in accordance with manufacturer's instructions.

END OF SECTION



## **SECTION 09 68 14**

### **ENTRANCE CARPET TILE**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including the General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. Prepare surfaces to receive entrance carpet tiles.
- B. Install entrance carpet tile on surfaces where indicated, complete with required accessories.
- C. Install edge guards where carpeting terminates at other floor finishes.

##### **1.03 RELATED WORK**

- A. Section 09 65 00 - Resilient Flooring: Wall base and edge guards.

##### **1.04 DESIGN REQUIREMENTS**

- A. Entrance carpet tiles shall be installed in all areas indicated on drawings and finish schedule. All design and color combinations shall be installed as per drawings.

##### **1.05 SUBMITTALS**

- A. Submit samples under provisions of Section 01 33 00.
- B. Submit minimum 3"x5" carpet sample of each color of manufacturer's standard colors for architect's selection.
- C. Contractor shall submit larger samples of any standard color if requested by the Architect.
- D. Submit product information indicating conformance with fire code requirements for finishes.

##### **1.06 REGULATORY REQUIREMENTS**

- A. Materials must be tested and in compliance with State Code Standards for interior finishes.
- B. Carpet is to meet the following fire code requirements:
  - 1. Flame radiant panel test: Meets NFPA Class 1 when tested under ASTM E-648.
  - 2. Smoke density: NBS smoke chamber NFPA-258 (ASTM E 662) – Less than 450 Flaming Mode

## 1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain room temperature at minimum 60 degrees F for at least 24 hours prior to installation, and relative humidity at approximately that at which the area is to be maintained. The maximum room temperature shall be 90 degrees F. at any time during the installation.
- B. Provide sufficient lighting.

## 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products under provisions of Section 01 60 00.

## 1.09 FIELD MEASUREMENT

- A. Verify all dimensions at site prior to installation.

## 1.10 SCHEDULING

- A. Do not commence with carpet tile installation until painting and finishing work is complete and ceilings and overhead work, tested, approved, and completed.

## 1.11 EXTRA MATERIALS

- A. Furnish under provisions of Section 01 78 00.
- B. Provide minimum of 2 carpet tiles of each color and type of tile installed. The additional tiles shall be properly packaged for long term storage.

## 1.12 WARRANTY

- A. Provide lifetime warranty under provisions of Section 01 78 00.

# **PART 2 - PRODUCTS**

## 2.01 MANUFACTURERS

- A. Shaw Contract Group
- B. Other acceptable manufacturers offering equivalent products.
  - 1. Mohawk
  - 2. Interface
- C. Substitutions: Under provisions of Section 01 60 00.

## 2.02 MATERIALS

- A. Entrance Carpet Tile:
1. Product Data (Shaw)

|                          |                            |
|--------------------------|----------------------------|
| Style Name               | Welcome II                 |
| Style number             | 5T031                      |
| Product type             | walk-off tile              |
| Size                     | 24" X 24"                  |
| Construction             | needlebond hobnail         |
| Dye method               | 100% solution dyed         |
| Fiber product            | 100% PET POLYESTER         |
| Primary backing          | SYNTHETIC                  |
| Secondary backing        | ecoworx®                   |
| Tufted yarn weight       | 49.0 ozs/yd <sup>2</sup>   |
| Pile height              | 0.157 inches               |
| Average density          | 6,477 ozs./yd <sup>3</sup> |
| Recommended installation | quarter-turn               |
  2. Performance:

|                           |                                                            |
|---------------------------|------------------------------------------------------------|
| Flame radiant panel test: | Meets NFPA Class 1 when tested under ASTM E-648 glue down. |
| Smoke density:            | NBS smoke chamber NFPA-258 (ASTM E 662) – Less than 450    |
  3. Warranty: Lifetime of carpet
  4. Standard color selection: Minimum of six (6) colors
- B. Adhesive: As recommended by the carpet manufacturer to conform to carpet warranty.
1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).
- C. Carpet colors selected by architect from manufacturer's standard colors.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. All floors should be tested for moisture: the presence of moisture will interfere with adhesion.
- B. The floor must be free of all foreign matter; grease, oil, paint, wax, dirt, dust, oil or noncompatible adhesives.
- C. The floor should be sound and level. All holes, compound and any protrusions must be eliminated.

### 3.02 FLOOR PREPARATION

- A. Concrete (unsealed): Floor must be sealed. Use a compatible non-silicone base sealer or latex primer or latex additives.
- B. Concrete with latex adhesive in good condition: No treatment needed except vacuuming.

### 3.03 INSTALLATION

- A. Measure the area to find the best starting point that would utilize a maximum size perimeter tile. In some cases, due to doorways or partition, the starting point is not the center of the room.
- B. After selecting the starting point, snap chalk lines that bisect this point at right angles. In order to achieve a perfect right angle, which is critical, form a triangle by measuring 6'x8'x10'.
- C. The chalk lines must be used as a guide for lining up the edges of modules. Using the pyramiding technique, install one quadrant at a time.
- D. The corners of the modules should be flat to assure proper fit. To avoid jamming install modules with slight space about 1/32 or so. We suggest the following spot check: Ten modules, properly spaced, should measure 1/4" to 1/2" over net.  
Caution! Do Not Jam Modules.
- E. Use a steel wheel seam roller or similar roller to blend and enhance the seams.
- F. Trimming: The loop pile modules will have some yarn blossoming at the edges, which is inherent to this type of construction. Face yarn may require occasional trimming.
- G. Install in an area of approximately 5'-0" x 5'-0" (fill this alcove) directly in front of Office 100 exterior door.

### 3.04 CLEANING

- A. Clean work under provisions of 01 70 00.

### 3.05 PROTECTION OF FINISHED WORK

- A. Prohibit traffic on new carpet tile flooring for 24 hours after the completion of installation.

END OF SECTION

## **SECTION 09 81 16**

### **SOUND ATTENUATION INSULATION**

#### **PART 1 - GENERAL**

##### 1.01 WORK INCLUDED

- A. Sound attenuation insulation for walls.

##### 1.02 SUBMITTALS

- A. Submit product data and manufacturer's installation instructions under provisions of Section 01 33 00.
- B. Sustainable Building Material Submittal:
  - 1. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content.
  - 2. Identify each regional material along with the location of its harvest, extraction, or manufacture.

##### 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products under provisions of Section 01 60 00.
- B. Store in a dry, protected area.

#### **PART 2 - PRODUCTS**

##### 2.01 ACCEPTABLE MANUFACTURERS

- A. Rockwool AFB evo (Acoustical Fire Batt) by Rockwool.
- B. Other acceptable manufacturers offering equivalent products:
  - 1. Owens Corning Thermafiber SAFB
  - 2. Johns Manville
- C. Substitutions: Under provisions of Section 01 60 00.

##### 2.02 MATERIALS

- A. Sound attention batts: Unfaced mineral wool fiber, non-combustible insulation designed for sound attenuation.  
3-1/2" thick in partitions in locations as occurring and noted on drawings
- B. Material Properties
  - 1. Compliance and Performance:
    - ASTM C 665 Mineral-Fiber Blanket Thermal Insulation Type 1, Complies
    - ASTM C 553 Mineral Fiber Blanket Thermal Insulation Complies
    - UL Design Nos U305, U311, U317, U411, U412, U448, U465, V417, V418, V419

2. Fire Performance:
 

|                                                     |                 |
|-----------------------------------------------------|-----------------|
| ASTM E 136 Behaviour of Materials at 750°C (1382°F) | Non-Combustible |
| ASTM E84 (UL 723) Surface Burning Characteristics   |                 |
| Flame Spread = 0                                    |                 |
| Smoke Developed = 0                                 |                 |
  3. Acoustical Performance:
 

|                                                              |        |
|--------------------------------------------------------------|--------|
| ASTM E 90 Airborne Sound Transmission Loss                   | Tested |
| ASTM E 413 Rating Sound Insulation                           | Tested |
| ASTM C 423 Sound Absorption Coefficients                     | Tested |
| ASTM E 1050 Impedance and Absorption of Acoustical Materials | Tested |
  4. Air Erosion:
 

|                             |          |
|-----------------------------|----------|
| UL 181 Maximum Air Velocity | 1000 fpm |
|-----------------------------|----------|
  5. Corrosive Resistance:
 

|                                   |      |
|-----------------------------------|------|
| ASTM C 665 Corrosiveness to Steel | Pass |
|-----------------------------------|------|
  6. Total recycled content to be 40 %.
- C. Acoustical Putty
1. QuietPutty 380 manufactured by Pabco Gypsum or equal.
  2. Description: Moldable sheets of fire rated, acoustical putty to be used to seal penetrations in partitions that are constructed with sound attenuation insulation. Use putty to maintain the performance of acoustically rated walls at penetrations.
  3. Surface burning requirements: (ASTM E84) Flame Spread 15, Smoke developed: 250, Classification: A.
  4. One hour fire-rated to UL 1479
  5. Install in accordance with manufacturer's instructions.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Verify adjacent materials are dry and ready to receive installation.
- B. Verify mechanical and electrical services within walls have been installed and tested.

#### **3.02 INSTALLATION**

- A. Install batt insulation in accordance with manufacturer's instructions.
- B. Install acoustical insulation of 3 1/2" thickness in walls where indicated on the drawings.
- C. Install batt insulation in spaces without gaps or voids.
- D. Trim insulation neatly to fit spaces. Use batts free of damage.
- E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- F. Install acoustical putty in accordance with manufacturer's instructions in locations as noted below.
  1. Acoustical putty is to be installed at all partitions where sound attenuation insulation is being installed so as to maintain the performance of acoustically rated walls.

2. Install as required to seal around the entire back of all electrical boxes penetrating gypsum board.
3. Install as required to seal all gaps where items penetrate gypsum board, such as HVAC ductwork, piping, conduits, cables, etc.

### 3.03 CLEANING

- A. Clean under provisions of Section 01 70 00.

END OF SECTION

## **SECTION 09 91 00**

### **PAINTING**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. Finish painting and priming of all items exposed and identified to receive a finish.

##### **1.03 RELATED SECTIONS**

- A. Surfaces scheduled or indicated to be painted.
- B. Touch up of shop coats provided under other sections unless specifically included in that section.
- C. Exposed structural steel.
- D. Finish painting of exposed piping, conduit, exposed raceways, metal hardware, exposed equipment including rooftop equipment supplied under mechanical and electrical trades, when such items have not been factory pre-painted.
- E. Examine the specifications for the various other trades and become thoroughly familiar with all their provisions regarding what they are painting. All exposed-to-view surfaces that are left unfinished by the requirements of other specifications shall be painted or finished as a part of this work.

##### **1.04 REFERENCES**

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.
- C. Federal Specifications

##### **1.05 DEFINITIONS**

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.
- B. The term "paint" as used herein includes enamels, paint, emulsions, varnishes, stains, sealers and other coatings whether used as prime, intermediate or finish coats.

##### **1.06 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.



- B. Submit manufacturer's technical data sheet and Material Safety Data Sheets (MSDS) for each scheduled coating, giving the descriptive data, curing time, mixing, thinning and application instructions. Provide certification that paint was formulated within lead or mercury.
- C. Submit manufacturer's fan deck of color chips for selection of colors by the Architect.
- D. Samples
  - 1. At the request of the Architect, prepare and submit paint samples on the materials he requires for approval.
  - 2. Prepare and submit stained wood samples on the type and quality of wood specified for use on the project as requested by the Architect.
- E. Submit a list of all interior paints and coatings used in the project that are addressed by the Green Seal Standard GS-11 and state the Volatile Organic Compounds (VOC) content for each product.

#### 1.07 QUALIFICATIONS

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with five years experience.
- B. Applicator: Company specializing in commercial painting and finishing with 3 years documented experience.

#### 1.08 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

#### 1.09 FIELD SAMPLES

- A. At the request of the Architect, provide field sample panel, one complete surface of each color scheme illustrating special coating, color, texture, finish and workmanship.
- B. Locate where directed by the Architect.
- C. If approved, sample area will serve as a minimum standard for Work throughout the building. Accepted sample may remain as part of the Work.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and protect products under provisions of Section 01 60 00.
- B. Deliver all paint materials to the job site ready mixed and in their original containers with all labels intact and legible at time of use.
- C. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
- D. Use all means necessary to insure the safe storage and use of paint materials.
- E. All soiled or used rags, waste and trash must be disposed off site every night and every precaution taken to avoid the danger of fire.

- F. All materials must be stored at above freezing temperature.

#### 1.11 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent.
- C. Application Temperature for Paints: 50 degrees F minimum, and 95 degrees F maximum.
- D. Application Temperature for Varnish and Other Natural Finishes: 65 degrees F minimum and 90 degrees F maximum.
- E. Provide lighting level of 80 ft. candles measured mid-height at substrate surface.
- F. Do not apply paint to areas where dust is being generated.

#### 1.12 COORDINATION

- A. Coordinate work under provisions of Section 01 31 00.

#### 1.13 EXTRA MATERIALS

- A. Furnish under provisions of Section 01 78 00 extra paint equaling approximately 10% of each color and gloss used in each coating material used, tightly sealed in clearly labeled containers.
- B. The additional material shall be properly packaged for long term storage and delivered to the Owner.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURER:

- A. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following:
  - 1. Paint:
    - a. Sherwin Williams
    - b. Pittsburgh Paint (PPG Industries, Inc)
    - c. Benjamin Moore Paint
- B. Substitutions: Under provisions of Section 01 60 00.

## 2.02 COMPATIBILITY:

- A. All paint materials and equipment shall be compatible in use; finish coats shall be compatible with prime coats; prime coats shall be compatible with the surface to be coated; all tools and equipment shall be compatible with the coating to be applied.
- B. Thinners, when used, shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

## 2.03 MIXING AND TINTING:

- A. Accomplish job mixing and tinting only when acceptable to the Architect. Mix only in mixing pails placed in suitable sized non-ferrous or oxide resistant metal pans.
- B. Tints and all other additives or thinners shall be used only as recommended by the manufacturer of the paint and as approved by the Architect.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- B. In the event of discrepancy, immediately notify the Architect.
- C. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

### 3.02 PREPARATION:

- A. General
  - 1. Prior to all surface preparation and painting operations, completely mask, remove or otherwise adequately protect all hardware, accessories, machined surfaces, plates, lighting fixtures, and similar items in contact with painted surfaces but not schedule to receive paint.
  - 2. Remove all existing loose, flaking and poor condition paint by scraping and then sanding surface. Sand as required to feather edges of remaining paint.
  - 3. Spot prime all exposed nails and other metals that are to be painted with emulsion paints, using a primer recommended by the manufacturer of the coating system.
  - 4. Surface to be painted shall be thoroughly clean and dry. All concrete and masonry work shall be completely cured.
  - 5. All items concealing surfaces to be painted that are readily detachable shall be removed for the painting of said surface. Reinstall upon completion of space.
  - 6. Surfaces in spaces above suspended ceilings and chases are not required to be painted unless otherwise indicated.
  - 7. Doors shall be removed to paint the bottom edges.
  - 8. Provide minimum of one coat of primer and minimum of two coats of finish paint. The shop priming coat, as occurring, shall substitute for the field applied primer coat.
  - 9. Complete coverage is required. Provide additional coats to areas that do not show complete coverage.

B. Preparation of wood surfaces:

1. Clean all wood surfaces until they are free from dirt, oil, and all other foreign substance.
2. Smooth all finished wood surfaces exposed to view, using the proper sandpaper.
3. Where so required, use varying degrees of coarseness in sandpaper to produce uniformly textured and unmarred wood surfaces.
4. On small, dry, seasoned knots, thoroughly scrape and clean the surface and apply one coat of good quality knot-sealer before application of the priming coat.
5. On large, open, unseasoned knots, scrape off all pitch and thoroughly clean the area, followed by an application of one coat of good quality knot-sealer.
6. Back prime all wood mouldings and trim.
7. Fill nail holes, cracks, open joints and other defects with oil based putty after priming coat has dried. Color to match finish color.

C. Preparation of metal surfaces:

1. Galvanized Metal

- a. Clean all surfaces thoroughly with solvent until they are completely free from dirt, oil and grease.
- b. Thoroughly treat the cleaned surface with phosphoric acid etch.
- c. Remove all excess etching solution and allow to dry completely before application of paint.
- d. Prepare surface in accordance with recommendations of directions of manufacturer of rust-inhibitive primer.
- e. New galvanized metal is to be allowed to weather 6 months prior to coating. If weathering is not possible, clean with solvents per manufacturer's instructions, and verify test patch adhesion with Architect.

2. Other Metals

- a. Thoroughly clean all surfaces until they are completely free from dust, dirt, oil, loose rust and grease.
- b. All shop-primed surfaces that have been marred or abraded shall be wire-brushed and touched up with the same material as the shop coat prior to painting of surfaces.

D. Preparation of Concrete and Masonry

1. Concrete and masonry shall be repaired before painting.
2. Dirt, fungus, grease and oil shall be removed prior to application of paint by washing with a solution composed of from 2 to 8 ounces of tri-sodium phosphate per gallon of hot water and then rinsing thoroughly with fresh water.
3. Efflorescence shall be removed from concrete and masonry surfaces by scraping, wire brushing and washing with 5 to 10 percent solution of muriatic acid and then washing thoroughly with fresh water.
4. Unless otherwise recommended by the manufacturer of the paint materials as approved, all concrete and masonry surfaces to be painted shall be given a neutralizing treatment consisting of 2 pounds of zinc-sulfate in one gallon of warm water. The neutralizer shall be applied liberally and allowed to dry, following which the surfaces shall be rinsed

thoroughly with clean water and allowed to dry for not less than 48 hours before paint is applied.

E. Preparation of Gypsum Wallboard

1. All surfaces must be thoroughly clean and joint treatment dry.
2. Steel corner beads shall be spot primed before water based paint is applied.
3. Do not apply solvent based coatings directly over unpainted wallboard.

3.03 APPLICATION

A. General

1. Apply all paint in accordance with manufacturer's instructions.
2. Do not apply the initial coating until moisture-meter reading of the surface is within limits recommended by the paint materials manufacturer.
3. Allow sufficient drying time between coats in accordance with manufacturer's recommendations.
4. Oil base and Oleo resinous solvent type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
5. Schedule all cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
6. Sand, dust, and clean between coats to remove all defects visible to the unaided eye from a distance of five feet.
7. Finished surfaces shall be free from runs, drops, ridges, waves, laps, sags and unnecessary brush marks.
8. Slightly vary the color of succeeding coats.
9. Primer and intermediate coats shall be tinted to approximately the tint of finish coats.
10. Damaged painting shall be retouched before applying the succeeding coat.
11. Do not apply additional coats until completed coat has been inspected and approved by the Architect.
12. Only inspected and approved coats of paint will be considered in determining the number of coats applied.
13. Edges of paint abutting other materials or colors shall be clean and sharp with no overlapping.
14. Refinish entire wall where portion of finish has been damaged or is not acceptable.
15. Refinish all woodwork that has been removed and reset.
16. Paint all exposed, plastic drain pipes, electrical conduits, uninsulated metal piping, ceiling & wall access panels, sprinkler piping and ductwork, unless otherwise noted. Verify with Architect prior to painting these items.
17. Colors will be selected by Architect from manufacturer's full color palette.
18. Unlimited number of different colors allowed per project. Multiple colors are allowed per room. Opposite sides of door frames, window frames and doors may be painted different colors at Architect's discretion. Number of colors is to be determined by Architect and included in a color schedule that will be assembled after submittal of color sample fanex by the General Contractor prior to commencement of work.
19. All steel door frames are to be painted using a brush or roller and back-brushed.
20. Spray painting is not allowed unless all sprayed surfaces are back-brushed using brushes or rollers.

### 3.04 CLEANING

- A. Prevent accidental spilling of paint materials and, in event of such spill, immediately remove all spilled material, the waste of equipment used to clean up the spill, and wash the surfaces to their original undamaged condition.
- B. After completion of the painting work, all glass shall be cleaned on both sides by professional window cleaners. The use of acid solution or water containing caustic soaps will not be permitted. The edge of compound shall not be disturbed by scrapers. Upon completion of contract, the glass shall be left whole, free of any defacements or rattle and shall be clean on both sides.
- C. Prior to final inspection visually inspect all surfaces and remove all paint and traces of paint from surfaces not scheduled to be painted.
- D. Paint storage space shall be thoroughly cleaned following the completion of all work.
- E. All waste materials shall be disposed of properly and in accordance with all Federal, State, and Local regulations. Do not dispose of waste materials in the building sanitary waste system.

### 3.05 WASTE MANAGEMENT

- A. Set aside extra paint for future color matches. All paint unused by the Contractor is to be delivered to the Owner in sealed containers.
- B. Close and tightly seal all partly used paint and finish containers and store in a well-ventilated, safe area at moderate temperature.
- C. Do not dispose of paints or solvents by pouring on ground. Place in designated containers for proper disposal.

### 3.06 PAINTING SCHEDULE

- A. Exterior: Based on Sherwin Williams Paints unless noted otherwise.
  - 1. Wood
    - 1st Coat: S-W A-100 Exterior Fast Dry Alkyd Wood Primer  
(4 mils wet, 2.2 mils dry)
    - 2nd & 3rd Coats: S-W Resilience Latex Satin K43 Series  
(4 mils wet, 1.52 mils dry per coat)

2. Ferrous Metals (doors, frames, steel)
  - 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1300 Series  
(5-10 mils wet, 2-4 mils dry)
  - 2nd & 3rd Coats: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66-1150 Series  
(6.0 mils wet, 2.5mils dry)
3. Galvanized Metal (designated to be painted)
  - 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1300 Series  
(5-10 mils wet, 2-4 mils dry)
  - 2nd & 3rd Coats: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66-1150 Series  
(6 mils wet, 2.4 mils dry per coat)
4. Concrete and Masonry Walls
  - 1st Coat: S-W Loxon Block Surfacer  
(50 – 100 sq ft/gal)
  - 2nd & 3rd Coats: S-W Resilience Latex Satin K43 Series  
(4 mils wet, 1.52 mils dry per coat)
5. PVC, Plastic
  - 1st Coat: 1 coat S-W Adhesion Primer latex, B51W8050  
(4 mils wet, 1.7 mils dry)
  - 2nd & 3rd Coats: 2 coats S-W Resilience Exterior Gloss K44  
(4 mils wet, 1.6 mils dry per coat)

B. Interior: Based on Sherwin Williams Paints unless noted otherwise.

1. Interior clear floor sealer for concrete floors listed in finish schedule to receive sealer:
  - a. Sealer Finish 1 coat TK-290 WB as manufactured by TK Products.  
Tel: 952-938-7223  
www.tkproducts.com
2. CEMENT - (Walls & Ceilings, Poured Concrete, and Cast-In-Place)  
Eg-Shel / Satin Finish
  - 1st Coat: S-W Loxon Block Surfacer  
(16 mils wet, 8 mils dry)
  - 2nd & 3rd Coats: S-W ProMar 200 Zero VOC Latex Eg-Shel B20-2600 Series,  
(4 mils wet, 1.6 mils dry per coat)
3. METAL - (Galvanized)  
Semi-gloss Finish
  - 1st Coat: S-W ProCryl Universal Primer, B66-310 Series (110 g/L)  
(2-4 mils dry)
  - 2nd & 3rd Coats: S-W Pro Industrial DTM Acrylic Semi-gloss B66-1150 Series  
(6.0 mils wet, 2.5mils dry)

4. METAL - (Doors & frames, Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous & Ornamental Iron, Structural Iron, Ferrous Metal, steel pipe railings) (exposed, uninsulated metal piping and ductwork)  
Semi-gloss Finish  
1st Coat: S-W ProCryl Universal Primer, B66-310 Series (110 g/L)  
(2-4 mils dry)  
2nd & 3rd Coats: S-W Pro Industrial DTM Acrylic Semi-gloss B66-1150 Series  
(6.0 mils wet, 2.5mils dry)
5. METAL - (Ceilings; Structural Steel, Joists, Trusses, Beams, Ferrous Metal)  
Dryfall Waterborne Topcoats  
Eg-Shell Finish  
1st Coat: S-W ProCryl Universal Primer, B66-310 Series (110 g/L)  
(2-4 mils dry)  
2nd & 3rd Coats: S-W Waterborne Acrylic Dry Fall, B42W2 (58 g/L)
6. WOOD - (Walls, ceilings)  
Eg-Shell / Satin Finish  
1st Coat: S-W Premium Wall & Wood Primer B28 Series  
(4 mils wet, 1.3 mils dry per coat)  
2nd & 3rd Coats: S-W ProMar 200 Zero VOC Latex Eg-Shel B20-2600 Series  
(4 mils wet, 1.7 mils dry per coat)
7. WOOD - (Trim)  
Semi-gloss  
1st Coat: S-W Premium Wall & Wood Primer B28 Series  
(4 mils wet, 1.5 mils dry per coat)  
2nd & 3rd Coats: S-W ProMar 200 Zero VOC Latex Semi-gloss B31-2600 Series  
(4 mils wet, 1.7 mils dry per coat)
8. DRYWALL - (Walls, Gypsum Board, etc.)  
Eg-Shell / Satin Finish  
1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600  
(4 mils wet, 1.5 mils dry).  
2nd & 3rd Coats: S-W ProMar 200 Zero VOC Latex Eg-Shel B20-2600 Series  
(4 mils wet, 1.7 mils dry per coat)
9. CEILINGS – (Gypsum Board)  
Flat Finish  
1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600  
(4 mils wet, 1.5 mils dry).  
2nd & 3rd Coats: S-W ProMar Ceiling Paint Latex Flat, A27W05050 Series  
(4 mils wet, 1.2 mils dry per coat).
10. CONCRETE BLOCK  
Semi-gloss Finish  
1st Coat: S-W Loxon Block Surfacer  
(16 mils wet, 8 mils dry)  
2nd & 3rd Coats: S-W ProMar 200 Zero VOC Latex Semi-gloss B31-2600 Series  
(4 mils wet, 1.7 mils dry per coat)

END OF SECTION



## **DIVISION 10**

## **SECTION 10 11 16**

### **MARKERBOARDS**

#### **PART 1 - GENERAL**

##### **1.01 WORK INCLUDED**

- A. Porcelain Enamel Steel Markerboards
- B. Trim, and accessories.

##### **1.02 RELATED WORK**

- A. Section 06 20 10 - Carpentry and Millwork (Wood blocking)

##### **1.03 REFERENCES**

- A. American Society for Testing Materials
  - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics for Building Materials
  - 2. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wires, Profiles and Tubes
- B. Porcelain Enamel Institute
  - 1. PEI-1002 Manual and Performance Specifications for Porcelain Enamel Writing Surfaces

##### **1.04 SUBMITTALS**

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Indicate on shop drawings, wall elevations, dimensions, joint locations, and special anchor details.
- C. Provide product data on markerboards, trim and accessories.
- D. Submit samples and color charts under provisions of Section 01 33 00.
- E. Submit two samples 3 x 3 inch in size illustrating materials and finish, color, and texture of markerboard.
- F. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

##### **1.05 MAINTENANCE DATA**

- A. Submit maintenance data under provisions of Section 01 78 00.
- B. Include maintenance information on regular cleaning, and stain removal.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Storage shall be in building, closed to the weather with temperatures ranging from 60°F to 85°F at not more than 70% relative humidity.

## 1.07 WARRANTY

- A. Provide five year warranty under provisions of Section 01 78 00.
- B. Warranty: Include coverage of markerboard surface from discoloration due to cleaning, crazing or cracking, and staining.

## **PART 2 - PRODUCTS**

### 2.01 MANUFACTURER

- A. Claridge Products and Equipment Company.
- B. Substitutions: Under provisions of Section 01 60 00.

### 2.02 MATERIALS

- A. Writing Surface Face Sheet – Manufactured in accordance with Porcelain Enamel Institute's specification.
  - 1. Shall be enameling grade cold rolled steel manufactured from a minimum of 30 percent post-consumer and post-industrial waste.
  - 2. Enameling grade steel shall be coated with LCS<sup>3</sup> Porcelain Enamel by Claridge Products and Equipment (or equal)
    - a. 3-Coat process shall include:
      - i. Bottom Ground Coat – 1.5 to 2.2 mils
      - ii. Top Ground Coat – 2.0 to 2.8 mils
      - iii. Top Cover (Color) Coat – 3.0 to 4.0 mils
  - 3. Firing Temperature: Enamel shall be fired at lowest possible temperatures to reduce steel and porcelain stresses and achieve superior enamel and hardness.
  - 4. Color: As selected by architect from manufacturer's standards.
- B. Writing Surface Core
  - 1. 7/16" Medium Density Fiberboard (MDF).
- C. Writing Surface Backing
  - 1. Aluminum Sheet Back
- D. Factory Framed Markerboards
  - 1. Face Sheet: (Specify LCS<sup>3</sup> porcelain enamel steel, magnetic markerboard)
  - 2. Core Material: (Specify 7/16" MDF)
  - 3. Backing: (Aluminum Sheet Back)
  - 4. Series: 4
  - 5. Typical Arrangement: Type CO

6. Color of board: Selected by Architect from manufacturer's standard colors.

## 2.03 ALUMINUM TRIM

- A. Trim shall be 6063 alloy grade aluminum with T5 tempering in accordance with ASTM B221, and shall have 201-R1 satin anodize finish.
  1. Factory Built Trim
    - a. Series 4
  2. Field-Applied Trim:
    - a. Snap-On, 5/8" face, Aluminum Trim
    - b. No map rail
    - c. Finish: Satin anodized aluminum.
- B. Accessories:
  1. Marker Tray
    - a. Standard continuous, solid, blade-type aluminum tray with ribbed section and injection molded end closures at bottom of each markerboard. Full width of board.

## 2.04 ACCESSORIES

- A. Provide instructions for board cleaning on metal plate attached to perimeter frame near chalk trough.
- B. Provide two packages LCS Liquid Markers each containing four colors per marker board.
- C. Provide one standard felt eraser per markerboard.

## **PART 3 - EXECUTION**

### 3.01 INSPECTION

- A. Verify that surfaces and internal wall blocking are ready to receive work, and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of substrate construction.
- C. Verify that wall surfaces are true and plumb and are prepared and ready to receive boards.

### 3.02 INSTALLATION

- A. Deliver factory built units completely assembled and of dimensions shown in details and in accordance with manufacturer's shop drawings as approved by the architect.
- B. Follow manufacturer's instructions for storage and handling of units before installation.
- C. Install markerboards in accordance with manufacturer's instructions with mounting angle clips at top and bottom.
- D. No joints in writing surface shall be permitted in lengths under 16 feet.

- E. Do not install boards on damp walls or in damp and humid weather without heat in the building.
- F. Install level and plumb, keeping perimeter trim straight in accordance with manufacturer's recommendations.

### 3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover board surfaces with protective cover, taped to frame for remainder of construction period.
- C. Remove protective cover at Date of Substantial Completion.

### 3.04 SCHEDULE

- A. Provide one 2'-0" w x 3'-6" h markerboard as specified.
- B. See drawings for location and layout for the markerboard.

END OF SECTION

## **SECTION 10 11 23**

### **TACKBOARDS**

#### **PART 1 - GENERAL**

##### **1.01 WORK INCLUDED**

- A. Tackboards
- B. Trim and accessories.

##### **1.02 RELATED WORK**

- A. Section 06 20 10 - Carpentry and Millwork (Wood blocking)

##### **1.03 REFERENCES**

- A. American Society for Testing Materials
  - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics for Building Materials
  - 2. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wires, Profiles and Tubes

##### **1.04 SUBMITTALS**

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Indicate on shop drawings, wall elevations, dimensions, joint locations, and special anchor details.
- C. Provide product data on tackboards, trim and accessories.
- D. Submit samples and color charts under provisions of Section 01 33 00.
- E. Submit two samples 3 x 3 inch in size illustrating materials and finish, color, and texture of tackboard.
- F. Submit manufacturer's installation instructions under provisions of Section 01 33 00.

##### **1.05 MAINTENANCE DATA**

- A. Submit maintenance data under provisions of Section 01 78 00.
- B. Include maintenance information on regular cleaning, and stain removal.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.

- B. Storage shall be in building, closed to the weather with temperatures ranging from 60°F to 85°F at not more than 70% relative humidity.

#### 1.07 WARRANTY

- A. Provide one year warranty under provisions of Section 01 78 00.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURER

- A. Claridge Products and Equipment Company.
- B. Substitutions: Under provisions of Section 01 60 00.

#### 2.02 MATERIALS

- A. Claridge Cork: Composed of 1/4 inch thick self-healing, burlap backed cork laminated to a 1/4" hardboard backing
- B. Colors: Selected by Architect from manufacturer's standard colors.
- C. Thickness: Total laminated thickness of core and covering is 1/2 inch. All thicknesses are nominal.
- D. Factory Framed Tackboards
  - 1. Tack Surface: (Claridge Cork)
  - 2. Series: 4
  - 3. Typical Arrangement: Type CO

#### 2.03 ALUMINUM TRIM

- A. Trim shall be 6063 alloy grade aluminum with T5 tempering in accordance with ASTM B221, and shall have 201-R1 satin anodize finish.
  - 1. Factory Built Trim
    - a. Series 4
  - 2. Field-Applied Trim:
    - a. Snap-On, 5/8" face, Aluminum Trim
    - b. No map rail
    - c. Finish: Satin anodized aluminum.

#### 3.01 INSPECTION

- A. Verify that surfaces and internal wall blocking are ready to receive work, and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of substrate construction.
- C. Verify that wall surfaces are true and plumb and are prepared and ready to receive boards.

#### 3.02 INSTALLATION

- A. Deliver factory built units completely assembled and of dimensions shown in details and in accordance with manufacturer's shop drawings as approved by the architect.

- B. Follow manufacturer's instructions for storage and handling of units before installation.
- C. Install tackboards in accordance with manufacturer's instructions with mounting angle clips at top and bottom.
- D. No joints in surface shall be permitted in lengths under 16 feet.
- E. Do not install boards on damp walls or in damp and humid weather without heat in the building.
- F. Install level and plumb, keeping perimeter trim straight in accordance with manufacturer's recommendations.

### 3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover board surfaces with protective cover, taped to frame for remainder of construction period.
- C. Remove protective cover at Date of Substantial Completion.

### 3.04 SCHEDULE

- A. Provide the following size tackboards as specified.
  - 1. Provide one (1): 2'-0" w x 3'-6" h
- B. See drawings for location and layout of tackboard.

END OF SECTION



## **SECTION 10 14 00**

### **SIGNAGE**

#### **PART 1 - GENERAL**

##### 1.1 SUMMARY

- A. Related Documents: The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### 1.2 SECTION INCLUDES

- A. Miscellaneous interior and exterior building signage.

##### 1.3 RELATED SECTIONS

- A. Section 01 21 00 - Allowances

##### 1.4 SUBMITTALS

- A. Submittal Procedures: Submit product data and samples under provisions of Section 01 33 00.
  - 1. Shop Drawings:
    - a. Indicate sign styles, letter font, terminology, foreground and background colors, locations, and overall dimensions of each sign.
    - b. Setting details for method of installation.
  - 2. Samples: Submit two sample signs illustrating type, style, letter font, and colors specified; method of attachment.
  - 3. Assurance/Control Submittals:
    - a. Certificates: Manufacturer's certificate that products meet or exceed specified requirements.
    - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
    - c. Manufacturer's Instructions: Include installation template, attachment devices, and procedures for care of finished surfaces.

##### 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing products specified with minimum 5 years documented experience.
  - 2. Installer: Company specializing in performing the Work of the Section with minimum 5 years documented experience.

##### 1.6 REGULATORY REQUIREMENTS

- A. Conform to all applicable Federal, State and local codes and laws.
- B. All sign design and installation is to meet the requirements of ICC A117.1 and the Rhode Island State Building Code, latest edition.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and protect products under provisions of Section 01 60 00.
- B. Deliver materials to project site in manufacturer's original unopened protective packaging.
- C. Identify contents, manufacturer, brand name, thermal values, and applicable standards.
- D. Handle as required to prevent damage.

## 1.8 WARRANTY

- A. Provide manufacturer's standard warranty (minimum of one year) for the specified product under the provisions of Section 01 78 00.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
  - 1. ACE Sign Systems
  - 2. ASI Sign Systems
  - 3. Best Sign Systems
  - 4. Approved fabricator.
- B. Substitutions: Under provisions of Section 01 60 00.

### 2.2 MATERIALS

- A. Interior signage and exterior entrance signage:
  - 1. Solid Polycarbonate Sheet: Thickness to be manufacturer's standard with minimum thickness of 3/16".
  - 2. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
  - 3. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
  - 4. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
  - 5. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
  - 6. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

### 2.3 SIGNAGE

- A. Interior Signage:
  - 1. Interior room signs shall have room names and/or numbers composing of minimum one inch high Helvetica Medium (uppercase) lettering that is 1/32 inch raised above their background and is to be duplicated in Braille.
  - 2. Signage design and installation is to meet the requirements of the applicable accessibility code.
  - 3. Size: As shown on drawings and noted in schedule listed herein.
  - 4. Material: Polycarbonate
  - 5. Color: To be selected by Architect from manufacturer's full color range.
  - 6. Install with exposed stainless steel, theft resistant screw fasteners.

7. Pictograms and Symbols of Accessibility:
  - a. Pictograms and Symbols of Accessibility are to meet the requirements of the applicable accessibility code.
  - b. Material: Polycarbonate
  - c. Color: To be selected by Architect from manufacturer full color range.

B. Exterior Entrance Signage:

1. Exterior signs shall have descriptions composing of minimum one inch high Helvetica Medium (uppercase) lettering that is 1/32 inch raised above their background and is to be duplicated in Braille.
2. Signage design and installation is to meet the requirements of the applicable accessibility code.
3. Size: As shown on drawings and noted in schedule listed herein.
4. Material: Polycarbonate
5. Color: To be selected by Architect from manufacturer's full color range.
6. Install with exposed, stainless steel, theft resistant screw fasteners.

2.4 FASTENERS AND OTHER MATERIALS

- A. Provide non-corrosive fasteners, hangers, and mounting devices which are compatible with sign material and finish.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive work.
  1. Examine walls, and other areas scheduled to receive signs for conditions that would affect quality and execution of work.
- C. By beginning work, contractor accepts conditions and assumes responsibility of correcting unsuitable conditions encountered at no additional cost to the client.

3.2 INSTALLATION

- A. Install signage in accordance with manufacturer's published instructions.
- B. Install sign units and components at the locations shown or scheduled, securely mounted to wall. Attach signs to substrates in accordance with the manufacturer's instructions.
- C. Install level, plumb, and at the proper height. Cooperate with other trades for installation of sign units to finish surfaces.
- D. Install room signs on wall on latch side of doors at height required by state and federal accessibility codes.
- E. Where polycarbonate signage is installed on exterior surfaces, exposed, theft resistant, screw fasteners are to be used.

- F. Coordinate and confirm location of all signs with Architect prior to installation.

### 3.3 CONSTRUCTION

- A. Interface with Other Work:
  - 1. Furnish full-size spacing templates for individually bundled letters and numbers for coordination with work of other trades.

### 3.4 FIELD QUALITY CONTROL

- A. Inspect signage locations, attachments, and messages to verify installation conforms to drawings.
- B. Verify actual sign locations and terminology with Architect prior to ordering.

### 3.5 SIGNAGE SCHEDULE

- A. Interior and exterior signage: Provide and install signs as noted below.  
Coordinate actual pictograms, terminology and locations with Architect.  
Content of signs will be similar to room names listed on floor plan drawings.
  - 1. Type "A" signs: 8"h x 8" w with pictographs, lettering and braille.  
Quantity: One (1)
  - 2. Type "B" signs: 6" h x 6" w with lettering and braille.  
Quantity: Two (2)

END OF SECTION

## **SECTION 10 28 13**

### **TOILET ROOM ACCESSORIES**

#### **PART 1 - GENERAL**

##### 1.01 SECTION INCLUDES

- A. The furnishing and installation of toilet room accessories as shown on drawings and herein specified.

##### 1.02 RELATED SECTIONS

- A. Section 09 21 16 – Steel Framed Drywall Systems

##### 1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 00
- B. Product data: Include manufacturer's illustration of item and installation instructions.
- C. Samples: Provide one sample of item if requested by the Architect. (Sample will be returned)

##### 1.04 QUALITY CONTROL

- A. Work is to be performed in accordance with Section 01 45 00.

##### 1.05 REGULATORY REQUIREMENTS

- A. Conform to all applicable Federal, State and local codes and laws including the state accessibility code for location and height requirements.

##### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00.

##### 1.07 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on drawings. Any inconsistencies or conflicts shall be reported to the Architect prior to installation.

##### 1.08 COORDINATION

- A. Coordinate work under provisions of Section 01 31 00.
- B. Coordinate the work with finish installers, and contractor for all wall openings, blocking, anchors, etc.
- C. The Owner will supply the surface mounted paper towel dispensers, soap dispensers and toilet tissue dispensers from their Vendor. Coordinate with the Owner for receipt of these items.

Contractor is to install them in locations shown on the drawings and as listed in this section's schedule. All installations are to meet state accessibility code location and height requirements. Contractor is to provide all blocking as required in stud walls.

#### 1.09 WARRANTY

- A. Provide warranty under provisions of Section 01 78 00.
- B. The bathroom accessories shall be warranted for one year from the date of purchase.

#### 1.10 OPERATION AND MAINTENANCE

- A. All keys, tools and instruction sheets supplied by the manufacturer are to be turned over to the owner.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURER

- A. Bobrick Washroom Equipment, Inc.
- B. Other acceptable manufacturers offering equivalent products.
  - 1. American Specialties, Inc.
  - 2. A&J Washroom Accessories, Inc.

#### 2.02 PRODUCT LIST

- A. Mirror (Bobrick B-2908 or ASI 0600-B) - Stainless steel angle frame with tempered glass mirror. Provide concealed wall hanger with theft resistant locking device.
- B. Grab Bars
  - 1. All grab bars are of 18 gauge, 1-1/2" diameter, satin finish with peened grip, concealed mounting plate and theft resistant screws. (ASI has a snap-on flange cover)
    - a. Straight grab bar (Bobrick B-6806 or ASI 3801)
- C. Feminine napkin disposal  
(Bobrick B-270 or ASI Type 20852) surface mounted
- D. Robe hook  
(Bobrick B-6707 or ASI Type 7340)

#### 2.03 MATERIALS

- A. Sheet Steel: ASTM A366, cold rolled stretcher leveled; 125 oz/sq. ft. galvanized coating.
- B. Stainless Steel Sheet: ASTM A167, commercial grade, 22 gauge.
- C. Stainless Steel Tubing: ASTM A269, commercial grade, seamless welded.
- D. Adhesive: Epoxy type contact cement.

- E. Fasteners, Screws, and Bolts: Hot dip galvanized. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

## 2.04 FINISHING

- A. All accessories shall be stainless steel with a satin finish except if specified otherwise in the schedule.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Provide rough-in dimensions and/or templates to site as required.
- B. Verify exact location of accessories with the Architect prior to installation.
- C. Provide all blocking, backup, anchors, mounting kits, etc. as required to install accessories.

### 3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's specifications and instructions.
- B. Install accessories plumb, square and level.
- C. Accessories shall be anchored securely.
- D. All items shall be attached with theft resistant fasteners.

### 3.03 CLEANING

- A. Clean work under provisions of Section 01 70 00.
- B. Protective plastic cover shall remain on accessories until all finishes and tile cleaning is completed.
- C. Upon installation and cleaning by all other trades, the protective covers may be removed and the accessories cleaned as recommended by the manufacturer.
- D. Do not use steel wool or other abrasives on stainless steel.

### 3.04 ACCESSORY SCHEDULE

#### Lavatory Room 101

|   |                           |                                                 |
|---|---------------------------|-------------------------------------------------|
| 1 | mirror 18"W x 36"H        |                                                 |
| 1 | 42" grab bar              |                                                 |
| 1 | 36" grab bar              |                                                 |
| 1 | 18" grab bar              |                                                 |
| 1 | feminine napkin disposal  |                                                 |
| 1 | Robe hook on back of door |                                                 |
| 1 | paper towel dispenser     | (Provided by Owner and installed by Contractor) |
| 1 | soap dispenser            | (Provided by Owner and installed by Contractor) |
| 1 | toilet tissue dispenser   | (Provided by Owner and installed by Contractor) |

END OF SECTION



## **SECTION 10 44 13**

### **FIRE EXTINGUISHERS & CABINETS**

#### **PART 1 - GENERAL**

- 1.01 SCOPE: Provide and install Fire Extinguisher Cabinets and Fire Extinguishers where indicated on drawings and as herein specified.

#### **PART 2 - PRODUCTS**

- 2.01 COMPONENTS: Cabinets (Architectural Series) and Extinguishers shall be as manufactured by Larsen Manufacturing Co., Minneapolis, Minnesota or an approved equal.
- A. Semi-recessed cabinets are to be Model 2409-6R, 24"x9-1/2"x6" inside box dimension with vertical duo door. (25"x10-1/2"x4" rough opening)
  - B. Surface mounted cabinets are to be Model 2409-SM, 27 1/2"x13"x6" inside box dimension with vertical duo door.
- 2.02 Door and trim are to be one piece construction with 18 gauge steel box, baked on enamel finish to be white. Door to be mounted to frame with continuous piano hinge, rubber roller catch, stainless steel glass clips, laminated safety glass and chrome-plated hardware. Provide a recessed handle.
- 2.03 Fire extinguishers (provide one per cabinet) shall be multi-purpose dry chemical extinguishers, Model No. MP-5A with UL rating 3A-40 B:C in accordance with Underwriters Standard 299.

#### **PART 3 - EXECUTION**

- 3.01 INSTALLATION: Install extinguishers in walls where indicated on contract drawings. Fasten and secure in conformance with the recommendations of the manufacturer. Install cabinets in accordance with state accessibility code. The cabinet handle should be a maximum of 48" above the floor for extinguisher cabinets. The distance from the floor to the top of the fire extinguisher should be a maximum of 5'-0".

END OF SECTION

## **DIVISION 11**

## **SECTION 11 06 00**

### **MISCELLANEOUS EQUIPMENT AND PRODUCTS**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Miscellaneous equipment not requiring a separate specification section.

##### **1.02 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
- B. Submit shop drawings, product data, and samples as required.

##### **1.03 OPERATION AND MAINTENANCE DATA**

- A. Submit under provisions of Section 01 78 00.

##### **1.04 QUALIFICATIONS**

- A. The manufacturer and installer's companies must have specialized in the products specified in this section with a minimum of 3 years documented experience.
- B. The installer must be approved by the manufacturer.

##### **1.05 REGULATORY REQUIREMENTS**

- A. The product and installation of product shall comply with all Local, State, and Federal codes.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00.

##### **1.07 FIELD MEASUREMENTS**

- A. Field verify all dimensions prior to fabrication of product.

##### **1.08 COORDINATION**

- A. Coordinate work under provisions of Section 01 31 00.
- B. Coordinate installation of product with other trades.

##### **1.09 WARRANTY**

- A. Provide warranty under provisions of Section 01 78 00.
- B. Provide standard length manufacturer's warranties with a minimum one year warranty.

---

## **PART 2 - PRODUCTS**

### 2.01 MANUFACTURERS

- A. Provide manufacturer and product specified in schedule.
- B. Substitutions: Under provisions of Section 01 60 00.

### 2.02 FINISHES

- A. Finish shall be as specified in schedule.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. Field verify all dimensions prior to product purchase or fabrication.
- B. Verify and coordinate any possible obstructions. Notify architect of any inconsistencies prior to fabrication.

### 3.02 PREPARATION

- A. Prepare all surfaces and/openings as required to accept product.

### 3.03 INSTALLATION

- A. Install product in accordance with manufacturer's specifications and instructions.
- B. Install product plumb, square, and level.

### 3.04 CLEANING

- A. Clean work under provisions of Section 01 70 00.

### 3.05 DEMONSTRATION

- A. Provide demonstration under provisions of Section 01 70 00.

### 3.06 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01 70 00.

### 3.07 SCHEDULE

#### A. COAT HOOK RACK

Basis-of-Design Product: Subject to compliance with requirements, provide the following or equal

1. Manufacturer; Bobrick
2. Model: B-232 x 24
3. Quantity: One (1)
4. Type 304, Stainless steel with satin finish.
5. Wall mounted. The unit has three, double hooks.
6. Mounting should be no more than 48 inches above finish floor to top of rack.
7. See drawings for location. Verify final location with Architect prior to installation.

END OF SECTION

## **DIVISION 12**

## **SECTION 12 24 13**

### **ROLL-UP WINDOW SHADES**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Section includes: Manually operated, roll-up fabric window shades including mounting and operating hardware.

##### **1.02 SUBMITTALS**

- A. Submit under provisions of Section 01 33 00.
  - 1. List of proposed products and product data.
  - 2. Shop drawings showing window openings, dimensions, and attachment method.
  - 3. Samples of fabrics and metal finishes.
  - 4. Window Shade Schedule listing rooms, field verified window dimensions, quantities, type of shade, fabric, and color.
  - 5. Manufacturer's installation and maintenance instructions.

##### **1.03 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum of five years documented experience.

##### **1.04 REGULATORY REQUIREMENTS**

- A. Conform to all applicable Federal, State and local codes and laws.
- B. Fabric must meet state fire retardant requirements.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- C. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- D. Label containers and shades according to Window Shade Schedule.

## 1.06 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on drawings. Any inconsistencies shall be reported to the architect prior to installation.

## 1.07 WARRANTY

- A. Provide under provisions of Section 01 78 00: 5 years warranty against defects in materials and workmanship for clutch operating mechanism.

## **PARTS 2 - PRODUCTS**

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Draper, Inc.
  - 1. Model: Clutch Operated FlexShade
- B. Substitutions: Under provisions of Section 01 60 00.

### 2.02 MANUALLY OPERATED WINDOW SHADES

- A. Type: Manually operated, vertical roll-up, fabric window shade with bead chain and clutch operating mechanism, mounting brackets, fasteners, and other components necessary for complete installation.
- B. Method of installation: Mounted inside of window opening and extending from head to sill and jamb to jamb.
- C. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide preset limit stops to prevent shade from being raised or lowered too far.
  - 1. Clutch mechanism: Fabricated from high carbon steel and molded fiberglass reinforced polyester or injected molded nylon.
  - 2. Control Loop: Stainless steel bead chain hanging at side of window.  
NOTE: Provide spring-loaded chain tension device with each loop.
  - 2. Chain location: Right hand side when facing window from interior.
- D. Shade size: As required for size of windows indicated on Drawings. Verify dimensions of windows at site prior to fabrication.
- E. Roller: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Provide roller idler assembly of molded nylon and zinc-plated steel pin. Provide sliding pin to allow easy installation and removal of roller.



- F. Brackets: Plated stamped steel suitable for mounting to wall or jamb. Provide size compatible with roller size and with fasteners appropriate for installation conditions. Provide bracket covers. Color selected by Architect.
- G. Provide 3 7/8" fascia with associated endcaps. Color as selected by Architect from manufacturer's standard colors.
- H. Shade slat: Minimum 1/8 by 1 inch aluminum slat encased in heat sealed hem and sealed ends.

## 2.03 FABRIC

- A. Light Filtering Material:  
Draper Phifer Series SheerWeave Fabric SW2400. Meets NFPA 701 fire rating.
  - 1. PVC coated fiberglass, woven into a full. 35% fiberglass, 65% vinyl on fiberglass.  
Openness 3%.  
Average 11.25 oz./ sq. yd., .017" thick.
- B. Color: As selected by Architect from manufacturer's standard colors.

## **PART 3 - EXECUTION**

### 3.01 PREPARATION

- A. Field verify window dimensions prior to fabrication.
- B. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

### 3.02 INSTALLATION

- A. Install window shades at locations indicated in window shade schedule and approved shop drawings.
- B. Install in accordance with shade manufacturer's written instructions and approved shop drawings.

### 3.03 ADJUSTING AND CLEANING

- A. Operate shade through complete cycle of lowering, stopping, and rising to ensure proper operation. Adjust as required for smooth operation.
- B. Clean shade assemblies and protect from damage from construction operations. If damage occurs, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.
- C. Clean under provisions of Section 01 70 00.

3.04 PROTECTION OF FINISHED WORK

- A. Protect finished product and work under provisions of Section 01 70 00.

3.05 WINDOW SHADE SCHEDULE

- A. Provide shades full height on all exterior windows in Office 100.

END OF SECTION

## **SECTION 12 32 16**

### **PLASTIC LAMINATE CASEWORK**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. Related Documents:  
The Drawings and general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 Requirements, apply to the work in this Section.

##### **1.02 SECTION INCLUDES**

- A. Provide and install all plastic laminate casework, countertops and accessory items as specified herein. Refer to plans for specific details and requirements.

##### **1.03 RELATED SECTIONS**

- A. Section 06 20 10 – Carpentry and Millwork
- B. Section 09 65 00 - Resilient Flooring

##### **1.04 SUBMITTALS**

- A. Submit product data, design data and test reports under provisions of Section 01 33 00.
- B. Submit shop drawings indicating materials, dimensions, and cabinet-cut details.
- C. Samples of colors shall be submitted for selection and coordination with other suppliers. Architect may request and retain samples and catalog cuts as required for accessory and special items.
- D. Full-sized sample of base cabinet with door and drawer. Also include countertop all of which is to be submitted for review and retained until completion of job for verification and compliance of specifications.
- E. Sustainable Building Material Submittal:
  - 1. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content.
  - 2. Identify each regional material along with the location of its harvest, extraction, or manufacture.

##### **1.05 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum five years documented experience approved by the manufacturer.

##### **1.06 REGULATORY REQUIREMENTS**

- A. Conform to all local, state, and federal codes.
- B. Conform to the State Building Code requirements for accessibility. The following special requirements shall be met, unless noted otherwise on the architectural drawings.
  - 1. Countertop height: With or without cabinet below, not to exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 24 inches.
  - 2. Kneespace clearance: Shall be minimum 29 inches A.F.F. at apron, and 30 inches clear span width.
  - 3. 12 inch deep shelving, adjustable or fixed: Not to exceed a range from 9 inches A.F.F. to 48 inches A.F.F.
  - 4. Wardrobe cabinets: Shall be furnished with rod/shelf adjustable to 48 inches A.F.F. at a maximum 21 inch shelf depth.
  - 5. Sink cabinet clearances: In addition to above, upper kneespace frontal depth shall be no less than 8 inches, and lower toe frontal depth shall be no less than 11 inches, at a point 9 inches A.F.F.
  - 6. Provide a removable angled knee panel at all accessible sinks

#### 1.07 PERFORMANCE REQUIREMENTS

- A. The cabinets shall meet certified product test data in accordance with ANSI A161.1-1980, NEMA LD3-2000, and general static load testing performed and certified by an independent testing agency, covering the following areas of product performance, with these minimum results:
  - 1. Base cabinet construction/racking test: 800 lbs.
  - 2. Cabinet front joint loading test: 425 lbs.
  - 3. Wall cabinet static load test: 2,000 lbs.
  - 4. Drawer front joint loading test: 600 lbs.
  - 5. Drawer construction/static load test: 750 lbs.
  - 6. Cabinet adjustable shelf support device/static load test: 300 lbs.
- B. Lamination System: Doors, finished end panels, and other decorative exterior laminate surfaces shall be laminated exterior with .030 inch high-pressure plastic laminate, and interior with .020 inch high-pressure cabinet liner. Lamination with hybrid P.V.A. Type III water resistant adhesive.
- C. Structural Cabinet Body: Cabinet backs shall be minimum 1/2 inch thick, inset from rear of body, and fully bound (dadoed) four sides. Provide 3/4 inch thick stiffeners fastened to back/body as specified herein. Back perimeter shall be toe-nailed with mechanical fasteners for tight interior fitment and direct connection of back panel to body, and sealed with full-perimeter high-strength hot-melt adhesive.
- D. Interior Structure: All cabinets over 36 inches wide shall be furnished with a mechanically fastened, yet removable, vertical divider to reduce horizontal member/shelf deflection. Wall cabinets shall have a clear inside nominal depth of 12 inches unless detailed otherwise.
- E. Shelf Loading: Shelves shall meet the loading/deflection standards of the National Particleboard Association.
- F. Structural Drawer Body: Drawer body shall be doweled with 1/2 inch typical bottom, recessed, fully bound (dadoed) and joint-glued all four sides. Provide under body stiffeners as specified herein.

- G. Structural Cabinet Support: Cabinet sub-base shall be of a separate and continuous ladder-type platform design, leveled and floor mounted prior to cabinet body placement. Material shall be exterior grade plywood. No cabinet sides-to-floor will be allowed.
- H. Quality Standard: Comply with the requirements for modular cabinets in AWI's "Architectural Woodwork Quality Standards."
  - 1. Provide AWI Quality Certification Program labels and certificate indicating that manufactured wood casework complies with requirements.
- I. Formaldehyde binders are not allowed.
- J. All adhesives are to be low VOC.

#### 1.08 DELIVERY, STORAGE HANDLING

- A. Deliver, store, protect and handle products at and to site under provisions of Section 01 60 00.
- B. Casework shall be protected in transit. Store under cover in a ventilated building not exposed to weather or extreme temperature and humidity changes. Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

#### 1.09 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on the shop drawings prior to fabrication.

#### 1.10 COORDINATION

- A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items under provisions of Section 01 31 00.

#### 1.11 WARRANTY

- A. Provide warranty under provisions of Section 01 78 00.
- B. All materials shall be guaranteed for a period of 5 years from manufacturer's defects and workmanship.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements of this Specification Section, provide products listed herein from one of the following:
  - 1. Case Systems
  - 2. Stevens Industries
  - 3. Product custom manufactured to the specifications noted herein.
- B. Basis of Design: Stevens Industries

C. Substitutions: Under provisions of Section 01 60 00.

## 2.02 MATERIALS

### A. Laminated Plastics/Finishes:

1. High-pressure plastic laminate, .030 inch in thickness, for exterior surfaces shall meet NEMA LD3-2000 VGL standards including thickness.
2. High-pressure plastic laminate color Selection Available:
  - a. Standard finish from casework manufacturer's standard stock colors. Minimum of 200 selections available.
  - b. Unlimited number of different colors and patterns allowed per project. Number of colors and patterns to be determined by Architect and included in color schedule.
3. Plastic Laminate Balancing Sheet: White high-pressure cabinet-liner, .020 inch in thickness shall meet NEMA LD3-2000 CLS standards. Use for balancing exterior surface laminates.
4. Countertop High-Pressure Plastic Laminate:
  - a. High-pressure plastic laminate, .050 inch thickness Color as selected from manufacturer's stock standard patterns and solid colors.
  - b. Heavy gauge neutral colored backing sheet for balanced construction.
5. Pressure Fused Laminate:
  - a. Melamine resin impregnated, 120 gram PSM minimum, thermofused to core under pressure.
  - b. Shall meet NEMA LD3-2000 VGL standards and NEMA LD3-2000 CLS standards.
  - c. White pressure fused laminate for cabinet interiors behind door and drawers, and underside of wall cabinets.
  - d. Shall be balanced at all concealed surfaces with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.

### B. Core:

1. Particleboard to be of 47 lb. density, and balanced 3-ply construction with moisture content not to exceed 8%. Particle board shall conform to ANSI A208.1-1993, type M-3.
2. Cabinet components shall be of the following minimum core thicknesses:
  - a. 1/2 inch: cabinet backs, drawer body, and drawer bottoms.
  - b. 3/4 inch: door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hangstrips, structural dividers, exposed cabinet backs, and shelves in cabinets.
  - c. 1 inch: product-specific work surfaces and library stack shelving unless stack is fitted with vertical divider.

- C. Edging types:
1. FlatEdge PVC. .020 inch. Solid, high-impact, purified, color-thru, acid resistant PVC edging machine-applied with hot melt adhesives, automatically trimmed face, back and corners for uniform appearance. Manufacturer's option of .030 inch high-pressure plastic laminate if PVC match is unavailable.
  2. 3 mm thick PVC. Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, automatically trimmed, inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design.
- D. Edging Locations. Provide the above specified edging types at the following locations.
1. Door/Drawer-Front edging: 3mm PVC  
Color and pattern of PVC is to match the color and pattern of the adjacent plastic laminate casework doors and drawers. Submit sample to be approved by Architect.
  2. Cabinet body edge, including door/drawer front spacer rail: FlatEdge PVC. Color selected from standard colors.
  3. Forward edge of interior body components, interior dividers, shelf, and top edges of drawer body: FlatEdge PVC to match cabinet interior surface color. FlatEdge PVC is to be on all six surfaces of interior adjustable shelving.
- E. Hardware
1. Hinges:
    - a. Heavy duty, five knuckle 2 3/4 inch institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, Teflon coated tight pin feature with all edges eased. Hinge shall be full wrap around type .095 inch thick steel. Each hinge shall have minimum of 9 screws, #7, 5/8 inch FHMS to assure positive door attachment.
    - b. Hinge finish shall be nickel.
    - c. One pair per door to 48 inch height, One and one-half pair over 48 inches in height. Hinge shall accommodate 13/16" thick laminated door and allow 270 degree swing.
  2. Pulls:
    - a. Stainless steel wire pull. 4" wide, 5/16" diameter, brushed or satin finish.
  3. Drawer Slides:
    - a. Provide Knap & Vogt model 8417 (or equal), full extension, self-closing design with in & out positive stop, ball bearing, anachrome finish.  
Minimum 100 lb dynamic load rating at 50,000 cycles.
  4. Catches: Catch shall provide opening resistance in compliance with the Americans with Disabilities Act.
    - a. Provide top-mounted magnetic catch at each base and wall cabinet door.
    - b. Provide two magnetic catches at each tall cabinet door.
    - c. Provide one magnetic catch on both leafs of double door base and wall cabinets.
    - d. Catch housing shall be molded in White.

5. Adjustable Shelf Supports: Shall be LH-354.1 by LSI white plastic, twin pin design with anti tip-up shelf restraints for both 3/4 inch and 1 inch shelves. Design shall include keel to retard shelf slide-off, and slot for ability to mechanically attach shelf to clip. Load rating shall be minimum 300 lbs. each support without failure. Cabinet interior sides shall be flush, without shelf system permanent projection.

F. Detailed Requirements for Cabinet Construction:

1. Sub-Base:
  - a. Cabinet sub-base shall be separate and continuous (no cabinet body sides-to-floor), water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type jobsite construction of individual front, back, and intermediates, are to form a secure and level platform to which cabinets attach.
  - b. Sub-base at exposed cabinet end panels shall be recessed 1/4 inch from face of finished end, for flush installation of finished base material by other trades.
2. Cabinet Top and Bottom:
  - a. Solid sub-top shall be furnished for all base and tall cabinets.
  - b. At cabinets over 36 inches, bottoms and tops shall be mechanically joined by a fixed divider.
  - c. Exterior exposed wall cabinet bottoms shall be Pressure Fused white laminate both sides. Assembly devices shall be concealed on bottom side of wall cabinets.
3. Cabinet Ends:
  - a. Holes drilled for adjustable shelves 1 1/4 inches on center.
  - b. Exposed exterior cabinet ends shall be laminated with high-pressure plastic laminate, balanced with high-pressure cabinet-liner interior surface.
4. Fixed and Adjustable Shelves:
  - a. Thickness shall be 3/4 inch.
  - b. All shelves are to be full depth of cabinet.
5. Cabinet Backs:
  - a. Cabinet back shall be fully bound (dadoed) into sides, top, and bottom, recessed 7/8 inch from cabinet rear. Rear, unexposed, side of back shall be toe-nailed to cabinet body with mechanical fasteners and solidified with a continuous bead of industrial grade hot melt adhesive.
  - b. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of 2 at base, 2 at wall, and 3 at tall cabinets.
  - c. Exposed exterior backs shall be high-pressure plastic laminate balanced with high-pressure cabinet-liner.
6. Door and Drawer Fronts:
  - a. Laminated door and drawer fronts shall be 13/16 inch thick for all hinged and sliding doors. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8 inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
  - b. Stile and Rail doors shall be 13/16 inch thick with full 1/4 inch plate glass. Available hinged or sliding. All exposed lite-opening edges shall be trimmed and glazed with extruded glazing bead.



7. Drawers:
  - a. Drawer fronts shall be applied to separate drawer body component sub-front.
  - b. Drawer sides shall be doweled and glued to receive front and back, machine squared and held under pressure, to set.
  - c. Drawer bottom shall be fully bound (dadoed) into front, sides, and back. Routing, in drawer body for bottom, shall receive continuous glue. Reinforce drawer bottoms with 1/2 inch x 4 inch front-to-back intermediate underbody stiffeners, mechanically fastened. One at 24 inches, two at 36 inches, and over.
8. Vertical and Horizontal Dividers: One of the following as indicated by cabinet number:
  - a. Natural hardboard 1/4 inch thick, smooth both faces. Secured in cabinet with molded plastic clips.
  - b. Pressure Fused laminate 3/4 inch thickness. Sub-dividers secured in cabinet with molded plastic clips or dowels. Structural dividers in cabinets over 36 inches wide secured in cabinet with mechanical euro fasteners.
9. Door/Drawer Front Rail: Provide minimum 3/4 inch x 6 inch x full width cabinet body rails immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, close off reveal, and be locator for lock strikes.

G. Workmanship:

1. All exposed exterior cabinet surfaces shall be .030 inch high-pressure laminate, color as selected from casework manufacturer's standards. Laminate surface/balancing liner to core under controlled conditions by approved and regulated laminating methods to assure a premium lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or environmentally hazardous ingredients, are required. Methods requiring heat are not allowed; "contact" methods of laminating are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panel shall be fully bound (dadoed) into, and recessed 7/8 inch from the back of cabinet sides, top, and bottom to insure rigidity and a fully closed cabinet. Cabinet back shall be mechanically fastened from rear of body for tight interior fit and sealed with full-perimeter high-strength hot-melt adhesive.
4. Drawer bottom shall be fully bound (dadoed) and glued into and recessed 1/2 inch up from the bottom of sides, back, and sub-front. Sides of drawer shall be doweled to receive drawer back and sub-front.
5. 3/4 inch thick hang rails shall be mechanically fastened to end panels of all wall, base, and tall cabinets for extra rigidity and to facilitate installation.
6. All cases shall be square, plumb, and true.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.
- B. Verify site dimensions of cabinet locations in building prior to fabrication.

#### **3.02 INSTALLATION**

- A. Install casework in accordance with manufacturer's instructions.
- B. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.
- C. Install all items complete and adjust all moving parts to operate properly.
- D. Leave surfaces clean and free from defects at time of final acceptance.
- E. Rubber or plastic coved base is to be installed at toe space of base cabinets. Color and material is to match base on adjacent walls unless noted otherwise.

#### **3.03 MANUFACTURER'S FIELD SERVICES**

- A. Install casework under the supervision of the manufacturer's representative.

#### **3.04 CLEANING**

- A. Clean work under provisions of Section 01 70 00.
- B. Remove all cartons, debris, sawdust, scraps, etc. and leave spaces clean and all casework ready for Owner's Use.

#### **3.05 PROTECTION OF FINISHED WORK**

- A. Protect finished work under provisions of Section 01 70 00.

END OF SECTION

## **DIVISION 22**

## SECTION 220000

### PLUMBING

#### PART I -- GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.
- B. Bidders shall utilize a complete set of Bidding Documents in preparing of Bid including Drawings and Specifications. The Engineer assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- C. Coordinate work with that of all other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

##### 1.2 DEFINITIONS

- A. As used in the drawings and specifications for plumbing work, certain non-technical words shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions of other documents governing the plumbing work.
- B. As used in this section, "provide" means "furnish and install", and "POS" means "Provided under Other Sections".
- C. "Approved Equal" means any equipment or material, which is approved by the engineer, and equal in quality, durability, appearance, strength, design and performance to the equipment or material originally specified.
- D. "Alternate" means an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
- E. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
- F. "Concealed" means hidden in chases, furred spaces, walls, above ceilings or enclosed in construction.
- G. "Contractor and/or Subcontractor" specifically means, the Plumbing Subcontractor working under this Section of the Specification.
- H. "Exposed" means visible, in sight, or not installed "concealed" as defined above.
- I. "Furnish" or "Provide" means:
  - 1. Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the plumbing work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased item(s) are free of all liens, claims, or encumbrances.
  - 2. To supply, erect, install and connect in complete readiness for operation, the particular work referred to, unless otherwise specified.

- J. "Install" means: Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the plumbing work.
- K. "May" means: A permissive term.
- L. "New" means: Manufactured within the past two (2) years and never before used.
- M. "Piping" means all piping including fittings, joints, hangers, supports and valves.
- N. "Provide" means: "Furnish" and "Install".
- O. "Shall" means: A mandatory term.
- P. "Underground or Below Slab" means piping that is buried exterior to or within the building.
- Q. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any plumbing item in the drawings or specifications for plumbing work carries with it the instruction to furnish, install and connect the item as part of the plumbing work, regardless of whether or not this instruction is explicitly stated.
- R. It shall be understood that the specifications and drawings for plumbing work are complimentary and are to be taken together for a complete interpretation of the plumbing work except that indications on the drawings, which refer to an individual element of work, take precedence over the specifications where they conflict with same.

### 1.3 SUMMARY

- A. This section addresses materials and methods common to more than one Subcontractor. Refer to the drawings to determine the extent of work required of each individual trade.

### 1.4 DESCRIPTION OF WORK

- A. The work described herein shall be interpreted as work to be done by the Plumbing Subcontractor. Work to be performed by other trades will be specifically referenced to a particular Contractor or Subcontractor.
- B. The work under this section shall consist of furnishing all labor, materials, equipment, supervision, transportation, construction, facilities, devices and incidentals necessary to provide complete plumbing systems as hereinafter described and as indicated on the drawings, including, but not limited to the following:
  - 1. Domestic cold water system.
  - 2. Domestic hot water system.
  - 3. Sanitary, waste and vent system.
  - 4. Coordination drawings.
  - 5. Electrical power 24 volt copper power wiring.

### 1.5 RELATED WORK IN OTHER SECTIONS

- A. The following work is not included as work in this Section and is to be performed under other Sections:
  - 1. Heating, Ventilating and Air Conditioning
  - 2. Electrical power 120 volt and above
  - 3. Utilities Beyond 5'-0" from the Building
  - 4. Excavation and Backfilling

5. Foundations and Trenching
6. Temporary Light and Power
7. Temporary Water, Heat, Fire Protection, and Toilet Facilities
8. Flashing and Caulking
9. All Cutting and Patching
10. Painting
11. Self contained emergency safety equipment.
12. Toilet Room Accessories

#### 1.6 CODES, ORDINANCES, AND PERMITS

- A. All materials and workmanship shall comply with the latest editions of all applicable Codes, Local and State Ordinances, Industry Standards, and Regulations.
- B. Where the contract documents indicate more stringent requirements than the following codes and ordinances, the contract documents shall take precedence.
- C. In the event of a conflict with Codes, the most stringent requirements shall apply.
- D. The Plumbing Subcontractor shall notify the Architect/Engineer of any discrepancies between the Contract Documents and applicable Codes, Standards, etc.
- E. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section.
- F. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings, in addition to contract drawings and documents in order to comply with all applicable local ordinances and regulations, whether or not shown on drawings and/or specified.
- G. The following Codes, Standards and References shall be utilized as applicable:
  1. Rhode Island Building Code SBC-1-2021  
Incorporates 2018 International Building Code
  2. Rhode Island Plumbing Code SBC-3-2021  
Incorporates 2018 International Plumbing Code
  3. Rhode Island Energy Conservation Code SBC-8-2024  
Incorporated 2024 International Energy Conservation Code
  4. 2017 International Code Council A117.1 Accessible and Usable Buildings and Facilities
  5. 2018 Rhode Island Fire Safety Code
  6. Regulations of East Providence Water Utilities Division
  7. Local Ordinances, Board of Health requirements and Regulations.
  8. American Gas Association (AGA).
  9. American National Standards Institute (ANSI).
  10. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
  11. American Society of Mechanical Engineers (ASME).
  12. American Society of Testing Materials (ASTM).

13. American Welding Society (AWS).
14. Cast Iron Soil Pipe Institute (CISPI)
15. Commercial Standards, U.S. Department of Commerce (CS).
16. Department of Environmental Protection (DEP).
17. Environmental Protection Agency (EPA).
18. Factory Mutual (FM).
19. Industrial Risk Insurers (IRI).
20. Insurance Services Organization (ISO).
21. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS).
22. National Electric Code (NEC).
23. National Electrical Manufacturers Association (NEMA).
24. National Fire Protection Association (NFPA).
25. Occupational Safety and Health Administration (OSHA)
26. Owner's Insurance Company Requirements.
27. State Department of Public Safety.
28. Underwriters' Laboratories, Inc. (UL).

#### 1.7 CONTRACT DRAWINGS AND SPECIFICATIONS

- A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before proper execution of the work.
- B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.

#### 1.8 OBTAINING INFORMATION

- A. Obtain from the manufacturer the proper method of installation and connection of the equipment that is to be furnished and installed. Obtain all information that is necessary to facilitate the work and to complete the project.
- B. Prior to performing any new work, uncover, locate and determine the routing, size, material and direction of slope of all existing systems to be connected to.

#### 1.9 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The Contract Drawings are diagrammatic only intending to indicate general routing and location of piping and equipment. The Drawings are not intended to show every offset and accessory required, nor every structural difficulty that may be encountered.

- B. Where requirements of the applicable codes, plans and/or specifications are in conflict, the most stringent requirement will be included in the Contract. Prior to ordering and/or installing any portion of the work which appears to be in conflict, the work shall be brought to the Architect/Engineer's attention for direction as to what is provided.
- C. Final location of plumbing fixtures and other pieces of equipment, whether or not furnished by the Plumbing Subcontractor, requiring plumbing services shall be coordinated with the Architectural Plans. Additional offsets, fittings, etc., shall be provided as needed to meet this requirement at no extra cost to the Owner.
- D. If discrepancies exist in the scope of work as to what trade provides items, they shall be reported to the Architect/Engineer prior to signing the Contract. If the discrepancies are not reported, the Plumbing Subcontractor shall furnish such items as needed for a complete and operable system.
- E. All work shall be installed in cooperation with other trades.
- F. Keep fully informed as to the shape, size and position of all openings required for all apparatus and give information in advance to build openings into the work. Furnish and set in place all sleeves, pockets, supports and incidentals.
- G. All distribution systems which require pitch or slope such as plumbing drains, steam and condensate piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.
- H. Prepare and submit for review, coordinated Plans and sections, clearly showing how the work is to be installed in relation to the work of other trades. Work that is installed before coordination with other trades, or that causes interference with the work of other trades shall be changed to correct condition.
- I. The Plumbing Contractor shall pay for all permits, inspections, labor, material and fees associated with the various Utility Companies coordination requirements mentioned in this section and for this Contractor's work under this project.
- J. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structural and other trades and to meet Architectural requirements.
- K. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the plumbing work shall interfere with the work of other trades, assist in working out the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owners, make reasonable modifications to the work as required by normal structural interferences. Pay the General Contractor for additional openings, or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.
- L. If any plumbing work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the trades involved without extra cost to the Owners.
- M. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect and Engineer for review and approval.



#### 1.10 UTILITY COMPANY COORDINATION

A. This section includes, but is not limited to coordination with the following utilities, agencies and authorities having jurisdiction:

1. Water Department: This Contractor shall coordinate with the local water department and provide all material & labor required to comply with the utility. Notify Engineer of discrepancies between the plans and the local utility company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the utility company, but corrections shall be made.
2. Sewer Department: This Contractor shall coordinate with the local sewer department and provide all material & labor required to comply with the utility. Notify Engineer of discrepancies between the plans and the local utility company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the utility company, but corrections shall be made.
3. Natural Gas: This Contractor shall coordinate with the local natural gas supplier and provide all material & labor required to comply with the utility. Notify Engineer of discrepancies between the plans and the local utility company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the utility company, but corrections shall be made.
4. Plumbing Inspector: Review plans and specifications with the local plumbing inspector. Obtain and pay for all permits.
5. Building Inspector: Review plans and specifications with the local building inspector, if not done so by the General Contractor.
6. OSHA Representative: Review plans and specifications with the local OSHA representative, if not done so by the General Contractor.
7. Dig Safe: This contractor shall notify and coordinate with Dig Safe prior to any excavation; digging; trenching; grading; tunneling; augering; boring; drilling; pile driving; plowing-in or pulling-in pipe or other sub-structure; backfilling; demolition; and blasting related to this Contractor.

#### 1.11 BIDDER'S REPRESENTATION

A. By the act of submitting a bid for the proposed contract, the Bidder represents that:

1. The Bidder and all subcontractors have carefully and thoroughly reviewed the drawings, specifications and other construction contract documents and have found them complete and free from ambiguities and sufficient for the purpose intended; further that.
2. The Bidder intends to use are licensed, skilled and experienced in the type of construction represented by the construction contract documents bid upon; further that.
3. Neither the Bidder nor any of the Bidder's employees, agents, intended suppliers or subcontractors have relied upon any verbal representations, allegedly authorized or unauthorized from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that
4. The bid figure is based solely upon the construction contract documents and properly issued written addenda and not upon any other written representation.

#### 1.12 SHOP DRAWINGS

- A. Within thirty (30) days after the date of notice to proceed, and before purchasing any materials or equipment, submit for approval a complete itemized list, in six (6) copies, of all materials, equipment and of Subcontractors to be incorporated under this Section.
- B. After approval of the list, submit for review a minimum of eight (8) sets of detailed shop drawings. All shop drawings for equipment submitted for review shall include complete Specifications, including type of materials, operating pressures and temperatures, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete for all equipment and shall apply only to this specific project.
- C. All shop drawing submittals shall be complete and include all Part 2 – Products of this specification and be clearly identified. No consideration will be given to partial submittals, except with prior approval.
- D. Facsimiles of any type will not be accepted.
- E. A written letter from the Plumbing Contractor stating all piping systems above and below ground specified herein have been tested, flushed and approved by the Local Plumbing Inspector.
- F. A written letter from the Plumbing Contractor stating all water piping systems above and below ground specified herein have been sterilized, flushed and approved by the Local Plumbing Inspector.
- G. Provide test certificates, registration forms, diagrams, plans, details, permits, etc. for all backflow devices, as specified herein with a written cover letter from a certified backflow protection device tester stating that all testable backflow devices have been tested.
- H. A written letter, stamped and signed by a Registered Structural Engineer, confirming that the pipe hanger system meets the state seismic code requirements.
- I. A written cover letter, attached to the insulation materials submittals, from the Insulation Contractor stating an outline for all insulating materials furnished and installed for all piping systems specified herein.
- J. If foreign materials are used, Engineer shall be informed in writing together with any information about them he requires for approval.
- K. Engineering Design Service's reserves the right to request additional submittals on any item not specified herein under this section.
- L. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist.
- M. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, same shall be provided. Plumbing Subcontractor to assume cost and entire responsibility thereof.
- N. Regardless of any information included in the shop drawing submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the shop drawing review.
- O. Each submittal shall be reviewed, stamped and certified prior to submission to the Architect. Such certification shall be made by the Owner, or Corporate Officer of the Contractor, or by a person duly authorized by the Owner to sign binding agreements for the Contractor. The certification shall state that data and details contained on each shop drawing, layout drawing, catalog data and brochure has been reviewed by the Contractor and that it complies with the

Contract Documents in all respects. Shop drawings, layout drawings, catalog data and brochures will not be reviewed and will be returned to the Contractor unchecked unless they are certified.

- P. It is intended that the Contractor submit complete and accurate data at the first submission. If the shop drawing is returned marked "Does not Conform", or "Resubmit For Final Review", only one (1) additional submission will be permitted.
- Q. Equipment shall be of proper size for its allotted space. Equipment shall be disassembled as required, without invalidating the manufacturer's warranty, so that it can be installed through regular window, door and/or louver openings.
- R. The shop drawings and manufacturer's data shall be submitted in a timely manner sufficiently in advance to give ample time for checking, correcting, resubmitting and rechecking if necessary. No claim for delay will be granted for failure to comply with this requirement.
- S. A minimum period of two (2) weeks, exclusive of transmittal time, will be required in the Engineer's office each time shop drawings, layout drawings and catalog data and brochures are submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling his work.

#### 1.13 EXCAVATION AND BACKFILL

- A. Pipe bedding shall be in accordance with provisions of sections on excavation and backfill. Work under this section shall commence only after proper bedding material has been provided, graded and properly compacted. Excavation shall be kept open until system has been inspected, tested and approved.
- B. The Plumbing Contractor shall observe all excavation, backfilling and compaction of all underground piping associated with work under this section.

#### 1.14 RECORD DRAWINGS

- A. All costs related to the following requirements shall be paid for by this Subcontractor.
- B. Purchase and maintain at the job site a complete and separate black line set of prints of the Contract Drawings on which accurately indicate daily progress by coloring materials and apparatus as installed. Schedules shall be modified to reflect data consistent with that of the installed equipment. Clearly show all changes to the work as a result of change orders, instructions issued by the Architect or conditions encountered in the field. Accurately indicate the location, size, type and elevation of new utilities and their relationship to existing utilities.
- C. The marked up and colored in prints will be used as a guide for determining the progress of the work installed. They shall be inspected weekly and shall be corrected immediately if found inaccurate or incomplete. Requisitions for payment will not be approved until the Drawings are accurate and up-to-date.
- D. At the completion of the work, submit one (1) set of marked up prints for review and comment. After review and comment, these marked up prints shall be used in the preparation of the Record Drawings. The Record Drawings shall consist of these prints (corrected) previously indicated, as well as two (2) CAD disks of the Final Coordination Drawings, corrected on the basis of the Architect/Engineer's final comments.
- E. Obtain and pay for one (1) set of reproducible mylars and CAD disks (AutoCAD Release 2000 minimum or compatible system) applicable to this Section. Make all modifications to these reproducible as shown on the marked up prints. Remove all superseded data to show the completed installation.
- F. The Record Drawings may be made from the originals of the Contract Drawings. Arrange

with the Architect to have these reproducibles made from the originals.

- G. Deliver the completed reproducible Record Drawings and CAD disks properly titled and dated to the Architect. These Record Drawings shall become the property of the Owner.

#### 1.15 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems installed. The cost of such instructions, up to one full day of the Contractor's time, shall be included in the contract price. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the Contract Price. Included shall be a letter with two (2) copies containing the name of the person or persons to whom the instructions were given and the dates of the instruction period shall be submitted to the Architect at the completion of the project.
- B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders containing only that information which specifically applies to this project and all unrelated material shall be deleted, indexed, containing the following:
  - 1. Complete shop drawings of all material and equipment in Part 2 of this section.
  - 2. Operation descriptions of all systems.
  - 3. Provide name, address and telephone number of the manufacturer's representative and service company for each piece of equipment so that the source of replacement parts and service for each item of equipment can be readily obtainable.
  - 4. Preventative maintenance instructions for all systems.
  - 5. Spare parts list of all system components.
  - 6. Copies of all valve charts.
  - 7. During the instruction period this manual shall be used and explained.

#### 1.16 GUARANTEE

- A. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of one (1) year minimum from the date of acceptance or final payment.
- B. Any failure due to defective material, equipment or workmanship which may develop shall be corrected at no expense to the Owner, including all damage to areas, materials and other systems resulting from such failures.
- C. Upon receipt of notice from the Owner of failure of any part of the systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

#### 1.17 STORAGE OF MATERIALS

- A. Store materials prior to their installation where designated by the General Contractor. This Contractor shall be responsible for all materials stored and protect all installed equipment from injury or defacement.

#### 1.18 PROTECTION OF WORK AND PROPERTY

- A. Be responsible for the care and protection of all work included under this Section until it has been tested and accepted.
- B. Protect all equipment and materials from damage from all causes including theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment.
- C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen and make good damage thus caused.
- D. When open flame or spark producing tools such as blow torches, welding equipment, etc., are required in the process of executing the work, the General Contractor will be notified not less than twenty-four (24) hours in advance of the time that the work is to begin and the location where the work is to be performed. Provide, where necessary, fire protective covering and maintain a constant non-working fire watch where work is being performed and until it is completed.

#### 1.19 COOPERATION WITH OTHER TRADES

- A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. Coordination drawings shall be initiated under Section 23.00.00 of the Specifications. It is their responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under Section 23.00.00 of the Specifications. These drawings shall be prepared at not less than 3/8 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections 21.00.00, 22.00.00 and 26.00.00, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted. After this Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each drawing has been coordinated between trades, each trade shall sign each drawing, indicating acceptance of the installation. The HVAC Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings.
- C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.
- D. The Coordination Drawings shall be produced on AutoCAD Release 2006 minimum or compatible system. A disc and one (1) set of reproducible sepia (all-trade composite) shall be provided to the Architect/Engineer for review.
- E. The cost of preparing and reproducing these Drawings will be included as part of this Contract.
- F. Coordination Drawings shall not be construed as replacing any Shop Drawings.
- G. The Plumbing Subcontractor shall be additionally responsible for preparing drawings indicating all the buried or underground plumbing systems. Include in these documents all other underground components such as, but not limited to, underslab drainage systems, foundation drainage systems, footings, foundation walls, pits, tie beams, electric and telephone duct banks.

#### 1.20 CONTINUITY OF SERVICE AND SCHEDULING OF WORK

- A. Continuity of all services shall be maintained in all areas which will be occupied during the construction period. When an interruption of service becomes necessary, such shall be made only upon consent of the Owner and at a time outside normal working hours as he shall designate.
- B. Refer to the overall scheduling of the work of the project. Schedule work to conform to this schedule and install work to not delay nor interfere with the progress of the project.

#### 1.21 ACCESSIBILITY

- A. Assure and be responsible for the adequacy of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of the work. Cooperate with all other trades whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. Locate all equipment, which must be serviced, operated, adjusted or maintained fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, filters, dampers, starters, coils, fire dampers, smoke dampers and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility, and the engineer shall approve any change.

#### 1.22 SUBSTANTIAL COMPLETION

- A. When Subcontractor considers Work under this Section (or designated portion of Work) is substantially complete, submit written notice through the General Contractor with a list of items remaining to be completed or corrected.
- B. Should Architect and/or his Engineer observe and find Work is not substantially complete, he will promptly notify Subcontractor through the General Contractor in writing, listing observed deficiencies.
- C. Subcontractor shall remedy deficiencies and send a second written notice of substantial completion.
- D. When Architect and/or his Engineer finds work is substantially complete he will prepare a Certificate of Substantial Completion in accordance with provisions of General Conditions.

#### 1.23 FINAL COMPLETION

- A. When Subcontractor considers Work under this Section is complete, submit through the General Contractor written certification that:
  - 1. Contract documents have been reviewed.
  - 2. Work has been inspected for compliance with Contract Documents.
  - 3. Work has been completed in accordance with Contract Documents and deficiencies listed with Certificate of Substantial Completion have been corrected.
  - 4. Equipment and systems have been tested, adjusted and balanced and are fully operational.
  - 5. Operation of systems has been demonstrated to Owner's personnel.
  - 6. Work is complete and ready for Architect's and/or his Engineer's final review.
  - 7. Should Architect and/or his Engineer observe and find work incomplete, he will promptly suspend his review and notify Subcontractor in writing through the General Contractor.
  - 8. Subcontractor shall complete his work, remedy deficiencies and send a second

certification of final completion.

9. Architect and/or his Engineer shall, upon receipt of a second certification of completion, make a second review and shall notify the Subcontractor in writing through the General Contractor listing observed deficiencies.

10. When Architect and/or his Engineer finds work complete, he will consider close out submittals.

#### 1.24 REOBSERVATION

- A. Should status of completion of Work require additional services by Architect and/or his Engineer due to failure of Work to conform with Subcontractor's claims on initial Architect and/or Engineer's review for Substantial Completion or for Final Completion, Owner will deduct the amount of Architect and/or his Engineer's compensation for additional services from final payment to Subcontractor.

#### 1.25 CERTIFICATES OF APPROVAL

- A. Upon completion of all work, furnish in duplicate certificates of inspections from all inspectors and authorities having jurisdiction, notarized letters from the manufacturers stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be in satisfactory operating condition.

#### 1.26 INSPECTION AND TEST

- A. If inspection of materials and/or equipment installed shows defects, such defective materials and/or equipment shall be replaced at no cost to the General Contractor or Owner, and the inspection and tests repeated.
- B. Make all reasonable tests as required and prove the integrity of all work and leave the entire installation in correct adjustment and ready to operate.

#### 1.27 MATERIALS AND EQUIPMENT STANDARDS

- A. Where materials or equipment are specified by patent proprietary name or name of the manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Architect.
- B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified and only if the term "approved equal" appears. The request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process.
- C. If a substitution of materials or equipment in whole or in part is made, the Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.
- D. Manufacturer's directions shall be followed in the delivery, storage and installation of any equipment. Notify the Architect/Engineer, in writing, of any conflict between the Contract Drawings and the manufacturer's requirements and obtain a written response prior to proceeding with work. Should the Subcontractor fail to comply with this, he/she shall bear the costs of any corrections which may be required.
- E. The Subcontractor shall furnish and install all equipment, accessories, connections and incidentals to complete the work under this Section.
- F. As of January 4, 2014; all products installed associated with any plumbing system utilized to convey potable drinking water shall comply with the Reduction of Lead in Drinking Water

Act.

#### 1.28 EQUIPMENT DEVIATIONS

- A. Where proposals to use an item of equipment other than that specified which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the plumbing, mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Architect at the Contractor's expense.
- B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

#### 1.29 SCAFFOLDING, RIGGING AND HOISTING

- A. Provide scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of material, equipment and apparatus furnished under this division. Remove same from premises upon completion of work.
- B. Coordinate propose routing with architect prior to rigging and protect all existing building components against damage.

#### 1.30 CONFLICT BETWEEN PLANS AND SPECIFICATIONS

- A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.

#### 1.31 SEISMIC RESTRAINTS

- A. It is the intent of this seismic specification to keep all plumbing building system components in place during a seismic event.
- B. All plumbing systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a Conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
- C. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. This contractor shall submit a report outlining the structural engineer's review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.
- D. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

### PART 2 -- PRODUCTS

#### 2.1 PLUMBING PIPE AND FITTINGS

- A. Pipe and fittings shall be of US manufacture and shall conform to the latest ANSI, ASTM, AWWA and NFPA Standards including latest amendments.
- B. Each length of pipe, each pipe fitting, trap, material and/or device used in the respective system shall have cast, stamped or indelibly marked on it, the maker's name or mark, weight and quality of the product when such marking is required by the approved standard that applies.
- C. Type A:



#### Corzan CPVC Schedule 80 Pressure Pipe and Fitting System

All pipe and fittings shall be supplied as a system by a single manufacturer.

Pipe and fittings shall be joined by a two step solvent cement and be chemical compatible with the associated plastic pipe material and comply with the FBC System Compatible Program.

All pipe and fittings shall be labeled and listed for plenum.

Installation to be in compliance with manufacturer's instructions.

All installers shall be trained on the use and installation of the system by a Lubrizol manufacturer's representative. Certification shall be furnished as part of the submittal process confirming that all users have been trained and certified.

#### D. Type B:

PVC Schedule 40 solid wall pipe and PVC drainage fittings joined by solvent welding.

This system is intended for use in non-pressure applications where the operating temperature will not exceed 140° F.

PVC cellular core pipe and PVC drainage fittings joined by solvent welding will not be approved as an equal.

All buried piping shall be provided with an electrically continuous corrosion resistant yellow tape marker and tracer wire (minimum AWG 14) to facilitate locating.

Vent through roof shall terminate utilizing no hub cast iron soil pipe and fittings.

#### E. Joints between different piping materials shall be made with a mechanical joint or dielectric fitting.

#### F. Pipe and fittings shall be in accordance with the following:

- |                                                                            |      |
|----------------------------------------------------------------------------|------|
| 1. Cold Water                                                              | Type |
| 2. Sanitary, Waste and Vent Inside Buried                                  | Type |
| 3. Sanitary, Waste and Vent Within the Building                            | Type |
| 4. Sanitary from Last Building Cleanout<br>to 5'-0" beyond Foundation Wall | Type |

### 2.2 WATER METER

#### A. Furnish and install one (1) domestic water meter at the entrance of the domestic water service into Building and additional meters as dictated in this article in accordance with the following:

#### B. Meter shall be approved equal with one-piece bronze case, bronze measuring chamber and ASME flanges to match incoming line size. Meter register shall be compatible with water department specification.

#### C. Meter shall conform with all rules and regulations of all Authorities having jurisdiction and shall comply with the latest Standards of American and New England Water Works Association, obtain approval and installation requirements of the Local Water Department prior to ordering or installation of meters.

#### D. The meter shall be the remote reading type and shall conform with all rules and regulations of all Authorities having jurisdiction. Obtain approval of the Local Water Department prior to ordering or installation of remote read device. Remote read device shall be mounted in an acceptable location as determined by the Local Water Department.

### 2.3 VALVES

- A. Copper solder shutoff valves on water piping 1/2 inch through 2 1/2 inch shall be Apollo 77LF series, lead free, bronze body ball valve, full port, chrome plated bronze ball, 600 psi WOG.  
 -100 = threaded  
 -200 = sweat
- B. Copper Pressfit shutoff valves on water 1/2 inch through 4 inch shall be Apollo 77VLF series, lead free, bronze body ball valve, full port, chrome plated bronze ball, 300 psi WOG.
- C. CPVC Shutoff valves on water piping shall be Corzan CPVC Schedule 80 socket ball valve joined by a two step solvent cement and be chemical compatible with the associated plastic pipe material and comply with the FBC System Compatible Program.  
 Installation to be in accordance with manufacturer's instructions.  
 All installers shall be trained on the use and installation of the system by a Lubrizol manufacturer's representative. Certification shall be furnished as part of the submittal process confirming that all users have been trained and certified
- D. Backflow preventers 2 inches and smaller shall be reduced pressure principle, all bronze Watts Series LF009-QT-S for cold water and hot water including bronze strainer, valves, air gap fittings test cocks and spare parts kit. Each backflow preventer and shut-off valves shall be installed between 3 and 4 feet above the floor and a minimum of 12 inches from any wall. Support the assembly from the floor or the wall. Run vent to nearest floor drain or similar open receptor. Pressure gauges shall be installed on the supply and discharge side of each backflow preventer assembly. Each pressure gauge assembly shall include TRERICE 600-C gauge, 3-1/2 inch diameter size, 0-160 psi dial range, 735-2 valve and 872-1 snubber. Furnish to the Owner one Watts TK-99 E Test Kit. This Contractor shall act as the Owner's agent in seeking approval from the Department of Environmental Protection or its designee. This Contractor shall submit all plans, specifications and applications required for approval and shall pay all fees. Approvals shall be secured prior to the purchase and installation of backflow preventers. Test and certify backflow preventer.  
 Provide Watts EDP 0113209 Sentry Plus relief port automated flood detection system with control box, wireless node, flood sensor and 2" tee (PVC) with NPTF threaded end connections.

## 2.4 INSULATION

- A. Insulation shall be Owens Corning Insulating Systems
- B. General:
  - 1. Products shall not contain asbestos, lead, mercury, or mercury compounds.
  - 2. Owens Corning pipe insulation is not known to contain penta-, octa, or deca-brominated diphenyl flame retardant substances, such as deca-Bromine (deca-BDE).
  - 3. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.
- C. Certifications:
  - 1. Only Owens Corning SSL II with ASJ Max and VaporWick pipe products are GREENGUARD Indoor Air Quality Certified and GREENGUARD Gold Certified.
  - 2. Owens Corning pipe products are certified by SCS Global Services to contain a minimum of 53% recycled glass content, 31% pre-consumer and 22% post-consumer (except Flexwrap Insulation).
  - 3. Owens Corning pipe products are UL listed and labeled (except Flexwrap Insulation and

Pipe and Tank Insulation).

4. No Wrap FIBERGLAS Pipe Insulation and Jacketed FIBERGLAS Pipe Insulation (ASJ Max, VaporWick, Evolution, ASJ) have received the Cradle to Cradle Products Innovation Institute's Bronze Level Material Health Certificate.
5. These products Environmental Product Declaration (EPD) has been certified by UL Environment.
6. Molded Fibrous Glass Pipe Insulation: Comply with ASTM C547, Type I, Grade A; and Type IV, Grade B; and ASTM C585, for sizes required and of a type suitable for installation on piping systems as required. One of the following types shall be used:
  - a. For indoor systems operating at temperatures from 0°F (-18°C) to +1000°F (538°C) with heat-up schedule:
    - I. Owens Corning® SSL II® with ASJ Max FIBERGLAS Pipe Insulation.
  - b. For systems operating at temperatures up to +850°F (232°C), no heat up-schedule required.
  - c. For systems operating at temperatures to +1000°F (538°C) with heat-up schedule and always above the ambient temperature:
    - I. Owens Corning No Wrap Pipe Insulation.
7. For systems operating below ambient (32°F (0°C) to +65°F (18°C)) temperature:
  - a. Owens Corning VaporWick® Pipe Insulation. (see Plumbing Pipe Insulation – VaporWick® Pipe Insulation)
8. Perpendicular Oriented Mineral Fiber Insulation: ASTM C1393, Type IIIB, Category 2:
  - a. For piping equal to or larger than 10 in (250 mm) diameter operating at temperatures up to +850°F (454°C):
    - I. Owens Corning Flexwrap FIBERGLAS Insulation.
9. Perpendicular Oriented Mineral Fiber Insulation: ASTM C1393, Type II, Category 1:
  - a. For piping equal to or larger than 10 in (250 mm) diameter operating at temperatures up to +650°F (343°C):
  - b. Owens Corning® FIBERGLAS Pipe and Tank Insulation.
10. Provide accessories per insulating system manufacturer's recommendations, including the following:
  - a. Closure Materials: Butt strips, bands, wires, staples, mastics, adhesives, and pressure-sensitive tapes. a. Mold resistant mastics are recommended for chilled water applications.
  - b. Field-Applied Jacketing Materials: Sheet metal, plastic, canvas, fiberglass cloth, insulating cement, PVC fitting covers.
  - c. Support Materials: Hanger straps, hanger rods, saddles, support rings, and high density inserts.
  - d. Adhesives For Indoor Applications: VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Insulation shall be in accordance with the following schedule:

System

Insulation Thickness

## 2.5 HANGERS AND SUPPORT

- A. Pipe hangers, pipe anchors, auxiliary steel, wood blocking and fixture supports shall be furnished and set by this Contractor, and he shall be responsible for their proper and permanent location. This Contractor shall be responsible for all core drilling.
- B. All piping shall be rigidly supported from the building structure by means of approved hangers and supports. The hanging and support of all piping system shall conform to the ANSI/MSS-SP.58 AND MSS-SP 69 latest edition. This Contractor shall furnish and install all required auxiliary steel required for hanging of piping.
- C. All horizontal piping shall be hung with approved adjustable malleable iron pipe hangers.
  - 1. Copper tubing 1-1/2 inch and larger shall be supported at ten (10) foot intervals. Copper tubing 1-1/4 inch and smaller shall be supported at six (6) foot intervals.
  - 2. Plastic piping shall be supported at 3 foot intervals for 1-1/4 inch piping and at 4 foot intervals for 1 1/2 inch piping and larger.
- D. Vertical hangers
  - 1. Copper tubing shall be supported at each story height and at not more than ten (10) foot intervals.
  - 2. Plastic piping shall be supported at each floor.
- E. Interior hangers for piping sizes four (4) inches and smaller shall be Carpenter & Paterson, No. 1A band type, Grinnell Company, Calco Steel Products Company or equal, black steel with hanger rods with machine threads. Hangers for piping larger than four (4) inches shall be the adjustable clevis hanger type, malleable iron with extension rod. Chain, strap, perforated bar or wire hangers will not be approved. Where used for uninsulated copper tubing, all hangers shall be copper plated and chrome plated for chrome plated piping. Insulation shields shall be provided on all horizontal insulated piping at each hanger or support location. Insulation shields shall be galvanized steel, 180 degrees arc and centered on the hanger or support. On diameters 4 inches and smaller, shield shall be 12-inch long, 18 gauge steel. On diameters 5 inches and 6 inches, shield shall be 18-inch long, 16 gauge steel. On diameters 8 inches and 10 inches, shield shall be 24-inch long, 14 gauge steel. On diameters greater than 10 inches, shield shall be 24-inch long, 12 gauge steel. Structure attachments shall be as manufactured by Carpenter & Patterson and shall be suitable to carry the weight.
- F. Approved gang hangers may be used in lieu of separate hangers on pipes running parallel to each other and close together.
- G. All fixtures and equipment shall be supported and fastened in a satisfactory manner and in accordance with fixture manufacturer's recommendations.
- H. Where chair carriers are required, they shall be completely concealed in the building construction and shall rigidly support the fixture from the floor. Chair carrier shall support fixtures in such a manner that no part of the fixture will be supported by the wall or partition. Chair carriers shall be furnished complete with necessary bolts, nuts and washers as well as connecting nipples of the proper length with gaskets for the fixture connection. All available or optional anchor foot assemblies shall be utilized. Carriers must fit in available space and shall be of the special narrow type or compact style where necessary. Chair carriers for water closets and urinals shall include flushometer supply pipe support. Flushometer supply pipe shall always be provided with a concealed support regardless of if the design includes a carrier or not.

- I. Wherever wood blocking is required to insure adequate support of fixtures and related piping, it shall be provided by this Contractor and it shall be fire treated.
- J. All inserts in new concrete construction shall be capable of developing the full strength of the rod or bolt used in them and shall be either continuous insert type or malleable iron concrete inserts for rod sizes 3/8 inch to 7/8 inch. Continuous inserts shall have anchors every 4 inches and shall extend 1-1/2 inches above the back of the insert and shall hook to provide anchor. All inserts shall be tied to the reinforcing steel rods with wire and properly sized reinforcing rods shall be inserted through the special holes, hooks or brackets provided in or on the inserts to securely anchor insert to the structure.
- K. Seismic Restraints: It is the intent of this seismic specification to keep all mechanical building system components in place during a seismic event.
  - 1. All mechanical systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
  - 2. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. Contractor shall submit a report outlining the structural engineer's review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.
  - 3. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

## 2.6 SLEEVES, ESCUTCHEONS AND FIRESTOPPING

- A. Sleeves shall be furnished and set by this Contractor and he shall be responsible for their proper and permanent location. This Contractor shall be responsible for all core drilling. Core openings shall have link-seal fire-rated penetration closures.
- B. This Contractor shall provide steel sleeves at all points where pipes and all other work under his charge pass through masonry, concrete or wood. Sleeves shall have flanges or wings at mind-points to prevent sleeve from slipping through the floor or wall. Pipe sleeves shall be sufficient diameter to provide approximately 1/4 inch clearance around the pipe or the insulation on insulated systems. Sleeves through walls shall end flush with the surface of the walls. Sleeves in floors shall extend one inch above the floor and after installation of piping shall be packed, firestopped and made watertight. Sleeves in exterior walls shall have waterstop plates, shall end flush with the surface of the walls, shall have link-seal penetration closures and shall be of a diameter that is compatible with the Link Seal System.
- C. Seal the sleeve penetrations with firestopping and smoke stopping systems as manufactured by Dow Corning, Bio-Shield, Rectorseal Metacaulk, 3M, Fyre Putty or equal. Where pipes penetrate fire rated construction, the openings shall be packed with the material and system that shall maintain the integrity of the fire rating as detailed in the UL Fire Resistance Directory.
- G. Pipe Sleeves shall be according to the following:
  - 1. Sleeves on pipes passing through masonry or concrete construction shall be scheduled 40 galvanized steel pipe.
  - 2. Sleeves on pipes passing through wood or drywall partitions shall be 16 gauge galvanized steel.

- H. Whenever new penetrations to a previously poured slab are required for the installation of floor drains, shower drains, mop receptors, flush floor cleanouts or similar items of plumbing, these penetrations shall be totally sealed with a fire and water stop sealant. Sealant shall be Dow Corning fire stop sealant, Catalog No. 2000. Hourly fire rating in hours must be meet the requirements of the slab being penetrated.
- I. Provide chrome plated brass escutcheons with set screws for exposed piping in all areas. In mechanical rooms use plain brass or cast iron escutcheons suitable for painting. All escutcheons shall be sized to fit the bare pipe or insulation in a snug and neat manner. They shall be of sufficient size to cover sleeves openings for the pipes and of sufficient depth to cover sleeves projecting above floors.
- J. Bored holes within wood construction. A hole not greater in diameter than 40 percent of the stud width is permitted to be bored in any wood stud. Bored holes not greater than 60 percent of the width of the stud are permitted in nonbearing partitions or in any wall where each bored stud is doubled, provided not more than two such successive doubled studs are so bored. In no case shall the edge of the bored hole be nearer than 5/8 inch (15.9 mm) to the edge of the stud. Bored holes shall not be located at the same section of stud as a cut or notch.

## 2.7 CLEANOUTS

- A. Cleanouts shall be provided at the base of all sanitary, waste and storm water stacks and at all changes in direction on horizontal piping. Distance between cleanouts on horizontal piping shall be at intervals in accordance with code.
- B. Cleanouts shall be as manufactured by Josam Manufacturing Company, Jay R. Smith Manufacturing Company, Zurn Industries, Inc. or approved equal. The following series numbers are intended to establish a level of quality and comparison.

## 2.8 WALL HYDRANTS

- A. WH-A shall be Jay R. Smith Model No. 5509QT-SS or SE stainless steel box and cover, bronze nickel plated hydrant, bronze casing, hose connection with integral vacuum breaker, sweat inlet connection, T-handle key and adjustable wall clamp. Length to suit wall thickness. Provide with mild climate, Jay R. Smith Figure No. SAP where applicable.

## 2.9 FLOOR DRAINS

- A. FD-A: PVC Shower Drain Body and Stainless Grate with trap primer adapter similar to: Jay R. Smith 216-H02X03-276 (PVC Schedule 40 – round grate)  
Provide deep seal trap with barrier type floor drain trap seal protection device.

## 2.10 PLUMBING FIXTURES

- A. Water Closet, P-1:  
Fixture: American Standard Cadet Pro 215AA.104 / 215AA.105 ADA height, elongated floor outlet, vitreous china, 1.28 gpf siphon jet bowl complete with tank, tank cover, fill valve, bolt caps and trip lever. Tank trip lever control shall be installed on wide side of water closet compartment to satisfy the Americans with Disabilities Act (ADA).  
Seat: American Standard 5001G.055 extra heavy duty elongated open front seat less cover with self-sustaining hinge.  
Miscellaneous: Closet flange, bolts and wax sealing ring to suit.
- B. Lavatory, P-2:

Fixture: American Standard Lucerne 0356.421 20-1/2-inch x 18-inch wall hung vitreous china, concealed arm supports and single faucet hole.

Support: Concealed arm carrier with foot support to suit.

Faucet: American Standard Nextgen Selectronic 775B.303-PK00.WRK ten year battery powered sensor operated faucet with integral thermostatic mixing valve, external temperature control and maximum flow rate 0.35 gpm.

Electric Water Heater: Chronomite CM-40L/208-SS-NPT08-ADJ-2095-CL electric tankless water heater, 40 amp, 208 volt, 1 phase with stainless steel lockable NEMA 4X 316 stainless steel housing, 0.35 gpm at 90°F rise, male NPT, field adjustment temperature, disconnect switch, and cylinder lock.

Miscellaneous: McGuire heavy duty polished chrome-plated cast brass loose key angle valve kits, flexible braided stainless steel risers, escutcheon. Polished chrome-plated cast brass perforated offset strainer with 1-1/4 inch x 1-1/2 inch polished chrome-plated cast brass adjustable "P" trap, cleanout plug, with PVC adapter extension to wall and escutcheon.

Insulation: Truebro Handi Lav-Guard antimicrobial white flexible vinyl insulation kit with foam inserts.

C. Hose Bibb, P-3:

Chicago Faucet 952 polished chrome-plated inside sill faucet, 3/4 inch hose thread outlet, vacuum breaker, removable loose key handle, 1/2 inch inlet and wall flange.

## 2.11 SHOCK ABSORBERS

A. Maintenance free water hammer arresters shall be furnished and installed at all locations in the water systems where quick acting valves are installed as well as wherever water hammer may occur.

B. Examples of such locations are as follows:

1. As indicated on the drawings.
2. Self-closing and metering faucets.

C. Water hammer arresters shall be as manufactured by Precision Plumbing Products or approved equal. Arresters shall be installed at each and every multiple of fixtures or items as listed above and/or as indicated on drawings. Water hammer arresters may serve groups of fixtures.

D. Sizing, placement, tested, certified and shall be in accordance with Plumbing and Drainage Institute Standard PDI-WH-201 and the manufacturer's recommendations.

E. Water hammer arresters shall be as follows:

| Designation | Fixture Unit Rating | Model   |
|-------------|---------------------|---------|
| SA-A        | 1-11                | SC-500A |

F. Water hammer arrestors are maintenance free and do not require an access panel per the manufacturer.

G. Air chambers will not be approved as an equal.

## 2.12 PIPE IDENTIFICATION AND VALVE TAGS

A. All piping, except that piping which is within inaccessible chases, shall be identified with semi-rigid plastic identification markers equal to Seton Setmark pipe markers. Direction of flow arrows are to be included on each marker. Each marker background shall be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ANSI/ASME

A13.1-2007). Setmark snap-around markers shall be used for overall diameters up to six inches and strap-around markers shall be used above six inch overall diameters. Markers shall be located adjacent to each valve, at each branch, at each cap for future, at each riser take off, at each pipe passage through wall, at each pipe passage through floors, at each pipe passage to underground and on vertical and horizontal piping at 20 foot intervals maximum.

- B. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve chart. Valve tags shall be 19 gauge polished brass, 1-1/2 inch diameter with stamped black filled letters similar to Seton S type 250-BL or approved equal. Lettering shall be 1/4 inch high for type service and 1/2 inch for valve number. Tag shall be attached to valves with approved brass "S" hooks, or brass jack chain. Whenever a valve is above a hung ceiling, the valve tag shall be located immediately above the hung ceiling.
- C. Furnish a minimum of two typed valve lists to be framed under glass or Plexiglass. Each chart shall be enclosed in an approved .015 inch thick plastic closure for permanent protection. Valve numbers shall correspond to those indicated on the Record Drawings and on the printed valve lists. The printed list shall include the valve number, location and purpose of each valve. It shall state other necessary information such as the required opening or closing of another valve when one valve is to be opened or closed. Printed framed valve lists shall be displayed in each Mechanical Room or in a location designated by the Owner.
- D. Equipment nameplates shall be 3/4 inch by 2-1/2 inch long .02 inch aluminum with a black enamel background with engraved natural aluminum letters similar to Seton Style 2065-20. Nameplate shall have pressure sensitive taped backing.
- E. All interior and exterior underground piping and utilities shall have metalized warning tape installed above the pipe or line that identifies the specific system buried below. Tape shall consist of a minimum 3.5 mil solid foil core encased in a protective plastic jacket (total thickness 5.5 mils) and be 6" wide with black lettering imprinted on a color coded background that conforms to APWA color code specifications. Tape shall be installed from 18" to 30" above the pipe and in no case less than 6" below grade.
- F. All interior and exterior underground non-metallic piping and utilities shall have a tracer wire installed along the length of the pipe. Tracer wire shall be 14 gauge minimum, copper single-conductor wire with insulation and shall be continuous along the pipeline passing through the inside of each valve box.

## 2.13 DISINFECTION OF WATER SYSTEMS

- A. All water systems shall be disinfected in accordance with Local Public Health and Plumbing Code Requirements.

## 2.14 TESTS AND APPROVALS

- A. Pipe lines shall be blown or flushed clean, before piping tests are applied. All plumbing work shall be tested as herein specified. No portion shall be covered, concealed, used or made inaccessible to testing, inspection, repair, correction or replacement until tests thereof have been satisfactorily completed in the presence of the Architect's Authorized Representatives. The Plumbing Subcontractor must accommodate his testing operations to the progress of the project as a whole. Correct all defects appearing under test and repeat the tests until all parts of the work have withstood them successfully.
- B. Furnish all labor, material and services for testing, including testing plugs, pumps and compressors; he shall make and remove all temporary piping connections required for the tests and shall dispose of test water and all wastes after tests. Leave all work in good order, ready for full use.



- C. Tests on all plumbing systems shall be made in accordance with the requirements of the Local Plumbing Code and the codes, standards, recommended practices and manuals of the National Fire Protection Association.

## PART 3 - EXECUTION

### 3.1 WORKMANSHIP

- A. Prior to the work of this section, this Contractor must ascertain that preceding work has been accomplished in a manner to permit compliance with the level of quality required by this Section.
- B. The entire work provided in this specification shall be constructed and finished in every respect in a workmanlike and substantial manner. It is not intended that the drawings shall show every pipe, fitting, and appliance. Furnish all parts as may be necessary to complete the system in accordance with the best trade practices and to be the satisfaction of the Architect, Engineer and General Contractor.
- C. This Contractor shall keep other contractors fully informed as the shape, size and position of all openings required for his apparatus and shall give full information to the General Contractor or other contractors sufficiently in advance of the work so that all openings may be built in advance. Furnish and install all sleeves, supports, etc., specified or required.
- D. In the case of failure on the part of this Subcontractor to give proper and timely information as noted above, he shall do his own cutting and patching, or have same done by the General Contractor at this subcontractor's expense, but in any case, without extra expense to the Owner and General Contractor.
- E. This Contractor shall obtain detailed information from the manufacturer of apparatus as to the proper method of installing and connecting same. He shall also obtain all information from the General Contractor and the other contractors which may be necessary to facilitate his work and the completion of the whole project.

### 3.2 CORE DRILLING

- A. Where a core hole or opening occur larger than 10 inches in any dimension is required, or where dimension between two openings in less than two times maximum dimension of largest opening, and condition is not shown on architectural or structural drawings, obtain prior written approval of the Owner.
- B. At floor slabs and walls where a core hole is to be drilled or opening is to be cut, contractor shall find and mark all reinforcing in both faces located by means of x-ray, pach-ometer, or prof-ometer. Submit sketch indicating core holes, openings, location of rebar, piping, conduit or any other obstruction for review.
- C. All holes through concrete or masonry for the passage of plumbing piping not provided by sleeves or openings at the time of casting, shall be cut by the Plumbing Contractor using an approved core boring machine with diamond edge bit and vacuum sludge removal device. The size of holes shall provide for fire stopping around a pipe. The location of all core drilled holes shall be coordinated with the structural reinforcing and be reviewed by the Architect prior to commencing work.
- D. Prior to coring, the Plumbing Contractor shall submit a minimum 1/8 in. scale plan, dimensioning the location of proposed cored opening locations and indicating the core diameter. Prior to developing the coring plan, the Plumbing Contractor shall examine the site carefully in an attempt to determine whether there are structural, mechanical or electrical obstacles in the proposed coring locations. Once the plans are reviewed by the Architect and Owner's representative, the Plumbing Contractor may proceed with caution. If an electrical

conduit, for example, was hit during coring operations, and it was determined that the Plumbing Contractor was negligent by not noting a conduit turning into the slab below, he would be responsible for the repair cost. If the Contractor were not found to be negligent, then the Owner would assume the cost of the repair.

### 3.3 TESTING PIPING SYSTEMS

- A. Test all work in the presence of the Architect/Engineer and/or Owner, Owner's representative and Plumbing Inspector as called for in local codes.
- B. After soil, waste and vent piping is in place and before being furred in, plug lower ends and fill. The system shall be left tight under these conditions and water level shall be maintained intact for a period of at least four hours.
- C. Test domestic water piping and service by applying a hydrostatic pressure of 125 psi using a pump for this purpose. Make sure that all lines are properly plugged or capped, and that air has been vented before applying pressure, which shall remain constant without pumping for one hour at least.
- D. Gas system piping shall be tested at a pressure of 50 psig and pressure shall be held for two hours minimum.
- E. This Contractor shall furnish all equipment, labor and materials, required for these tests.
- F. Any leaks in joints or evidence of defective pipe or fittings disclosed by tests shall be immediately corrected by replacing defective parts with new joints or corrected materials. No makeshift repairs effected by caulking threaded pipe with lead wool, application of wicking or patented compounds being permitted. Perform smoke tests as required by local code or by the Architect/Engineer.

### 3.4 PROTECTION AND CLEANING

- A. Each subcontractor shall be responsible for his work and equipment until finally inspected, tested and accepted. Carefully store materials and equipment, which are not immediately installed after delivery on site. Close open ends or work with temporary covers or plug during construction to prevent entry of obstructing materials.
- B. Each subcontractor shall protect work and materials of other trades from damage that might be caused by his work or workman and make good damage thus caused.
- C. The premises shall be kept reasonably clean at all times, and rubbish shall be removed as directed by the General Contractor.
- D. Upon completion of this work, the Contractor shall clean all fixtures and equipment and replace damaged parts. Upon failure of this Contractor to fulfill his obligation, this work will be taken care of at his expense.

### 3.5 WORK COORDINATION AND JOB COORDINATION

- A. Plumbing equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same with the other trades and the General Contractor.
- B. Particular attention shall be directed to the coordination of system with all equipment of other trades installed in and above the ceiling areas. Conflicts in heights and clearance above hung ceilings shall be brought to the attention of the General Contractor for a decision before equipment is installed.
- C. Furnish to the General Contractor and other trades all information relative to the position of the plumbing installation that will affect them so that they may plan their work and installation accordingly.

### 3.6 SUPPLEMENTARY STEEL, CHANNEL AND SUPPORTS

- A. Furnish and install all supplementary steel, channels and supports required for the proper installation, mounting and support of all equipment.
- B. Supplementary steel and channels shall be firmly connected to building construction in a manner approved by the Architect/Engineer.
- C. The type and size of the supporting channels and supplementary steel shall be determined by the Plumbing Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. all turns to be made with 90 degree fittings, as required to suit the construction and installation conditions.

### 3.7 SLEEVES AND INSERTS

- A. Sleeves shall be furnished, set and properly secured in place and at all points where piping passes through masonry or concrete. All sleeves shall be of sufficient diameter to provide 1/4-in. clearance around the pipe.
- B. Sleeves through concrete slabs, and interior concrete and masonry walls or partitions shall be steel pipe. Fire stop annular openings between sleeves and pipes at floor slab passages and make watertight. Galvanized sleeves and copper piping shall not be placed in concrete.
- C. Install UL listed and FM approved inserts or other anchoring devices in concrete and masonry construction as required to support piping. Inserts shall be of the adjustable type as manufactured by Carpenter and Patterson, Grinnell, or Fee and Mason.

### 3.8 SYSTEM IDENTIFICATION

- A. All valves on pipes of every description shall have circular brass valve tags of at least 1-1/2 in. in diameter, attached with brass hooks to each valve stem. Stamp number of the valve and the service, such as "HW", "CW", "GAS", etc., for hot water, cold water, gas, etc., respectively. The numbers of each service shall be consecutive and shall correspond with the numbers indicated for valves and controls on the record drawings and on three printed valve lists. These printed lists shall state number and locations of each valve and control and the section, fixture or equipment which it controls.
- B. The printed valve lists shall be prepared in a form to meet the approval of the Architect and Engineer and one copy shall be framed under glass and mounted in approved locations.
- C. All plumbing lines and equipment shall be identified by pipe markings, which shall be provided by this Contractor. Markers shall be applied every 20 ft. Markings shall indicate pipe content and direction of flow. The markers shall be as manufactured by Seton Name Plate Corp. or equal.

### 3.9 SAFETY PRECAUTIONS

- A. Furnish, place and maintain proper guards for the prevention of accidents and any other necessary construction required to secure safety of life and property.

### 3.10 INSERTS AND OPENINGS

- A. Inserts: Install inserts or other anchoring devices in concrete and masonry construction as required to support piping. Inserts shall be of the adjustable type as manufactured by Carpenter and Patterson, Grinnell or Fee and Mason.

- B. Escutcheons: All exposed pipe, uncovered, passing through walls, floors or ceilings shall be fitted with one piece chrome plated brass escutcheons with set screw holding in position. Floor escutcheons to be deep enough to fit over sleeves, fastened to pipe and extending down to floor.

### 3.11 PLANS AND SPECIFICATIONS

- A. The drawing showing layout of the plumbing systems indicate the approximate location of outlets, apparatus and equipment are schematic. The final determination as to the routing shall be governed by structural conditions and other obstructions.
- B. The right to make any reasonable change in the location of outlets, apparatus and equipment up to the time of the roughing-in is reserved by the Architect and Engineer without involving any expense to the Owner or the General Contractor.
- C. The specifications supplement the drawings and provide specifics pertaining to the methods of material to be used in the execution of the work.

### 3.12 SANITARY WASTE, STORM WATER AND VENT SYSTEMS

- A. Underground installation of plastic pipe shall be buried in strict accordance with ASTM D2321 Standard practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
- B. Underground installation of sanitary, waste and stormwater pipe shall be installed below electrical conduit with a minimum clearance of six inches.
- C. Furnish and install piping to take wastes from all soil and waste stacks, fixtures, drains and equipment as indicated and/or described in these plans and specifications.
- D. Unless specifically noted otherwise on the plans, all horizontal piping 4 in. and larger shall be pitched at the rate of 1/8 in. per foot in the direction of the flow. Horizontal piping 3 in. and smaller shall be pitched at the rate of 1/4 in. per foot in the direction of the flow.
- E. Vent System: Furnish and install piping to vent all stacks, fixtures, traps and appliances as indicated on the drawings and/or required to meet the Plumbing Code. All vent piping shall be concealed where possible with the horizontal pipe pitching back toward fixtures to allow connection to drain. Whether indicated on plan, riser diagram or not, offset vents below the roof to avoid air intakes, equipment, penthouse mansard etc., bring vents through the roof a minimum of 10 feet away from air intakes, windows, and operable sash and 10 ft. away from other obstructions.

### 3.13 HOT AND COLD WATER SYSTEMS

- A. Furnish and install complete cold, hot and hot water return systems to service all fixtures and equipment indicated on the drawings or specified as requiring cold or hot water. Cold water piping shall start at the connection to the water main indicated on plan and extend to all fixtures and equipment, including piping, fittings and valves requiring connections. Hot water piping shall extend from the hot water heater to all fixtures and equipment, including piping, fittings and valves. In general, piping shall pitch upward in the direction of flow with each branch and riser separately valved and with 1/2 in. hose end drains on the outlet side of the valve and at all low points in the systems. Install valves for each battery of fixtures and other valves as necessary to isolate all parts of these systems. All valves shall be accessible.
- B. Hot water piping shall be circulated as shown on plans to ensure uniform temperatures throughout the system. All branches longer than 50 ft. shall be provided with hot water return lines.

### 3.14 WALL HYDRANTS

- A. Water piping serving wall hydrants shall be installed within the interior side of the building envelope at an interior partition or exposed within building to prevent freezing. Installation with an exterior wall is prohibited.
- B. Wall hydrants shall be set approximately 18 inches above outside grade and shall include cross connection protection. Loose key stops shall be turned over to the Owner prior to completion.

### 3.15 TOILET ROOM HOSE BIBBS

- A. Hose bibbs shall be set approximately 12 inches to 18 inches above finished floor. Locations shall not interfere with other plumbing fixtures, equipment and code required clearances.

### 3.16 INSULATION

- A. Ensure that all pipe and fitting surfaces over which insulation is to be installed are clean and dry.
- B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.
- C. Ensure that pressure testing of piping and fittings has been completed prior to installing insulation.
- D. General
  - 1. Install all insulation materials and accessories in accordance with manufacturer's published instructions and recognized industry practices to ensure that it will serve its intended purpose.
  - 2. Install insulation on piping subsequent to installation of heat tracing, painting, and acceptance tests.
  - 3. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.
  - 4. Maintain the integrity of factory-applied vapor barrier jacketing on all pipe insulation, protecting it against puncture, tears or other damage. All staples used on cold pipe insulation shall be coated with suitable sealant to maintain vapor barrier integrity.
- A. Fittings
  - 1. Cover valves, fittings, and similar items in each piping system using one of the following:
  - 2. Mitered sections of insulation equivalent in thickness and composition to that installed on straight pipe runs.
  - 3. Insulation cement equal in thickness to the adjoining insulation.
  - 4. Owens Corning PVC Fitting Covers insulated with material equal in thickness and composition to adjoining insulation.
- B. Penetrations
  - 1. Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise specified.

C. Joints

1. Butt pipe insulation against hanger inserts. For hot pipes, it is recommended all joints be staggered when operating temperature is over 400F (204C) double layer. Seal jacketing according to type being used. For cold piping, seal self-sealing laps by firmly rubbing down surface of tape and flap.
2. All pipe insulation ends shall be tapered and sealed, regardless of service.

D. Vertical Piping

1. If specified on contract drawings, all insulated, exposed vertical piping within the building and all insulated piping exposed to the outdoors shall be additionally jacketed with 0.016" thick (0.4 mm) (minimum) aluminum. Vertical piping shall be protected to a height of 8'-0" (2.4 m) above the floor.

E. Field Quality Assurance

1. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

F. Protection

1. Replace damaged insulation, which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.
2. The insulation contractor shall advise the general and/or the mechanical contractor as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

G. Safety Precautions

1. Insulation contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.
2. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

3.17 CHLORINATION

- A. Each water piping system (cold water, hot water, hot water circulation, non potable cold water, non potable hot water, non potable hot water circulation and tepid water) shall be cleaned and disinfected by this Contractor. Cleaning and disinfection shall be performed after all pipes, valves, fixtures and other components of the systems are installed, tested and ready for operation.
- B. All water piping systems shall be thoroughly flushed with clean potable water prior to disinfection to remove dirt and other contaminants.
- C. Disinfection shall be done using sodium hypochlorite in the following manner:
  1. A service cock shall be provided and located at the water service entrance. The disinfecting agent shall be injected into and through the system from this cock only.

2. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an even rate. During disinfection, flow of disinfecting agent into main water supply is not permitted.
  3. All sectional valves shall be opened during disinfection. All outlets shall be fully opened during injection and the residual checked with orthotolidin solution.
  4. When the chlorine residual concentration, calculated on the volume of water the piping will contain indicated not less than 50 ppm (parts per million) at all outlets, then all valves shall be closed and secured.
  5. The residual chlorine shall be retained in the piping systems for a period of not less than 24 hours.
  6. After the retention, the residual shall be not less than five parts per million. If less, then the process shall be repeated as described above.
  7. If satisfactory, then all fixtures shall be flushed with clean potable water until residual chlorine by orthotolidin tests shall be not greater than the incoming water supply.
- D. All work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience. Certification of performance shall indicate:
1. Name and location of the job and date when disinfection was performed.
  2. Material used for disinfection.
  3. Retention period of disinfectant in piping system.
  4. ppm chlorine during retention.
  5. ppm chlorine after flushing.
  6. Statement that disinfection was performed as specified.
  7. Signature and address of company or person performing disinfection.
- E. Upon completion of final flushing (after retention period) the plumbing subcontractor shall obtain a minimum of one water sample from each water piping system and submit samples to a State approved laboratory. Samples shall be taken from faucets located at highest floor and furthest from meter or main water supply. The laboratory report shall show the following:
1. Name and address of approved laboratory testing the samples.x
  2. Name and location of job and date the samples were obtained.
  3. The coliform organism count. (An acceptable test shall show the absence of coliform organisms.)
- F. If analysis does not satisfy the above minimum requirements, the disinfection procedure shall be repeated.
- G. Before acceptance of the systems, this Contractor shall submit to the Project Manager and Clerk of Works for his review, three (3) copies of Certification of Performance as specified above.
- H. Under no circumstances shall this contractor permit the use of any portion of domestic water systems until properly disinfected, flushed and certified.

### 3.18 WATER SERVICE

- A. Furnish and install a complete water service piping system to five feet outside the building foundation including piping, fittings and supports, valves, and connection to the water main as shown on the drawings and specified herein.
- B. All materials and installation shall be in complete accord with the requirements of the local water department and NFPA Pamphlet. Pay all inspection fees. Include in bid.
- C. Backfilling of trench excavation will not be permitted until after the domestic water service line has been installed, inspected, tested and accepted. With prior written approval of the Architect, partial backfill may be installed, leaving joints exposed.
- D. When a section of pipe is ready for testing, the line shall be completely filled with water, thoroughly cleaned for elimination of all air, and a leakage test made.
- E. Testing shall be carried out in an approved manner and shall consist of filling the main with water from the municipal distribution system and maintaining a hydrostatic test pressure of 200 per NFPA 24 Standards. All visible leaks shall be made tight in an approved manner. Any defective pipe, fitting or material shall be removed and replaced at the expense of the Contractor and the test shall be repeated until the conditions of allowable leakage are met. Thoroughly flush the service per NFPA 24 Standards.
- F. Disinfection shall be performed in an approved manner in conforming with AWWA "Procedure for Disinfecting Water Mains" designation C601-48 and shall be witnessed by the Architect or his authorized agent. Before disinfection, the line shall be flushed with water to create as high a velocity as practicable.
- G. Following chlorination and after the entire length of the line is ready for operation, all treated water shall be flushed thoroughly from the newly laid pipe line, at its extremities, until the replacement water throughout its length will upon test, both chemical and bacteriological, be provided equal to the quality introduced at the permanent source of supply. Where bends turn down and the resulting thrust will be upward, provision to restrain the thrust shall be made with joint harnesses or thrust blocks. Submit proposed methods to Architect for approval.

END OF SECTION



## **DIVISION 23**

## SECTION 230000

### MECHANICAL

#### PART 1: GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and **Division-1** Specification Sections, apply to work of this section.

##### 1.2 SUMMARY OF WORK

- A. Provide complete functional Heating, Ventilating and Air Conditioning system as shown on Mechanical Construction Documents.

##### 1.3 REFERENCE STANDARDS

- A. NFPA Standards
- B. ANSI Standards
- C. ASME Standards
- D. ASTM Standards
- E. AWWA Standards
- F. ASHRAE Standards
- G. SMACNA Standards
- H. OSHA Standards
- I. NEBB Standards
- J. Local Codes and Ordinances
- K. Owner's Insurance Company Requirements
- L. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the contract documents shall take precedence.
- M. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section.

##### 1.4 CONTRACT DRAWINGS & SPECIFICATIONS

- A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before

proper execution of the work.

- B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.

#### 1.5 CONFLICT BETWEEN PLANS AND SPECIFICATIONS

- A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.

#### 1.6 SHOP DRAWINGS AND PRODUCT DATA

- A. SUBMITTALS: Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication, or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable industry, and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor propose to furnish.
- B. Submit in accordance with **Division 1**.
- C. It is the intent of these specifications that all equipment, materials and workmanship used on this project be in complete conformance with all local, state and national codes, ordinances and standards.
- D. Substitutions shall be equivalent to specified equipment in all aspects of quality and performance and shall conform to the intent stated above. It is the contractor's responsibility to submit only those items that meet these requirements. Should any non-conforming items be installed, they shall be replaced by the contractor at no additional cost to the owner.
- E. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist.
- F. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, it shall be provided. Contractor to assume cost and entire responsibility thereof.

#### 1.7 INSPECTION AND TESTS

- A. During the progress of the work it shall be subject to the inspection of the Owner and to such other inspectors, as may have jurisdiction.
- B. At completion of the work, Contractor shall submit to the Owner's representative in writing a statement stating: (1) that the work is complete; (2) that the entire installation is in accordance with the specification; (3) that preliminary tests have been made; and (4) that the work is ready for final inspection and test.
- C. A final inspection of the installation to determine compliance with the drawing and specifications will be made by the Owner's representative. Work will be checked for quality of materials, quality of workmanship, proper installation and finished appearance. This Contractor shall provide the services of the project foreman for inspection purposes. The

foreman shall remove and reinstall access panels, ceiling tiles, etc., as required to facilitate any inspections required by the Owner's representative.

- D. The Contractor shall arrange and conduct operating tests on all equipment in the presence of the Owner's representative. The component parts of systems and the various systems shall be demonstrated to operate in accordance with the requirements and intent of this specification. Any non-complying or defective materials or workmanship disclosed as a result of the inspection and the Contractor shall correct tests promptly, and the tests repeated as often as necessary until approved and accepted by the Owner's representative.

#### 1.8 ELECTRICAL EQUIPMENT

- A. Electrical components of mechanical equipment and systems, such as motors, factory mounted motor starters, disconnects, and control equipment shall be provided under the related Section of **Division 15**.
- B. Temperature control equipment, including thermostats, zone valves, relays, aquastats, etc. shall be provided under related sections of **Division 15**. Temperature control wiring not specifically shown on electrical drawings shall be provided under related Section of **Division 15**.
- C. Upon completion of temperature control system wiring, the responsibility of the control system will fall under **Division 15**.
- D. All electrical equipment installed in concealed spaces shall be provided with a hard-wired electrical connection. Plug-type disconnects shall not be allowed in concealed spaces. Equipment provided with plug-in cords shall not have their cords modified.

#### 1.9 OPENINGS IN EXTERIOR WALLS OR ROOF

- A. Openings in exterior walls or roof shall be kept properly plugged and caulked at all times, except when being worked on to preclude the possibility of flooding due to storm or other causes. After completion of work, openings shall be permanently sealed and caulked in a manner approved by the Architect.

#### 1.10 GUARANTEE

- A. Except as otherwise specified, all work, materials and equipment shall be guaranteed against defects resulting from the use of inferior materials, equipment, or workmanship for one year from the date of final completion of the contract, or from full acceptance by the Owner, whichever is earlier.
- B. If, within any guarantee period, repairs or changes to guaranteed work are required as a result of the use of defective materials or equipment, inferior workmanship or work that is not in accordance with the terms of the contract, and upon receipt of notice from the Owner, the following shall be done without expense to the Owner.
- C. Place in satisfactory condition in every particular all of such guaranteed work and correct all defects therein.
- D. Repair all damage to the building or site/equipment or contents thereof which is the result of the use of defective materials or equipment or inferior workmanship, or of work not in accordance with the terms of the contract.
- E. Make good any work or materials, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.

- F. In fulfilling the requirements of the contract or of any guarantee embraced in or required thereby, any work guaranteed under another contract is disturbed, restore such disturbed work to original condition and guarantee such restored work to the same extent as it was guaranteed under such other contract.
- G. If upon failure to proceed promptly after notice to comply with the terms of the guarantee, the Owner may have the defects corrected and Contractor and his surety shall be liable for all expenses incurred.
- H. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities, which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of one (1) year minimum from the date of acceptance or final payment.

#### 1.11 CLEANING OF SYSTEM

- A. Thoroughly clean piping, ducts, fixtures and equipment of all foreign substances inside and out before placing in operation. All air handling equipment shall be provided with "construction filters" for use during construction. Once construction is substantially complete and prior to final testing adjusting and balancing, furnish and install new filters for each piece of equipment.
- B. If any foreign matter should stop any part of a system after being placed in operation, clean and reconnect system.
- C. Remove all covers of interior floor drains and cleanouts, clean of all dirt, concrete traces, etc., then lightly grease and reinstall.

#### 1.12 TEMPORARY OPENINGS

- A. Coordinate construction and provide temporary openings in the building as required for the admission of equipment furnished under this Division.

#### 1.13 DEFINITIONS

- A. "Piping" includes, in addition to pipe, all fittings, valves, hangers, and other accessories relating to such piping.
- B. "Concealed" means hidden from sight in trenches, chases, furred spaces, shafts, hung ceilings, embedded in construction or in crawl spaces.
- C. "Exposed" means not installed underground or "concealed" as defined above.
- D. "Provide" means furnish and install complete and ready to operate.

#### 1.14 EQUIPMENT DEVIATIONS

- A. Where proposals to use an item of equipment other than that specified which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Architect at the Contractor's expense.
- B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, furnish and install any such ductwork, piping, structural supports, insulation, controllers,

motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

#### 1.15 EQUIPMENT PADS

- A. All grade and floor mounted equipment shall be provided with a reinforced concrete pad. Refer to architectural plans for pad locations, thickness, sizes, and construction requirements.
- B. If grade and/or floor mounted equipment is shown but no pad indicated on the architectural plans the contractor shall be responsible for clarifying the necessity, size, and location of any pads during the bidding process. No additional compensation will be given for pads which are required by this section but not indicated on the plans if no formal request for clarification was issued during the bidding process.

#### 1.16 EQUIPMENT VISIBILITY

- A. Where equipment is located on the roof or outside the building at grade in a place that is visible to the owner or general public, the following shall take place prior to roofing, placement of roof curbs or concrete equipment pads, routing of piping/electrical/controls/etc.:
  - 1. The contractor shall construct a full-size temporary mock-up of the equipment in the proposed location.
  - 2. The contractor shall review mock-up with architect and owner to obtain approval of equipment location. After approval, contractor shall remove and dispose of mockup materials.
  - 3. Any modification to equipment location to satisfy architect/owner requirements shall be noted on a shop drawing and submitted to the architect/engineer for comment and approval prior to final placement of equipment.

#### 1.17 ELECTRICAL ROOM REQUIREMENTS

- A. Do not install any piping, ductwork or equipment in or through electrical rooms, transformer rooms, electrical closets, telephone rooms or elevator machine rooms, unless piping or ductwork of equipment is intended to serve these rooms. Additionally, no ductwork or piping will be installed above electric panels. If the Contractor violates this requirement, he shall remove and/or relocate all items as required at his expense and to the satisfaction of the Architect.

#### 1.18 COOPERATION WITH OTHER TRADES

- A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. Coordination drawings shall be initiated by this contractor. It is this contractor's responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under Section **230000** of the Specifications.
  - 1. Drawings shall be prepared at not less than 1/4 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services.
  - 2. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections **210000**, **220000**, and **260000**, who shall be

responsible to coordinate his equipment and systems and shall show these on the drawings submitted.

3. After each Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each drawing has been coordinated between trades, and appropriate revisions made, each trade shall sign each drawing, indicating acceptance of the installation.
  4. The HVAC Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings.
- C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

#### 1.19 PROJECT RECORD DOCUMENTS:

- A. Each Contractor shall record clearly, neatly, accurately, and promptly as work progresses the following data:
1. Changes made resulting from change orders or instructions issued by the Architect.
  2. Changes in routing made to avoid conflict with other trades or structural conditions.
  3. Final location of equipment and panels if different than contract documents.
- B. Upon completion of the project submit to the Architect a set of electronic media noting "as built" conditions indicating all variations and deviations of his work from contract documents.

#### 1.20 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

- A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems installed. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the Contract Price.
- B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders, indexed, containing the following:
1. Complete shop drawings of all material and equipment of this section.
  2. Operation descriptions of all systems.
  3. Names, addresses and telephone numbers of all suppliers of system components.
  4. Preventative maintenance instructions for all systems.
  5. Spare parts list of all system components.
  6. Copies of all valve charts.

#### 1.21 PROTECTION

- A. Protect all work and material from damage by work and workmen, and accept liability for all damage thus caused.
- B. Be responsible for work and equipment until finally inspected, tested, and accepted. Protect work against theft, injury or damage; and carefully store material and equipment received on

site, which is not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

- C. All openings in stored & installed ductwork shall be covered & sealed when not in use to prevent contamination from dust & debris.

#### 1.22 SCAFFOLDING, RIGGING AND HOISTING

- A. Provide scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of material, equipment and apparatus furnished under this division. Remove same from premises upon completion of work.
- B. Coordinate propose routing with architect prior to rigging and protect all existing building components against damage.

#### 1.23 MATERIALS AND WORKMANSHIP

- A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.
- B. Furnish the services of an experienced foreman who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welder, helpers, and labor required to unload, transfer, erect, connect, adjust, start, operate, and test each system.
- C. All equipment and materials shall be installed in strict accordance with the manufacturer's recommended installation instructions as well as UL Listing instructions and all Local, State and National codes.

#### 1.24 QUIET OPERATION AND VIBRATION

- A. Work shall operate under all conditions of load without any objectionable sound or vibration. In case of moving machinery, sound, or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable shall be corrected in an approved manner at no expense to the Owner. Vibration control shall be means of approved vibration eliminators in a manner as recommended by the manufacturer of the eliminators.

#### 1.25 ACCESSIBILITY

- A. Assure and be responsible for the adequacy of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of the work. Cooperate with all other trades whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. Locate all equipment, which must be serviced, operated, adjusted or maintained fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, filters, dampers, starters, coils, fire dampers, smoke dampers and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility, and the engineer shall approve any change.
- C. Provide access panels for installation in concrete block walls or gypsum wallboard ceilings



and partitions in locations, which require access for service to the items located behind the permanent gypsum wallboard or concrete block finish.

- D. Access panels shall be installed where required to gain access to valves, dampers, controls, etc. Panels shall be flush, insulated, contain continuous steel hinge and screwdriver operated latch. Panels shall be rated equal to the assembly that they are being installed in panels shall be UL listed.
- E. Access panels located in fire rated partitions shall be fire panels. The frame and panel assembly of these fire panels shall be manufactured under the Factory Inspection Service of the Underwriters' Laboratories, Inc., and shall bear a label reading: "Frame and Fire Panel Assembly, Rating 2 hours. (B) Temperature Rise 30 Minutes, 250° F. Maximum." Rated panels shall be equipped with automatic closing mechanism and be self-latching.
- F. Panels shall be provided with screwdriver operated flush cam locks.
- G. Panel size shall be 12 inches x 12 inches except furnish a larger size if required to service a particular item. The exact location and size of each access panel shall be reviewed with, and approved by, the Engineer.
- H. The exact location and size of each access panel shall be noted on a shop drawing and reviewed with, and approved by, the Architect and Engineer in writing prior to installation.

#### 1.26 CUTTING AND PATCHING

- A. Provide all cutting and patching necessary to install the work specified in this division. Patching shall match adjacent surfaces.
- B. At floor slabs & wall openings to be cored drilled or cut, contractor shall find and mark on both faces all reinforcing, rebar, conduits, utilities, etc.. by means of x-ray, pach-ometer or prof-ometer. Submit sketch showing locations of all findings and proposed cuts or cores for review.
- C. No structural members shall be cut without the approval of the Structural Engineer, and all such cutting shall be accomplished in a manner directed by the Structural Engineer.

#### 1.27 GROUNDING

- A. All components of mechanical piping systems shall be properly grounded to building ground. Where ground path is interrupted by non-conductive materials, appropriate bonding or grounding to building ground shall be provided.

#### 1.28 WATERPROOFING

- A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Architect before work is started. Furnish all necessary sleeves required.

#### 1.29 BUILDING EXPANSION JOINTS

- A. Where ductwork or piping crosses a building expansion joint provisions shall be made to allow for the movement of each side of the structure without adversely impacting the integrity of the ductwork or piping.
- B. Ductwork crossing a building expansion joint expansion joint shall be provided with a flexible connection as indicated in these specifications and allow for a minimum of 3x the expected maximum relative deflection between the two building sections.

- C. Piping crossing a building expansion joint shall be provided with an expansion joint as indicated in these specifications and allow for a minimum of 4x the expected maximum relative deflection between the two building sections.
- D. Ductwork and piping shall be rigidly affixed to the structure on either side of the building expansion joint.
- E. Flexible connections and piping expansion joints shall be suitable for the fluid type and pressure being transferred.

#### 1.30 DEMOLITION

- A. Prior to submitting bid, visit site and identify existing conditions and difficulties that will affect work of this section. Demolition work will require careful site examination prior to bidding. No compensation will be granted for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observers.
- B. Prior to commencing demolition, contractor shall identify with owner any equipment to be returned to the owner after demolition. All other debris shall be disposed of by this contractor in accordance with all applicable regulations. Any shutdowns required for demolition shall be coordinated with building owner to avoid impact to operations.
- C. During demolition, any equipment, ductwork, piping, etc. found to be abandoned shall be demolished. Existing unused connections to existing ducts or piping shall be cut back to the mains and capped accordingly.
- D. Under demolition, the following is, in brief, the extent of the work to be performed by the mechanical contractor under this contract.
  - 1. The mechanical contractor shall be responsible for the disconnection and removal of the existing mechanical equipment, ductwork, piping, valves, etc., in designated areas. Cut & cap piping and ductwork back to mains. Patch all roof and wall penetrations to match existing.
  - 2. This contractor shall protect work against injury or damage; and carefully store material and equipment to be relocated. Open ends of work shall be closed with temporary covers or plugs during storage and construction to prevent entry of obstructing material.
  - 3. All existing HVAC components, including but not limited to ductwork, piping, equipment, controls & accessories, shall be removed from the area of renovation.
  - 4. Coordinate all demolition with other trades to ensure all relevant portions of the system including associated electrical and plumbing components are removed.
  - 5. Refer to drawing plans and notes for additional information.

#### 1.31 DESIGN BUILD PROVISIONS (WHERE APPLICABLE)

- A. The Work will be performed based on a Design/Build approach in which the Mechanical Subcontractor provides the engineering needed to satisfy performance criteria and other requirements listed herein. The criteria and requirements are meant to establish the general intent and do not always give specific sizes and types. This proposal must therefore include both system design and engineering services.
- B. Shop Drawings shall clearly describe the limits of the Work and identify related work by other trades. Work that the Mechanical Subcontractor requires to be done by other trades should also be noted. Formal coordination drawings will not be produced. Instead each major

subcontractor will circulate their drawings to the other trades for review and comments. This will conclude with a coordination meeting in which all conflicts will be identified and resolved.

- C. The responsibility to insure that all Work items fit in the space available lies with the Mechanical Subcontractor. The Shop Drawings must in turn include dimensioned details drawn to scale.
- D. The Mechanical Subcontractor shall revise the Shop Drawings to include all required changes. Final revised drawings shall be issued prior to starting work.

#### 1.32 TEMPORARY HEAT

- A. The building must remain in full operation during the construction period. This contractor shall provide temporary space conditioning, hot water heating, and/or domestic water production for the duration of time which the existing systems are inoperable or have owner approval for any downtime.
- B. This contractor shall provide a minimum of 48 hours' notice of any shutdowns and coordinate maximum allowable system downtimes with the Owner and/or Director of Operations prior to the start of work.
- C. This contractor shall be responsible for providing temporary heating equipment at any point during construction as required to maintain laborer comfort and avoid damage to the building or any of its associated components, systems, or equipment.
- D. Contractor shall provide all temporary or permanent equipment, materials, and labor to ensure these stipulations are met.
- E. Temporary heating requirements shall be coordinated with the electrical and plumbing contractor as required. This contractor shall carry all costs associated with utilizing other contractors to provide materials or labor for temporary services indicated above.

#### 1.33 REBATES

- A. The contractor shall make the owner aware of all applicable "upstream" energy rebates available for this project.
- B. The contractor shall provide the owner all necessary information and documentation for completion and submission of energy rebate applications.

### PART 2: PRODUCTS

#### 2.1 IDENTIFICATION, MARKING AND TAGGING

- A. Systems and equipment to be identified and marked and valves tagged include, but are not limited to the Heating, Air Conditioning & Ventilating systems.
- B. Submit samples of marking and tagging devices and wording, lettering and numbering scheme for each system.
- C. Equipment Identification:
  - 1. Manufacturer's nameplates or trademark shall be permanently affixed to all equipment and materials furnished under this division. Manufacturer's nameplates shall include all pertinent data relative to the piece of equipment including model number, serial number, and operating characteristics as applicable.
  - 2. Separate Equipment Identification Markers shall identify each item of equipment

with a permanently attached marker indicating designation and/or number corresponding to design documents.

3. Markers shall be of rigid black Bakelite or phenolic construction with white engraved or incised letters.
4. Lettering on equipment markers shall be of adequate size to be legible from floor levels. In all cases marker lettering shall no be less than 1 inch high.

D. Piping System Identification:

1. Piping Systems shall be identified as indicated herein or as required by applicable codes and/or officials having jurisdiction.
2. Pipe Markers shall be color coded according to " Designations to Colors" - ASME A13.1-2007.
3. All piping and equipment shall be identified by pipe markings, which shall be provided by this Contractor. Markers shall be applied every 20 ft. Markings shall indicate pipe content, system, operating pressure & temperature, and direction of flow. The markers shall be as manufactured by Seton Name Plate Corp. or equal
4. Pipe Markers shall be of the pressure sensitive type as manufactured by the Seton Nameplate Corp. (F10-Code)
5. Valve Identification: Provide laminated plastic nameplates on all valves installed under **Division 23**, except stop valves in supplies to fixtures. Tags shall be constructed of 0.125 inches thick melamine plastic conforming to Fed. Spec. L-P-387. Surface shall be matte finish. Accurately align lettering and engrave into white core. Nameplates shall be to 2 inches round or hexagonal. Lettering shall be minimum of 0.375 inch high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame one chart and schedule for each system under glass and place where directed in mechanical room. Furnish four copies of each chart and schedule. Each inscription shall identify its function. Attach nameplates with "S" hooks and chain to each valve. Valve nameplates shall be numbered and "keyed".

2.2 SLEEVES, INSERTS AND ESCUTCHEONS

- A. Provide sleeves for all work passing through floor, wall, and ceiling construction. Locate and provide sleeves and inserts before the floor, wall or ceiling is constructed. If this contractor does not comply with the above, he shall bear all costs incurred for cutting and patching required for the installation of sleeves and inserts. Holes required for sleeves in existing walls and floors, or to conform to the above shall be saw cut or core drilled. This Contractor shall provide all drilling required for the installation of hangers.
- B. Pipe sleeves through outside walls shall be Schedule 80 black steel pipe with 150 lb. black steel slip-on welded flanges welded at the center of the outside. Extend sleeves 1/2 inch beyond each side of the wall. Pack the space between sleeve and pipe with oakum to within 2 inches of each face of the wall. Pack the remaining space and make watertight with an approved waterproof compound.
- C. Pipe sleeves through concrete floors or interior masonry walls shall be Schedule 40 black steel pipe, set flush with finished wall or ceiling surfaces, but extending 2 inches above finished floors. Plastic, PVC, or light metal sleeves shall not be installed.
- D. Provide individual or strip type inserts pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4-inch diameter, permitting lateral adjustment.

Individual inserts shall have an opening at the top to allow reinforcing rods to 1/2 inch diameter to be passed through the insert body. Strip inserts shall have attached rods with hooded ends to allow fastening to reinforcing rods.

- E. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes, the sleeves shall be large enough to pass the pipe and the insulation. Check floor and wall construction finishes to determine proper length of sleeves for various locations.
- F. Provide 22 gauge galvanized steel duct sleeves through interior walls, floors and ceilings set flush with finished surfaces.
- G. Pack the space between sleeves and structure, and sleeves and pipes or ducts passing through fire rated interior walls, floors, and ceilings with an approved fire and smoke proof packing material. Fire-stopping material shall maintain its dimensions and integrity while preventing the passage of flame, smoke, and gases under conditions of installation and user when exposed to the ASTM E119 time-temperature curve for a time period equivalent to the rating of the assembly penetrated. Cotton waste shall not ignite when placed in contact with the non-fire side during the test. Fire-stopping material shall be non-combustible as defined by ASTM E136; and in addition, for insulation materials, melt point shall be a minimum of 1700 degrees F. for 1-hour protection and 1850 degrees F. for 2-hour protection.
- H. Fasten sleeves securely in floors, walls, etc. so that they will not become displaced when concrete is poured or when construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.
- I. In all areas where ducts are exposed and pass through floors, the hole shall be surrounded by a 4-inch high by 3-inch wide concrete curb, or otherwise protected as determined by the Engineer.
- J. Escutcheon plates shall be provided for all exposed un-insulated pipes passing through walls, floors, and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe. Where plates are provided for pipes passing through sleeves, which extend above the floor surface, provide deep recessed plates to conceal pipe sleeves.

### 2.3 SUPPORTS & ATTACHMENTS

- A. Provide all necessary supports and bases required for all equipment, piping and for all other equipment furnished under this contract. Submit shop drawings to the Architect for approval before purchase, fabrication or construction of same.
- B. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are not strong enough shall be replaced as directed.
- C. Vibration Isolation: All mechanical equipment, piping and ductwork shall be mounted on vibration isolators/inertia bases to prevent the transmission of vibration and mechanically transmitted sound to the building structure.
  - 1. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
  - 2. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.

## 2.4 SEISMIC RESTRAINTS

- A. It is the intent of this seismic specification that this contractor shall provide all necessary seismic restraints required to keep all mechanical building system components in place during a seismic event as required by the Building Code.
- B. All mechanical systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
- C. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. Contractor shall submit a report outlining the structural engineer's review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.
  - 1. Any questions relative to Component Importance factors shall be issued to the Architect/Engineer for resolution prior to seismic analysis.
- D. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

## 2.5 ELECTRIC MOTORS/STARTERS/VARIABLE FREQUENCY DRIVES

- A. Electric motors and starters shall conform to requirements of the AIEE, NEMA, UL, and NEC and shall be suitable for load duty, voltage, phase, frequency, service and location required. Provide inverter duty rated motors for use with variable frequency drives. Provide shaft grounding rings for all VFD controlled motors.
- B. All motors shall be rated at 85% power factor at full rated load. Motors less than 85% power factor shall be corrected to 90% power factor at the factory. All motors shall be rated high efficiency.
- C. Disconnects provided by this contractor will be installed by **Division 26**, with the exception of factory mounted disconnects.
- D. Motors smaller than 1/2 HP shall be capacitor-start or split phase type, single phase, 60-hertz alternating current for voltage required. Motors 1/2 HP and larger shall be squirrel-cage induction three phase 60 hertz alternating current for voltage required, unless specifically noted otherwise.
- E. Where available, starters and disconnects shall be factory mounted by the unit manufacturer.

## 2.6 USE OF INSTALLATION

- A. The Owners shall have the privilege of using any part of the installation when sufficiently complete, but such use thereof, or partial or final payment shall not be considered as an acceptance of such work in lieu of a written certificate from the Engineer.

## 2.7 DUCTWORK

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, supports and sealing for operating pressures indicated.
- B. Duct gauge shall be as required by SMACNA Duct Construction Standards taking into account duct size, supports, pressure rating, and any other relevant parameters. All ductwork, regardless of SMACNA Standards, shall be no thinner than 26 gauge.

- C. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having G90 zinc coating of in conformance with ASTM A90.
1. Sealant: As recommended by manufacturer specifically for sealing joints and seams in ductwork.
  2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
  3. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- D. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Flexible Connections
1. Flexible connections shall be provided where a fan connects to a duct or casings to prevent transmission of vibration to ductwork.
  2. Flexible connections shall fit tightly around ducts and fans and be securely bolted or clamped in place. Taping shall not be allowed.
  3. Flexible duct connections shall be 6" long and made of straight, waterproof, flame retardant fabric having a flame spread rating of not over 25 and a smoke development rating of not over 50
- F. Fire Dampers:
1. Provide fire dampers throughout air distribution system as required by applicable codes, standards and authorities. Provide access door for each fire damper of sufficient size to repair internal link. **Fire dampers indicated on drawings may not fully represent the exact number required for this project. It is the Contractor's responsibility, at no additional cost to the Owner, to provide all required dampers.**
  2. Dampers shall be approved fusible-link self-closing spring loaded type, Buckley Model 150B or equal.
  3. Dampers shall be dynamic type when serving a system that is not shut down during fire alarm activation.
  4. Frame shall be fitted with angle iron stop and stainless steel spring latch, and shall be securely fastened to building construction.
  5. Seal spaces between damper frames and walls and between damper frames and floor with approved fire-retardant material.
  6. Use of dampers shall NOT reduce net free area of duct below that shown on drawings. Fire dampers shall be Type B with blades of dampers out of air stream.
  7. Samples of fire dampers shall be submitted to and approved by local authorities having jurisdiction.
  8. Dampers shall bear 1-1/2 hour UL-rating fire damper label and shall be constructed and installed as required by UL-555.
  9. Fire dampers shall be Buckley, Ruskin, Nailor Industries or Prefco for use in the proper duct pressure classification.

10. Dampers shall be installed per SMACNA with breakaway connections and nose pieces on duct liner (see SMACNA HVAC Duct Construction Standards).
11. All dampers in ductwork served by equipment not subject to fan shut down upon fire alarm activation shall be dynamic type.

#### G. Combination Fire/Smoke Dampers

1. Dampers shall meet the requirements of NFPA 80, 90A, 92, 101 and 105. Dampers shall be classified by Underwriter's Laboratories and labeled as a 1 1/2 hour Fire Damper under UL 555 and as a Class I or Class II Smoke Damper under UL 555S at an elevated temperature of 250°F (121°C) for use in dynamic or static Smoke Control Systems.
2. Dampers shall be tested under UL 555 and UL 555S by UL to a minimum velocity/pressure rating of 2000 fpm @ 4" w.g.
3. Frame shall be constructed of 16 ga. (1.6) galvanized steel hat channel with mitered corners reinforced with die-formed corner gussets for strength. Blades shall be 14 ga. (2.0) equivalent galvanized steel formed double-skin airfoil design on 5 1/2" (140) centers.
4. Dampers shall be of opposed blade configuration with an interlocking blade design that provides complete flame and smoke seal under fire conditions at an elevated temperature of 2000°F (1093°C) when in the closed position. Dampers requiring blade seals to maintain leakage class when under elevated temperature conditions are not acceptable. Blade linkage shall be zero-maintenance, concealed in frame, out of airstream. Jamb seals shall be compression type stainless steel.
5. Dampers shall be supplied with factory installed sleeves, length dependent on wall thickness, minimum 16" (406). Wall thickness shall be field verified by contractor. Where dampers are installed adjacent to a supply or return grille the sleeves shall be specifically designed for this installation.
6. Appropriate internally mounted Electric Resettable Link actuators shall be installed by the damper manufacturer in the factory. Actuators shall incorporate an OEM internal spring return mechanism; external after-market spring mechanisms are not acceptable.
7. Each damper shall be equipped with a UL Classified heat responsive device that will cause the damper to close in a controlled manner and lock in a closed position by means of an over center/knee lock linkage, when the duct temperature reaches the maximum degradation temperature of the damper/actuator assembly as required by UL 555S. Closure devices that cause instantaneous closure are not acceptable.
8. Submitted pressure drop data to be based on tests in accordance with AMCA Standard 500-D. Dampers must comply with the requirements of AMCA 511 Certified Ratings Program and be qualified to bear the AMCA Seal for Air Performance.
9. Standard of acceptance shall be Nailor Industries Model Series 1220, 12221G or approved equal.
10. Wall and duct access doors shall be provided to allow for testing and maintenance.

#### H. Ceiling Radiation Dampers and Fire-Rated Blankets:



1. For fire-rated ceiling assemblies, provide at all duct penetrations, ceiling diffusers, registers and grilles: Radiation dampers (Nailor Industries Series 0700 or approved equal) and Fire Blanket (Nailor Industries 0725 or approved equal) or fire assembly: radiation damper and blanket already assembled Nailor or equal.
2. All radiation dampers shall be installed strict accordance with the manufacturer's recommended installation instructions and UL listing. Contractor shall keep a copy of the installation instructions on site for review by the engineer upon request.

I. Volume Dampers:

1. Provide Young Regulator manual adjustable rectangular opposed blade dampers for duct heights less than 12" with factory-installed locking hand quadrants extended 2" for all dampers installed in externally insulated duct:
  - a) On each supply, return and general duct take-off.
  - b) At each take-off to register, grille or diffuser (not all are shown on drawing).
2. Dampers are manufactured approximately 5/16" smaller in width and 1/8" smaller in height than size of duct in which they are installed; e.g., nominal damper size is 24" x 10"; actual size is approximately 23-11/16" x 9-7/8".
3. Damper frame shall be constructed of #6063 extruded aluminum reinforced channel with minimum thickness of .050". Opposed damper blades shall be #6063 extruded aluminum with minimum thickness of .050" and shall include reinforcing ribs. Each blade shall be supported in the damper frame by individual Teflon axle bearings, and shall be driven by stainless steel connecting slide linkage controlled by 3/8" square steel control shaft.
4. Note: All required volume dampers may not be indicated on drawings but dampers shall be provided as necessary for systems balancing.
5. Dampers 12" and larger in height shall be opposed multi-blade equal to Greenheck, Nailor or Vent Products.
6. Where dampers are inaccessible, use Young Rectangular locking type ceiling regulators and miter gear or worm gear for all horizontal dampers. Bearing coupling for bottom duct control may be used for shaft on vertical blade dampers. The 3/8" rod between ceiling regulator and damper shall be provided by Contractor.
7. Where dampers are to be located above hard ceilings Young Regulator Bowden Cable Control Dampers shall be utilized. Controllers (actuators) shall be of the concealed ceiling type. Controller type, finish & locations to be approved by architect prior to purchase & installation. The cable between the damper and controller shall be provided by the contractor.
8. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to supporting rods. Hem over edges parallel to rods.
9. Brackets shall be galvanized metal, secured to ductwork with sheetmetal screw with locking quadrant arms (see seal class section for additional requirements). Provide 2" handle extension for all dampers on externally insulated ductwork.
10. Note: All required volume dampers may not be indicated on Drawings but dampers shall be provided as necessary for system balancing.
11. Constant Airflow Regulators (CAR Dampers)

- a) Dampers shall solely operate on duct pressure and require no external power supply. Each regulator shall be pre-set and factory calibrated, requiring no field adjustment to the airflows as indicated on the schedule, and shall be rated for use in air temperatures ranging from -25° to 140°F (-32° to 60°C.)
- b) Constant Airflow Regulators shall be capable of maintaining constant airflow within +/- 10% of scheduled flow rates (15% for units 50 CFM or less), within the operating range of 0.2 to 0.8 in. w.g. differential pressure, or 0.6 to 2.4 in. w.g. on high-pressure models (CAR-II-HP), or 0.1 to 0.42 in. w.g. on low-pressure models (CAR-II-LP).
- c) Regulators shall be provided as an assembly consisting of a 94V-0 UL ABS plastic body housed within a round sleeve for mounting in round duct. Each round sleeve must be fitted with a lip gasket to ensure perimeter air tightness with the interior surface of the duct.
- d) All regulators must be classified per UL 2043 and carry the UL mark indicating compliance. All Constant Airflow Regulators will require no maintenance and must be warranted for a period of no less than five years. Constant Airflow Regulators shall be installed in tight ducting systems in accordance with all applicable codes and manufacturer's instructions.
- e) Provide Model CAR-II Constant Airflow Regulators by American ALDES Ventilation Corporation or approved equal.

## 2.8 DUCT INSULATION

- A. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes. Where local code conflicts with specifications, the more stringent shall apply.
- B. Concealed supply, return and fresh air ducts for heating, cooling and air intakes:
  - 1. Insulation: ASTM C553; flexible, foil faced, noncombustible blanket.
    - a) Interior Concealed/Tempered: R-Value of 8.0 installed.
    - b) Interior Ventilated/Untempered: R-Value of 12.0 installed.
  - 2. Vapor Barrier Jacket:
    - a) Kraft paper with glass fiber yarn and bonded to aluminized film.
      - (i) Moisture vapor transmission: ASTM E96; 0.02 perms.
      - (ii) Secure with pressure sensitive tape.
  - 3. Vapor Barrier Tape:
    - a) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- C. Exhaust Ductwork Insulation:
  - 1. Insulation: ASTM C553; flexible, foil faced, noncombustible blanket.
  - 2. Direct Exhaust: No Insulation Required.
  - 3. Upstream of an ERV:
    - a) Refer to Supply, Return & Fresh Air Duct Insulation.

#### D. Fire Wrap

1. Provide fire wrap on Ductwork after ductwork penetrates a fire barrier/partition or where proper clearance to combustibles (as required by NFPA 96 and local codes and ordinances) cannot be achieved.
  2. Acceptable Manufacturer: Thermal Ceramics; 2102 Old Savannah Rd., Augusta, GA 30906. ASD. Toll Free Tel: (800) KAOWOOL. Tel: (706) 796-4200. Fax: (706) 796-4398. Email: [firemaster@thermalceramics.com](mailto:firemaster@thermalceramics.com). Web: <http://www.thermalceramics.com>.
- E. All duct insulation & wrap shall be installed per the manufacturer's application instructions. Provide mechanical fasteners to the bottom of ducts as required by the manufacturer.

### 2.9 INTERIOR DUCT LINER

- A. Polymer Foam insulation (EPFI) equal to IMCOA "IMCOSHEET" Engineered Polymer Foam Insulation, 1 inch thick,  $R = 4.0$ , closed cell. Insulation shall be installed as required by the insulation manufacturer. Insulation shall be in compliance with NFPA 90 and 90B. Flame spread shall be less than 25 and smoke density less than 50 per ASTM E-84, NFPA 255, UL 723 Class I and UL 181.
- B. Duct lining shall be applied in the following locations:
1. 10' upstream and downstream from all air handling unit of 10 tons or less.
  2. 5' downstream from all other fan powered units including, but not limited to, fan powered VAV boxes.
- C. Areas provided with interior duct lining shall also be provided with exterior duct insulation as indicated by these specifications.

### 2.10 PIPING

#### A. Equipment Drains and Overflows

1. Copper Tubing: ASTM B88, Type L, hard drawn.
  - a) Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
  - b) Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F (220 to 280 degrees C) or Victaulic grooved joints.
2. PVC Pipe: ASTM D1785, Schedule 40 and Schedule 80 for sizes 8 inch (200 mm) and larger or ASTM D2241, SDR 21 or 26.
  - a) Fittings: ASTM D2466 or D2467, PVC.
  - b) Joints: ASTM D2855, solvent weld.

#### B. Refrigerant Piping Copper Tubing: ASTM B280, Type ACR hard drawn.

1. Fittings: ASME B16.22 wrought copper.
2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.
3. Provide all valves and accessories required for complete installation.

C. Plenum Return Applications

1. Where piping is installed in a return air plenum piping shall be plenum rated.
2. PVC and/or PEX piping shall not be allowed in return air plenums.

2.11 PIPING INSULATION

A. Insulation

1. Hydronic/Steam Piping: Preformed glass fiber meeting ASTM C547, "k" value of 0.24 @ 75°F with all service jacket (ASJ). Service temperature 0°F to +850°F, 25/50.
2. Low Temperature Fluid Applications: Provide insulation with integral wick material. Product shall include a factory applied integral vapor retarder extending under the evaporator area of the wick and covering not less than 98% of the circumference of the product. Exposed evaporator area shall be not less than 0.1 sq. ft./linear ft. of product.
3. Refrigerant Piping: Flexible closed cell insulation.
4. Plenum Return Applications: All insulation, jackets and accessories shall be rated for use in return air plenums.

- B. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes.

| FLUID                                          | NOMINAL PIPE DIAMETER |        |
|------------------------------------------------|-----------------------|--------|
|                                                | ≤1.5"                 | >1.5"  |
| Chilled Water, Cold Condensate, or Refrigerant | 1 1/2"                | 1 1/2" |

C. Condensate Piping

1. All condensate piping, regardless of temperature, shall be provided with insulation.
2. Condensate generated by cooling coils shall be considered Low Temperature Fluid.

- D. Fittings: Factory precut insulation inserts, thickness to be same as adjacent. Enclose in premolded, PVC fitting covers.

1. Low Temperature Applications: Fittings and valves shall be wrapped continuously with wicking material prior to installing insulation to ensure a continuous path for removal of condensation.

E. Jackets:

1. Interior: Factory applied, all service jacket of white Kraft bonded to aluminum foil reinforced with fiberglass yarn and suitable for painting. Longitudinal and butt joints shall be made with factory applied pressure sensitive material.
2. Exterior/Exposed (Low Temperature): Field applied, 20 mil, PVC sheet material.
3. Exterior/Exposed (High Temperature): Field applied, Aluminum sheet material.
4. All jackets exposed to the weather shall be reflective, UV resistant and sealed

watertight.

F. Preparation

1. Install materials after piping has been tested and approved.

G. Installation

1. Install materials in strict accordance with manufacturer's instructions.
2. Continue all insulation through penetrations.
3. In piping exposed to view, locate insulation and cover seams in least visible locations.
4. On piping that requires condensation control, (i.e. chilled or cold) insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
5. On piping not requiring condensation control (i.e. steam, condensate hot water) do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.
6. Provide pipe insulation with weatherproof jacket on exterior piping that has heat trace.

H. Supports:

1. All piping shall be supported in such a manner that the insulation is not compromised by the hanger or the effects of the hanger. In all cases, hanger spacing shall be such that the circumferential joint may be made outside the hanger. Cover the evaporating holes with contractor supplied VaporWick Sealing Tape for the length of the metal saddle.
2. Piping systems 3" (75 mm) in diameter or less, insulated with fiberglass pipe insulation, may be supported by placing saddles of the proper length and spacing under the insulation as designated in Owens Corning Pub. 1-IN-14210.
3. For hot or cold piping systems larger than 3" (75 mm) in diameter, operating at temperatures less than +200F (93C) and insulated with fiberglass, inserts such as foam or high-density fiberglass with sufficient compressive strength shall be used to support the weight of the piping system.
4. On vertical runs, insulation support rings shall be used.

I. Accessories:

1. Insulation Bands: ¾ inch wide; 0.015 stainless steel
2. Metal Jacket Bands: ½ inch wide; 0.015 thick aluminum.
3. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.
4. Finishing Cement: ASTM C449.
5. Fibrous Glass Cloth: Untreated; 8oz/sq. yd. Weight.
6. Adhesives: Compatible with insulation.
7. Wick material for wrapping valves and fittings
8. Closure Materials –Sealing Tape, and mastics.
9. Support Materials - Hanger straps, hanger rods, saddles, support high-density blocks,

and support rings.

10. All accessory materials shall be installed in accordance with project drawings and specifications, manufacturer's instructions, and/or in conformance with the current edition of "Commercial & Industrial Insulation Standards."

#### 2.12 PIPING / EQUIPMENT LOCATED IN AREAS SUBJECT TO FREEZING

- A. All piping subject to freezing shall be wrapped with heat trace cable, insulated as per specification and energy code, and in the case of drain piping, maintain a minimum continuous slope of 1%.
- B. Where ceiling mounted equipment penetrates into an uninsulated attic space, it shall be covered with blanket insulation meeting minimum building code requirements and done in a manner complying with the equipment manufacturer's recommendations.

#### 2.13 FIRESTOPPING

- A. Provide Firestopping systems for penetrations in fire-resistance-rated assemblies, including both membrane and through penetrations. This contractor shall thoroughly review architectural plans for assembly type and location and shall prepare bid accordingly.
- B. Materials and systems shall be designed to meet the requirements of the intended application and shall be installed per manufacturer's guidelines.
- C. Submittals: Provide for review Manufacturer's product literature and tested assembly for each type of fire protection material including product characteristics, typical uses, installation procedures, performance and limitation criteria.

#### 2.14 DRIP PANS & LEAK DETECTION

- A. Drip pans shall be provided where indicated on plans and under all new and existing piping within critical spaces.
- B. Drip pans shall be constructed of continuously welded sheet metal. Each section shall be provided with a wire type leak detection sensor compatible with fluids present in piping. Leak detection alarms shall be tied back to Building Management System.
- C. Provide new leak detection sensors in all existing drip pans. Tie alarms back to Building Management System.

#### 2.15 SECONDARY DRAIN PANS

- A. A secondary drain pan shall be provided under each piece of concealed (above ceilings, in closets, etc.) HVAC equipped which produces condensate.
- B. The pan shall have a minimum depth of 1.5" and shall not be less than 3" larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion resistant material. Metallic pans shall have a minimum thickness of not less than 0.0276-inch galvanized sheet metal and non-metallic pans shall have a minimum thickness of not less than 0.0625 inch.
- C. The secondary drain pan with a separate drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.
- D. A secondary drain pan without a separate drain shall be equipped with water level detection device that will shut off the equipment served prior to overflow of the pan

## PART 3: EXECUTION

### 3.1 OPERATING INSTRUCTIONS

- A. Instruction to the Owner's Personnel - After completion of all work and all tests and at such times as designated by the Architect, provide the necessary skilled personnel to operate the entire installation until receipt of owners acceptance.
- B. During the operating period, instruct the Owner's representative in the complete operation, adjustment, and maintenance of the entire installation.
- C. Give at least forty-eight (48) hours advance notice to the Owner to coordinate scheduling of this instructional period.
- D. Furnish to the Architect five (5) complete bound sets of typewritten or blueprinted instruction manuals for operating and maintaining all systems and equipment included in the contract. All instruction manuals shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.
- E. The above-mentioned instructions shall include the maintenance schedule for the principal items of equipment furnished under this contract.

### 3.2 MANUFACTURER'S RECOMMENDATIONS:

- A. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

### 3.3 TESTING, ADJUSTING, STARTING UP AND COMMISSIONING

- A. Testing: All work must be proved satisfactory. The tests herein specified shall be applied in the presence of, and to the satisfaction of, the Architect before the work is covered, concealed or made inaccessible to testing, repair, correction or replacement. Accommodate the testing operation to the progress of the project as a whole. Correct all defects appearing under test and repeat the tests until all parts of the work have been successfully tested. Apply the specific tests herein described. Present all work for acceptance in clean condition, properly adjusted and in good working order; for instance, all machinery must be quiet, well balanced, and must be in place and reading accurately. All systems, equipment, controls, and devices in this work shall be tested in operation and must prove for their purposes in the judgment of the Architect or his authorized representative. All internal surfaces of all lines and equipment shall be blown or flushed clean. Where pressure tests are specified, the apparatus shall be clean before the tests are applied. Contractor shall provide adequate protection of piping and duct systems to prevent vandalism and/or accidental damage, blockage, etc., that will hinder or prevent proper operation of the finished systems.
  - 1. Provide instruments, pumps, gauges, supplies, equipment, materials, and labor for testing and starting up. Dispose of test water and wastes after test, in a manner approved by all applicable codes.
  - 2. Perform tests which may be required by authorities or agencies in addition to those herein specified.
  - 3. Piping for steam, hot water, chilled water, supply and return, drain, escape and relief

valve discharge shall be tested with water and made tight under pressure of 150 pounds per square inch gauge maintained for one hour without pumping or as long as required to inspect all joints. Repair all leaks and retest. Piping shall be made tight without caulking. Apply pressure tests to piping only before connection of equipment. In no case shall piping, equipment or accessories be subjected to a pressure exceeding its rating. Low-pressure elements shall be isolated or removed before tests are conducted.

4. Test valve bonnets for tightness. Test operate all valves at least once from closed-to-open-to-closed positions while valve is under pressure. Test all automatic valves for proper operation at the settings indicated. Test pressure relief valves at least three (3) times.
5. Test piping specialties for proper operation. Test air vent points to ensure that air has been vented.
6. Furnish certified shop test records for all pressure vessels. After installation, test at full operating pressures and temperatures maintained for one hour. Set and test all pressure control, relief and safety devices.
7. Repair or replace all defective work and repeat tests until the particular system and component parts thereof receive the approval of the Architect.
8. The duration of tests shall be as determined by authorities having jurisdiction, but in no case less than the time prescribed in each section of the specifications.
9. Test equipment and systems, which normally operate during seasons of the year during the appropriate season. Perform tests on individual equipment, systems and their controls. Whenever the equipment or system under test is interrelated with and depends upon the operation of other equipment, systems and controls for proper operation, function, and performance; the latter shall be operated simultaneously with the equipment of system being tested.

#### B. Adjusting, Balancing and Starting Up

1. Flush clean all systems prior to starting up the system. Any damages to the building or system components caused by failure to clean the systems properly shall be corrected to the satisfaction of the Architect or his authorized representative at no additional cost to the Owner.
2. In duct and piping systems, eliminate all noise and vibration and take all measures to secure proper circulation.
3. Run motor-driven equipment continuously for at least two hours in the presence of the Architect. Correct all defects of noise, vibration, alignment and balance. Replace all motors, which overheat or are noisy.
4. Balance systems completely for temperature, volume, and pressure per NEBB performance standards. Balancing subcontractor shall provide proof of certification by NEBB.
5. Air and water volumetric flow rates shall be within ten (10) percent of those specified. Air and water quantities and pressures shall be tested, balanced and recorded at all terminal devices. Volumetric flows and pressures shall be recorded on suitable forms and submitted for approval.
6. Provide any and all labor and equipment necessary to properly balance the installation including but not limited to dampers, valves, flow stations, test ports,



sheaves, belts, etc.

7. All sequences of the system shall be checked and all temperature controls operated and commissioned as required to insure that all systems operate per Engineers intent.

C. Commissioning

1. This Contractor shall provide the deliverables to the engineer/owner.
2. Copies of all records shall be provided to the Engineer by this Contractor including, but not limited to:
  - a) Equipment manuals including the name of at least one service agency;
  - b) Testing and Balancing reports;
  - c) Functional performance testing of the equipment, controls, economizers, and lighting control systems.
3. All commissioning shall be performed as indicated here and elsewhere in the specifications and shall comply with provisions of the applicable Energy Conservation Code.
4. Start-up shall be provided by factory representatives and a full start-up report shall be provided for review and approval for the following equipment:
  - a) **Split System Heat Pump**
  - b) **Energy Recovery Ventilator**
  - c) **ETC...**

3.4 SEQUENCE OF OPERATIONS

- A. Sequence of Operations: This is a performance-based specification intended to convey the control intent of the various systems. The contractor shall provide detailed shop drawings including P&ID diagrams, equipment lists and finalized sequences for review by the Engineer prior to installation. Any questions concerning specific details shall be referred to the engineer for clarification.
- B. System: It is the intent of this specification that a complete Building Management System (BMS) utilizing Direct Digital Control (DDC) be provided to control and monitor all HVAC systems within the facility. Provide a single workstation for building maintenance personnel to interface with system sequences, setpoints and values.
- C. System: It is the intent of this specification that programmable electronic controls be provided to control occupied/unoccupied modes of all HVAC systems within the facility. Systems shall be provided with all additional required controls including, but not limited to, space mounted monitoring and user interface devices, to provide the specified sequence.
- D. Equipment and Wiring: This contractor shall provide all control equipment, and wiring (regardless of voltage) to accomplish the sequence of operations as detailed below. This contractor shall carry funds sufficient to hire the Electrical Contractor to provide line-voltage power, including any required wiring, breakers, and/or disconnects, to all control's components needing such power. Such components shall include, but may not be limited to:
  1. Control Transformers
  2. Central Equipment Controllers
  3. BMS Controllers

4. BMS Head-end Equipment
  5. Line-voltage Thermostats or other sensors
- E. Control and Monitoring: Sensors shall be provided throughout the HVAC systems (hydronic and air) as required to control and monitor their operation and verify performance at BMS. Provide sensors with remote mounted stats where indicated on the drawings. Where multiple space mounted sensors are required for a given unit they shall be located in the same general area.
- F. Safety Controls: This contractor shall provide all safety controls required to protect the building and all controlled equipment from damage as well as those controls necessary to signal abnormal operation or malfunction of equipment. These shall include but not be limited to high limits, low limits, freezestats, flow switches, interlocks and relays.
- G. Energy Efficiency: All controls and sequences shall be configured to provide maximum energy efficiency while maintaining occupant comfort.
- H. Automatic Load Management Controls: all load management controls shall be configured to conform with the following sequences: (IECC 2024 – Renewable Load Requirements)
1. Cooling temperature shift: Where electric cooling is in use, controls shall gradually increase the cooling setpoint by at least 3°F (1.7°C) over a minimum of 3 hours or reduce effective cooling capacity to 60 percent of installed capacity during the peak period or adjust the cooling temperature setpoint.
  2. Heating temperature shift: Where electric heating is in use, controls shall gradually decrease the heating setpoint by at least 3°F (1.7°C) over a minimum of 3 hours or reduce effective heating capacity to 60 percent of installed capacity during the peak period or adjust the heating temperature setpoint.
  3. Ventilation shift: Where HVAC systems serve multiple zones and have less than 70% outdoor air required, controls shall provide excess outdoor air preceding the peak period and reduce outdoor air by at least 30% during the peak period.
- I. Functional Performance Testing: The contractor shall perform complete and thorough Control Functional Performance Test (FPT) and Commissioning of the control systems. Upon completion of the FPT, a report shall be submitted to the engineer for review and comment. The FPT shall include testing of:
1. Safeties in every mode, i.e., in manual run mode as well as auto mode.
  2. Signals to and from the fire alarm, security and entry systems.
  3. Sequences of operation step by step in every mode and possible situation.
  4. The operation of all control loops under actual operating conditions.
  5. The interlocked operation of all equipment (i.e., the operation of starters in manual and off modes as well as auto mode, damper end switch interlock, etc.)
  6. Commissioning should test every conceivable life safety scenario and every conceivable operational scenario that the system will encounter and document this testing with printed graphs of trend logs.
- J. Energy Recovery Ventilator (ERV):
1. Occupied: Supply & exhaust fans shall run continuously in the occupied mode.
  2. Unoccupied: Supply and exhaust fans shall be de-energized in the unoccupied mode.

K. Electric Heater Control: (cabinet type, unit type, baseboard type, etc.)

1. Provide single temperature unit or room mounted thermostat to cycle electric heating coil and fan motor to maintain constant space temperature.

L. Variable Refrigerant Flow (VRF) System:

1. VRV Heat Pump (outdoor unit): Unit shall fully modulate its refrigerant flow and condenser fan speed in order to match the heat rejection requirements of the system.
2. Terminal Unit (FC):
  - a) Occupied: Fan shall run continuously. Unit shall cycle its refrigerant flow to maintain the space temperature as sensed by the space mounted temperature sensor.
  - b) Unoccupied: Fan shall be de-energized. On a call for heating or cooling from the space mounted temperature sensor the unit shall cycle its refrigerant flow to maintain the space temperature.

M. Overflow cut-off switches:

1. Provide an overflow cut-off switch in each secondary drain pan to shut down the associated unit and provide an alarm prior to overflow.

END OF SECTION

## **DIVISION 26**

## SECTION 260000

### ELECTRICAL

#### PART 1 – GENERAL

##### 1.1 RELATED SECTIONS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
- B. This Contractor shall also include allowances for startup and for making the systems fully operational, and for scope and design contingencies. Future changes in price for items not shown on these drawings will not be allowed if the system itself is shown on these Drawings.
- C. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.
- D. The drawings show the layout of the electrical systems and indicate the approximate locations of outlets, apparatus, and equipment. The runs of feeders and branches as shown on the drawings are schematic only. The exact routing of branch circuits and feeders shall be determined by the structural conditions and possible obstructions. This shall not be construed to mean that the design of the systems may be changed but refers only to exact runs between given points. The Engineer reserves the right to revise the drawings from time to time to indicate changes in the work.
- E. The Contractor shall consult and review all contract and reference drawings which may affect the location of any outlets, apparatus and equipment to avoid any possible interference and permit full location of outlets, apparatus and equipment up to the time of rough-in is reserved by the Engineer and such change shall be made without additional expense to the Owner.
- F. It shall be the responsibility of this Contractor to see that all electrical equipment such as junction and pull boxes, panelboards switches, controls and such other apparatus as may require maintenance and operation from time to time is made accessible. Although the equipment may be shown on the drawings in certain locations, the construction may disclose the fact that such locations do make its position accessible. In such cases this Contractor shall call the attention of the Engineer to the condition before advancing the construction to a state where a change will reflect additional expense to the Owner.

##### 1.2 SUMMARY

- A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 1.
- B. These documents have been prepared with the intention that they call for finished, tested work, in full operating condition and complete with necessary accessories.
- C. The contract drawings are generally diagrammatic and convey the scope of work and general arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect/Engineer before being installed. The Contractor shall follow the drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Contractor shall, without extra charge, make

reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

- D. These contract documents are complementary. What is called for by one shall be as binding as if called for by all. Materials or work described in words, which have well-known technical, or trade meaning shall be held to refer to such recognized standards. Incidental devices and accessories needed for complete, operational systems shall be provided even though they may not be indicated or identified in the documents.
- E. If apparatus have been omitted, notify the Architects/Engineers of such belief. It is understood that bidder has included all required items and work in his bid, and will not if bid is successful, claim extra compensation for furnishing a complete and satisfactory system. If a particular item is called for or specified more than once in these contract documents, the higher grade shall be considered specified.
- F. Should it appear that the character of the work is not sufficiently explained in these specifications or on the drawings, apply to the A/E for further information. Conform to the A/E's decision and directions as shall become part of these contract documents. The A/E reserves the right to be sole interpreter of the drawings and specifications, and all decisions shall be conclusive, final and binding on the parties.
- G. Materials called for in these documents shall be new, unused equipment and of the latest recognized standards.
- H. The work to be done under Division 26 is shown on the electrical drawings.

### 1.3 OUTLINE SCOPE OF WORK

- A. The work under this contract, without limiting the generality thereof, includes all materials, labor, equipment, services, and transportation, unless otherwise specified, necessary to complete all systems of electrical wiring and equipment required by the drawings and/or as specified herein. It is the intent of this section and accompanying electrical drawings that these systems be furnished complete in every respect. The Electrical Contractor shall furnish all wiring, equipment and labor needed for a complete operating installation.
- B. The Electrical Contractor shall fully indemnify the Owner against any damages, removals and alteration work. This is in addition to the requirements of the General Conditions of the Specifications.
- C. The Electrical Contractor shall review architectural, interior design and all other trades plans, elevations and details prior to any work and identify any conflicts between furnishings, furniture, art-work, molding, casework, televisions, signage, awnings, canopies, diffusers, fixtures, etc.. and electrical, fire alarm, audio/visual and communications devices shown on the electrical plans and details. The Electrical Contractor shall prepare 8.5" x 11" sketches showing the conflicts and submit to the Architect for resolution prior to any work. Failure of the electrical contractor to coordinate, identify and obtain a field-directive on any conflict herein noted, that results in installed electrical work to be relocated to the Owner/Architects liking shall be the sole-responsibility of the Electrical Contractor. The Electrical Contractor shall assume and cover all costs associated with conflicts not coordinated, identified and submitted to the Architect, inclusive of material, labor, overtime pay, etc.. and shall not affect the project schedule.

### 1.4 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 25 for rough-in requirements.

### 1.5 SURVEYS AND MEASUREMENTS

- A. Base measurements, both horizontal and vertical, on established bench marks. Work shall agree with these established lines and levels. Verify measurements at site and check the corrections of same as related to the work.
- B. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the A/E.

#### 1.6 EXAMINATION OF SITE

- A. Prior to submitting bid, visit the site where the work is to be performed and the materials are to be delivered. Failure in this respect shall not excuse the Contractor from his obligation to supply and install the work in accordance with the plans and specifications and under all conditions, as they exist.
- B. By submitting a bid, this Contractor warrants that all specification sections and drawings showing equipment for plumbing, heating, ventilation, air conditioning, electrical, and architectural, have been examined and is familiar with the conditions and extent of work affecting this contract.

#### 1.7 EQUIPMENT AND MATERIALS

- A. All equipment and materials for permanent installation shall be the products of recognized manufacturer's and shall be new, unless noted for re-use, without damaged, functional or aesthetic components.
- B. New equipment and materials shall:
  - 1. Be Underwriters Laboratories, Inc. (UL) labeled and/or listed where specifically called for, or where normally subject to such UL labeling and/or listing services
  - 2. Be without blemish or defect.
  - 3. Be in accordance with the latest applicable NEMA standards.
  - 4. Be products, which will meet with the acceptance of the agency inspecting the electrical work. Where such acceptance is contingent upon having the products examined, tested and certified by UL or other recognized testing laboratory, the product shall be so examined, tested and certified.
- C. For all equipment, which is to be installed but not purchased as part of the electrical work, the electrical work shall include:
  - 1. The coordination of their delivery.
  - 2. Their unloading from delivery trucks driven in to any point on the property line at grade level.
  - 3. Their safe handling and field storage up to the time of permanent placement in the project.
  - 4. The correction of any damage, defacement or corrosion to which they may have been subjected.
  - 5. Their field make-up and internal wiring as may be necessary for their proper operation.
  - 6. Their mounting in place, including the purchase and installation of all dunnage, supporting members and fastenings necessary to adapt them to architectural and structural conditions.
- D. Equipment, which is to be installed but not purchased as part of the electrical work, shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The electric work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

#### 1.8 ELECTRICAL INSTALLATIONS

- A. All materials and labor called for, specified in Division 26 of the specifications, and or shown on the electrical drawings furnished under this contract shall be provided under Division 16 unless called for

otherwise in the Division 16 documents. The word "provide" as used in the Division 16 documents, shall mean to furnish, install, connect up, complete with all accessories ready for operation and warranted.

- B. Coordinate electrical equipment and materials installation with other building components. Fully coordinate work with that of other trades. Furnish information in writing that is needed for the coordination of clearances, etc., with the work of others, and such information shall be given in a timely fashion so as not to impede the progress of two or more trades. Confer and resolve the conflict immediately. If so directed by the A/E, prepare composite drawings to resolve any space or clearance conflict.
- C. Verify all dimensions by field measurements.
- D. Arrange for chases, slots, and openings in other building components to allow for electrical installations.
- E. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.
- F. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- G. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.
- H. Where mounting heights are not detailed or dimensioned, the exact location shall be determined by the A/E, install electrical services and overhead equipment to provide the code and/or utility requirements.
- I. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- J. Coordinate the installation of electrical materials and equipment above ceilings with suspension systems, mechanical equipment and systems, and structural components.
- K. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- L. Attention is directed to areas and items indicated on the drawings by the notations "HOLD", "N.I.C.", "BY OTHERS" and words of similar intent. The work indicated in these areas is shown for information and continuity only. Work or items furnished and installed in these areas solely for the convenience of this Contractor or others, without prior written approval of the Owner, shall be removed at the option of the Owner and at the Contractor's expense.
- M. Provide all required staging and scaffolding for all the work under this section.

#### 1.9 ALTERATION WORK

- A. Maintain continuity of service in areas where occupancy is to be maintained during alterations. If it becomes necessary to disconnect or interrupt service, obtain written consent of the Owner, and only disconnect service at the convenience of, and with the consent of the Owner. A copy of the written request for a shutdown shall be forwarded to the A/E.

#### 1.10 CUTTING AND PATCHING

- A. Cutting and patching of electrical equipment, components, and materials specified under Division 26 (conduit, sleeves, equipment, etc.) shall be performed by Electrical Contractor.
- B. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 Section: "Cutting and Patching" for definitions, requirements, and procedures.



- C. Cutting and patching of existing structures (thru walls, floors, ceilings, etc.) to accommodate equipment, components, and materials of all Contractors, including Mechanical and Electrical Contractors, shall be performed by General Contractor and/or his designated Subcontractor.
- D. Cutting and patching of new structures (thru walls, floors, ceilings, etc.) to accommodate installation of ill-timed work or removal and replacement of defective work or work not conforming to requirements of Contract Documents, shall be performed by General Contractor and/or his designated Subcontractor and costs shall be back charged to appropriate trade Contractor.
- E. Do not endanger or damage installed work through procedures and processes of cutting and patching.
- F. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installations.
- G. Arrange to have ducts, raceways, conduit, panelboards, boxes, and such other pertinent parts, set in place ahead of construction work so that they will be built-in with structures and eliminate need for cutting and patching. Failure to conform to this paragraph will require that this Contractor perform any cutting and patching required for his work at his expense. Cutting shall be neatly finished to match adjoining work in a manner acceptable to the A/E. Cutting and patching shall not affect the fire rating of walls or structural parts. Cutting and patching required to correct work, due to error or negligence of the Contractor, or to defects in his material or workmanship, shall be corrected at no additional cost to the Owner. Patching shall meet or exceed quality of adjacent surfaces. Cutting must be accomplished as not to weaken adjacent structural members and must be approved by the Structural Engineer before proceeding.
- H. Perform cutting, fitting, and patching of electrical equipment and material required to:
  - 1. Uncover work to provide for installation of ill-timed work.
  - 2. Remove and replace defective work.
  - 3. Remove and replace work not conforming to requirements of the contract documents.
  - 4. Remove samples of installed work as specified for testing.
  - 5. Install equipment and materials in existing structures.
  - 6. Upon written instructions from the A/E, uncover and restore work to provide for A/E observation of concealed work.
- I. Cut, remove and legally dispose of selected electrical equipment, components and materials as indicated, including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by the work.
- J. Protect the structure, furnishing, finishes, and adjacent materials not indicated or scheduled to be removed. Protect the electrical work and the work of others in a manner best suited to the particular case. Correct any damage done to any work at no additional cost.
- K. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- L. Locate, identify, and protect electrical services passing through areas that are to under-go remodeling or demolition. Electrical services serving other areas required to be maintained, and transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

#### 1.11 SUBMITTALS

- A. Within fifteen (15) business days after the date of notice to proceed and before purchasing any materials or equipment, submit for approval a complete list, in six (6) copies, of all materials to be incorporated in the work.
- B. Shop drawings/manufacturer's cuts are required for:
  - 1. Wire & Cable.
  - 2. Lighting Fixtures.
  - 3. Panelboards.
  - 4. Disconnect Switches.

5. Wiring Devices and Plates.
  6. Fire Alarm System.
  7. Fire Stopping Materials.
  8. Seismic Restraint Components.
- C. After the list has been processed, submit complete shop drawings of all equipment. These shop drawings submittals shall be submitted within thirty days after the processing date of the original submittal.
- D. All submittals shall be complete and submitted electronically to all applicable parties. No consideration will be given to partial submittals except with prior approval. No consideration will be given to faxed submittals.
- E. Explanation of Shop Drawing Stamp:
1. Approved: indicates that we have not found any reason why this item should not be acceptable within the intent of the documents.
  2. Approved with Comments: indicates that we have found questionable components which, if corrected or otherwise explained, make the product acceptable.
  3. Resubmit for Final Review: indicates that this item should be resubmitted for approval before further processing.
  4. Does Not Conform: indicates that the item will not meet the intent of the Contract.
- F. No shop drawing stamp or note shall constitute an order to fabricate or ship. Such notification can only be performed by the Project Manager for construction, the Contractor scheduling his own work, or the Owner.
- G. Submittal of shop drawings, product data, will be reviewed only when submitted by the Contractor. Data submitted from Sub-contractors and material suppliers directly to the A/E will not be processed.
- H. If shop drawing is not in compliance after two submissions, a third submission for the same manufacturer will not be considered for review.
- I. Check shop drawings and other submittals to assure compliance with contract documents before submittal to A/E.
- J. Review of shop drawings is final and no further changes shall be considered without written application. Shop drawing review does not apply to quantities, dimensions, nor relieve this Contractor of his responsibility for furnishing materials or performing his work in full compliance with these contract drawings and specifications. Review of these shop drawings shall not be considered a guarantee of the measurements of this building or the conditions encountered.
- K. General requirements for the substitution of equipment and submittal of shop drawings as follows. If apparatus, systems or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, wiring, supports, or construction, it shall be provided by this Contractor at no additional cost to the Owner. This Contractor shall assume all cost and entire responsibility thereof. The approval of substituted equipment does not relieve the contractor of his/her responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist. It is the contractor's responsibility to submit only those items that meet the specified apparatus, systems and material. Should any non-conformance code items be installed, they shall be replaced by this Contractor at no additional cost to the Owner. The construction means and methods used in the project shall be reviewed and approved through the local building department or a deputy inspector to insure compliance with the current codes, project specifications and general building practices.
- L. Coordination drawings shall be submitted and shall show all HVAC, Electrical, Plumbing and Fire Protection systems superimposed in order to identify conflicts and ensure inter-coordination of all trades. Coordination drawings shall be initiated under this Section of the Specifications. It is this Contractors responsibility for preparation of project coordination drawings showing the installation of all electrical equipment, switchgear, motor control centers, panelboards, transformers, transfer switches, disconnect switches, enclosed circuit breakers, conduits, outlets, switches and accessories to be provided under this Section of the Specifications. These drawings shall be prepared at not less than

3/8 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. A reproducible copy of each drawing prepared shall then be submitted to the Mechanical, Plumbing and Sprinkler Contractors, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted. After this Contractor has fulfilled his obligation, he shall notify all other Contractors. After each drawing has been coordinated between trades, each trade shall sign each drawing, indicating acceptance of the installation. This Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings. A Subcontractor who fails to promptly review and incorporate his work on the drawings shall assume full responsibility of any installation conflicts affecting his work and of any schedule ramifications. Review of coordination drawings shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, and Electrical Contractors.

#### 1.12 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 for definitions, requirements, and procedures.
- B. If materials of equipment are substituted for specified items that alter the systems shown or its physical characteristics, or which have different operating characteristics, clearly note the alterations or differences and call it to the attention of the A/E. Under no circumstances shall substitutions be made unless identical material or equipment has been successfully operated for at least three consecutive years.
- C. All substitution made by the Contractor shall require the Contractor to fully coordinate the substitution with other trades. The Contractor must make any modifications required by the substitution at no additional cost to the Owner. In addition the Contractor must notify the A/E of any changes required and obtain approval for the changes. The review of the shop drawings by the A/E shall not relieve the Contractor from his responsibility as set forth in this specification.

#### 1.13 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated equipment, conduits with pull string, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in a readily accessible location.

#### 1.14 DELIVERY STORAGE AND HANDLING

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage. All devices shall be stored in a locked room. Assume responsibility for the devices until the date of final inspection.
- C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

#### 1.15 RECORD DOCUMENTS

- A. As work progresses and for the duration of Contract, maintain a complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design. Work shall be updated on a weekly basis and shall be made available for review by Architect. Failure to perform this work shall be reason for withholding requisition payments. In addition, take photographs of all concealed equipment in gypsum board ceilings, shafts, and other concealed, inaccessible work. At completion of work, make copies of photographs with written explanation on back. These shall become part of Record Documents.
- B. At completion of work prepare a complete set of Record As-Built Drawings in AutoCAD, Computer Aided Drafting (CAD) software, showing all systems as actually installed, including all fire alarm and electrical circuitry. The Record As-Built Drawings computer files shall be made available to the Architect, Engineer and Owner prior to final payment.
- C. The Architect will not certify the accuracy of the Record Drawings. This is the sole responsibility of the Electrical Contractor.
- D. This trade shall submit the record set for approval by the Fire and Building Departments in a form acceptable to the departments, when required by the jurisdiction.
- E. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

#### 1.16 WARRANTIES

- A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 for definitions, requirements, and procedures.
- B. All work and equipment furnished under this Section shall be guaranteed free from defects in workmanship or materials for a period of one (1) year, unless specifically noted otherwise for a particular system, from the date of final acceptance of the systems as set forth in this Contract. The Subcontractor shall replace any defective work developing during this period, unless such defects are clearly the result of misuse of equipment by persons not under the control of the Subcontractor, without cost to the Owner. Where such defective work results in damage to work of other Sections, all such work shall be restored to its original condition by mechanics skilled in the affected trade, at the expense of the Subcontractor. The Subcontractor shall submit a separate written guarantee stipulating the aforesaid conditions.
- C. Prior to or at the time of Substantial Completion for the work and during administrative close-out of the project, submit one (1) copy of all specified warranties and guarantees to the Architect for review, approval and subsequent transmittal to the Owner.
- D. Warranties and guarantees, including those specified in excess of the general one (1) year guarantee, shall be complete for all specific materials, systems, sub-systems, equipment, appliances and products specified and required by the Contract Document.
- E. Warranties and guarantees shall clearly define what is to be guaranteed; the extent, terms, conditions, time and effective dates.
- F. Copies of the same warranties and guarantees shall be included in the "Operating and Maintenance Manual" as specified herein.

#### 1.17 CLEANING

- A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 for definitions, requirements, and procedures.
- B. Upon completion of work, the Contractor shall clean, polish and leave bright, fixtures and lamps, and shall remove dust, dirt, debris and loose plaster from panelboards, controls, and switchboards. Unused

openings in pull boxes, junction boxes, equipment and raceways shall be capped or closed by an approved means. Replace all inoperative lamps.

#### 1.18 DEFINITION OF TERMS

- A. "This Contractor" or "E.C." specifically means, the Electrical Contractor working under this section of the specifications.
- B. "Concealed" means hidden, in chases, furred spaces, walls, above ceilings or enclosed in construction.
- C. "Exposed" means visible in sight or not installed "concealed" as defined above.
- D. "Approved Equal" means any equipment or material which is approved by the Engineer and equal in quality, durability, appearance, strength, design and performance to the equipment or material originally specified.
- E. "Conduit" shall mean all conduit including fittings, joints, hangers and supports.
- F. "Furnish" shall mean to purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the electrical work.
- G. "Install" shall mean to perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the electrical work.
- H. "Provide" shall mean to furnish and install.

#### 1.19 QUALITY ASSURANCE

- A. Obtain services of manufacturer's representatives of electrical equipment, during erection and construction of their respective equipment to insure proper installation of same.
- B. A letter is required from each system manufacturer's representative certifying to the A/E that requirements have been checked and are properly installed and operating.

#### 1.20 PERFORMANCE TESTS - ELECTRICAL

- A. Test and adjust the electrical systems and equipment during the progress of the work.
- B. Upon completion of work and after preliminary tests to assure that all systems are complete and in proper working order, arrange with the A/E to conduct performance tests of the electrical systems. These tests may be witnessed by the A/E prior to acceptance of systems and shall be arranged for the purpose of demonstrating compliance with contract documents. During this period, visually inspect all electrical equipment. Lighting fixtures shall be tested with specified lamps in place for not less than six (6) hours. Check voltages to assure that all transformer taps are properly set.
- C. General operating tests shall be performed under as near design conditions as possible, for a period of not less than one (1) hour for each system, and shall demonstrate that all equipment is functioning in accordance with specifications. Furnish all instruments, ladders, test equipment and personnel required for tests. Any equipment or systems found by test to be deficient or unsatisfactory shall be replaced and tests repeated as often as necessary to assure compliance with contract documents.
- D. Test all feeders, sub-feeders and all branch wiring for amperage, voltage, phase balance, phase sequence of A,B,C and insulation resistance, then submit the results of this test to the A/E neatly typed in triplicate for review. This test may be conducted at any time up to, through and including, the guarantee period if requested by the A/E, at no additional cost to the Owner.
- E. Phase balance the complete electrical system, phase balance all panels as near as loads will permit under normal working conditions.
- F. Test all ground conductors for current flow, as near design operating conditions as possible. If any measured current exceeds one (1) ampere, determine and correct the cause. Also, if measured resistance is greater than 5 ohms indoor or 10 ohms outdoor, determine and correct the cause.

- G. During the progress or completion of the work it shall be subject to the inspection of the Owner and to such other inspectors, as may have jurisdiction, including those of the Electric Company, Fire Department and the Telephone Company.
- H. The Contractor shall be responsible for correct voltages, tap settings, trip settings and correct phasing on all equipment. Secondary voltages shall be measured at the line side of the main breakers with the breakers in an open position, at panelboards, and at such other location on the distribution systems and branch circuits as directed by the Engineer.
- I. At completion of the work, Contractor shall submit to the Owner's representative in writing a statement stating: (1) that the work is complete; (2) that the entire installation is in accordance with the drawings and specifications; (3) that preliminary tests have been made; and (4) that the work is ready for final inspection and test.
- J. A final inspection of the installation to determine compliance with the drawings and specifications will be made by the Owner's representative. Work will be checked for quality of materials, quality of workmanship, proper installation and finished appearance. The electrical contractor shall provide the services of the project electrical foreman for inspection purposes. The foreman shall remove and reinstall wiring devices, junction box covers, panelboard trims, switchboard covers, terminal box covers, ceiling tiles, lighting fixtures, etc. as required to facilitate any inspections required by the Owner's representative.
- K. The Contractor shall arrange and conduct operating tests on all equipment in the presence of the Owner's representative. The components parts of systems and the various systems shall be demonstrated to operate in accordance with the requirements and intent of this specification. Any non-complying or defective materials or workmanship disclosed as a result of the inspection and tests shall be corrected promptly by the Contractor, and the tests repeated as often as necessary until approved and accepted by the Owner's representative.
- L. The Contractor shall visit the site to acquaint himself with existing conditions. No extra compensation will be paid for failure to comply with this paragraph.
- M. The Electrical Contractor shall provide supervision, labor, materials, tools, test equipment, and all other equipment or services and expenses required to test, adjust, set, calibrate, and operationally check work and components of the electrical systems and circuitry throughout this section.
- N. The electrical contractor shall pay for all tests including expenses incident to retests occasioned by defects and failures of equipment to meet specifications at no additional cost to the owner.
- O. Any defects or deficiencies discovered in any of the electrical work shall be corrected at no cost to the owner.
- P. All testing shall be compatible with the manufacturer's installation instructions.

#### 1.21 SEISMIC RESTRAINT

- A. It is the intent of this seismic specification to keep all electrical building system components in place during a seismic event.
- B. All electrical systems must be installed in strict accordance with seismic codes, component manufacturer's and building construction standards. Whenever a Conflict occurs between the manufacturer's or construction standards, the most stringent shall apply.
- C. This contractor shall engage a professional structural engineer registered in the jurisdiction of this project to review the entire installation to determine all seismic restraint requirements and methods. Contractor shall submit a report outlining the structural engineer's review as well as seismic restraint shop drawings and supporting calculations prepared by the professional structural engineer for review by the Architect.
- D. Seismic restraints shall be designed in accordance with seismic force levels as detailed in the applicable building code.

## 1.22 TEMPORARY LIGHT AND POWER

- A. Under this Section of the specifications, this Contractor shall provide temporary electric service, sized suitable for construction for each trade. This contractor shall provide all material and labor for temporary electrical service per the local power company's requirements and standards with all necessary panelboards, disconnect switches, transformers, conduit, wiring, etc. as required. This contractor shall pay all associated costs, up front.
- B. Where temporary electrical service cannot be obtained from the local power company, this contractor shall provide a temporary, on-site, electric generator with all necessary panelboards, disconnect switches, transformers, conduit, wiring, etc. as required. The fuel used for the generator shall be provided and paid for by this Contractor.
- C. This contractor shall provide a distribution system with circuits for receptacles and lighting as required for construction. This contractor shall maintain the temporary electrical system during construction and remove the system when construction is complete.
- D. Under this section of the specifications, this Contractor shall provide and maintain temporary lighting based on using not less than one 100-watt lamp for each 100 square feet of building floor area and one duplex GFCI receptacle for each 200 square feet of building floor area. Where higher lighting intensities are required by Federal or State laws or otherwise specified, the above specified wattage shall be increased to provide the increase intensities.
- E. This contractor shall provide temporary power and telephone services from the local telephone company for site trailers, fax machines, computers, etc., per the general contractor's direction.
- F. The service shall incorporate ground fault protection and comply with NEC Article 527 and OSHA requirements.

## 1.23 PERMITS

- A. Obtain all required electrical permits and pay all fees for same.
- B. Provide to Engineer, in duplicate, a certificate of final inspection from the authority having jurisdiction for the electrical and systems.

## 1.24 OPERATING, INSTRUCTION, AND MAINTAINANCE MANUALS

- A. Refer to Section 017000 – CONTRACT CLOSEOUT for submittal procedures pertaining to operating and maintenance manuals.
- B. Each copy of the approved operating and maintenance manual shall contain copies of approved shop drawings, equipment literature, cuts, bulletins, details, equipment and engineering data sheets and typewritten instructions relative to the care and maintenance for the operation of the equipment, all properly indexed.

## 1.25 BIDDERS REPRESENTATION

- A. By the act of submitting a bid for the proposed contract, the Bidder represents that:
  - 1. The Bidder and all subcontractors the Bidder intends to use have carefully and thoroughly reviewed the drawings, specifications and other construction contract documents and have found them complete and free from ambiguities and sufficient for the purpose intended; further that,

2. The Bidder and workmen, employees and subcontractors the Bidder intends to use are skilled and experienced in the type of construction represented by the construction contract documents bid upon; further that,
3. Neither the Bidder nor any of the Bidder's employees, agents, intended suppliers or subcontractors have relied upon any verbal representations, allegedly authorized or unauthorized from the Owner, or the Owner's employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that,
4. The bid figure is based solely upon the construction contract documents and properly issued written addenda and not upon any other written representation.

## 1.26 UTILITY COMPANY & AGENCY COORDINATION

- A. This section includes, but is not limited to coordination with the following utilities, agencies and authorities having jurisdiction:
1. Power Company: This Contractor shall coordinate with the local utility power company and provide all material & labor required to comply with the utility power company's requirements and standards, prior to ordering any electrical equipment, such as, switchgear, panels, transformers, disconnect switches, SPD, etc. This Contractor shall confirm metering sequence (hot or cold) and make the appropriate provisions and/or changes for the utility companies approved metering sequence arrangement. Notify Engineer of discrepancies between the plans and the local utility company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the utility company, but corrections shall be made. All A.I.C. ratings, grounding, bonding, concrete pads & curbs, protective bollards, raceways, ductbank, manholes, etc., shall be in accordance with the utility company's standards.
  2. Telephone Company: This Contractor shall coordinate with the local telephone company and provide all material & labor required to comply with the telephone company's requirements and standards, prior to ordering any electrical or telephone equipment, such as, terminal boards, grounding systems, raceways, ductbanks, manholes, etc. This Contractor shall confirm the telephone company's requirements and provide as necessary. Notify Engineer of discrepancies between the plans and the telephone company's standards. No extra compensation will be given for corrections required to this Contractor for failure to coordinate with the telephone company, but corrections shall be made.
  3. Cable TV Company: This Contractor shall coordinate with the local cable TV company and provide all material & labor required to comply with the cable TV company's requirements and standards, prior to ordering any electrical or cable TV equipment, such as, terminal boards, grounding systems, raceways, ductbanks, manholes, etc. This Contractor shall confirm the cable TV company's requirements and provide as necessary. Notify Engineer of discrepancies between the plans and the cable TV company's standards. No extra compensation will be given for corrections required for failure to coordinate with the cable TV company, but corrections shall be made.
  4. Local Fire Marshal: This contractor shall verify with the local fire alarm official, the type of master-box or municipal connection required for this project. This contractor shall provide all material & labor to comply with the local municipality. Notify Engineer of discrepancies between the plans and the municipality's standards. No extra compensation will be given for corrections required for failure to coordinate with the municipality, but corrections shall be made.
  5. Electrical Inspector: Review plans and specifications with the local electrical and/or wiring inspector(s). Obtain and pay for all permits.
  6. Building Inspector: Review plans and specifications with the local building inspector, if not done so by the General Contractor.
  7. OSHA Representative: Review plans and specifications with the local OSHA representative, if not done so by the General Contractor.



8. Dig Safe: This contractor shall notify and coordinate with Dig Safe prior to any excavation; digging; trenching; grading; tunneling; augering; boring; drilling; pile driving; plowing-in or pulling-in pipe, cable, wire, conduit, or other sub-structure; backfilling; demolition; and blasting related to this Contractor.
- B. The Electrical Contractor shall pay for all permits, inspections, labor, material and fees associated with the various Utility Companies coordination requirements mentioned in this section and for this Contractor's work under this project.
- C. The Electrical Contractor shall carry a minimum of \$15,000 of utility expenses. In the case the expenses are less than the carried expense, the difference will be credited to the owner. In the case the utility charges are more than the carried expense, the remaining payment shall be coordinated between the Electrical Contractor, General Contractor and Owner.
- D. HVAC, Plumbing, Fire Protection, and Electrical Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structural and other trades and to meet Architectural requirements.
- E. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect. Where the electrical work shall interfere with the work of other trades, assist in working out the space conditions to make satisfactory adjustments before installation. Without extra cost to the Owners, make reasonable modifications to the work as required by normal structural interferences. Pay the General Contractor for additional openings or relocating and/or enlarging existing openings through concrete floors, walls, beams and roof required for any work which was not properly coordinated. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.
- F. If any electrical work has been installed before coordination with other trades so as to cause interference with the work of such trades, all necessary adjustments and corrections shall be made by the trades involved without extra cost to the Owners.
- G. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect and Engineer for review and approval.

## PART 2 – PRODUCTS

### 2.1 CONDUIT

- A. Minimum Size:  $\frac{3}{4}$ -inch, unless otherwise specified.
- B. Underground Installations:
1. More than Five Feet from Foundation Wall: Use thick wall nonmetallic conduit concrete encased.
  2. Within Five Feet from Foundation Wall: Use rigid steel conduit concrete encased.
  3. In or Under Slab on Grade: Use plastic coated conduit.
  4. Minimum Size: 1-inch.
- C. Outdoor Locations, Above Grade: Use rigid steel conduit.
- D. In Slab Above Grade:
1. Use rigid steel conduit.
  2. Maximum Size Conduit in Slab:  $\frac{3}{4}$  inch (19 mm);  $\frac{1}{2}$  inch (13 mm) for conduits crossing each other.
- E. Wet and Damp Locations: Use rigid aluminum conduit.
- F. Dry Locations:
1. Concealed and in Cable-Tray: Use metal clad (MC) cable (see Division 1)
  2. Exposed: (Unfinished or utility spaces) Use electrical metallic tubing.
- G. Metal conduit: Rigid Steel Conduit shall comply with ANSI C80.1 and be heavy wall zinc coated steel. Rigid Aluminum Conduit shall comply with ANSI C80.5. Intermediate Metal Conduit (IMC) shall be

rigid steel. Fittings and Conduit Bodies shall comply with ANSI/NEMA FB 1 and material to match conduit. Acceptable manufacturers are Western Tube and Conduit Company, Allied Tube and Conduit Company and Triangle Wire and Cable, Inc.

- H. Flexible metal conduit shall be interlocked aluminum construction. Fittings shall comply with ANSI/NEMA FB 1. Acceptable manufacturers are AFC Cable Systems, Electri-Flex Company and Eastern Flexible Conduit Technologies. All flexible conduits shall include a grounding conductor.
- I. Electrical metallic tubing (EMT) shall comply with ANSI C80.3; galvanized zinc coated steel tubing. Fittings and Conduit Bodies shall comply with ANSI/NEMA FB 1; steel, compression or set screw type. Acceptable manufacturers are Western Tube and Conduit Company, Allied Tube and Conduit Company and Triangle Wire and Cable, Inc.
- J. Nonmetal conduit shall comply with NEMA TC 2; Schedule 40 PVC, or as indicated on plans. Fittings and Conduit Bodies shall comply with NEMA TC 3. Acceptable manufacturers are Carlon or approved equal.
- K. Flexible nonmetallic conduit (Sealtite) shall be UL and CSA listed for purpose specified and shown. Acceptable manufacturers are Carlon or approved equal.
- L. Install conduit in accordance with NECA "Standard of Installation." Install nonmetallic conduit in accordance with manufacturer's instructions.
- M. Arrange supports to prevent misalignment during wiring installation. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits. Fasten conduit supports to building structure and surfaces under provisions of Division 1. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports. Do not attach conduit to ceiling support wires.
- N. Arrange conduit to maintain headroom and present neat appearance. Route exposed conduit parallel and perpendicular to walls. Route conduit installed above accessible ceilings parallel and perpendicular to walls. Route conduit in and under slab from point-to-point. Do not cross conduits in slab.
- O. Maintain adequate clearance between conduit and piping. Maintain 12-inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- P. Cut conduit square using saw or pipe cutter; de-burr cut ends. Bring conduit to shoulder of fittings; fasten securely. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- Q. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate or factory elbows for bends in metal conduit larger than 2-inch (50 mm) size.
- R. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints. All expansion and deflection fittings shall have a ground strap. Provide suitable pull string in each empty conduit except sleeves and nipples. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- S. Ground and bond conduit under provisions of NEC 250.

## 2.2 SURFACE RACEWAYS

- A. Multi-outlet assemblies shall be steel channel with fitted cover suitable for use as multi-outlet assembly. There shall be two compartments separated by a steel divider: one for power wiring and one for tele/data wiring. Provide flush feed box equal to Wiremold #WSA42-4 with backfeed kit #WSA86. Color of surface raceway per the Architect and Owner.
- B. Provide 125-volt, 20 amp duplex receptacles with ground slot spaced 12 inches (300 mm) on center or as indicated on the plans. Color of receptacles per the Architect and Owner.

- C. Provide tele/data outlets spaced 12 inches (300 mm) on center or as indicated on the plans. The number of jacks per tele/data outlet as indicated or as required per the Owner. Color of outlets per the Architect and Owner.
- D. Provide cover plates equal to Wiremold #4049.
- E. Coordinate with Architect and Owner for exact height of surface raceway prior to installing any material. De-rate conductors as required per code. Coordinate with furniture supplier and millwork supplier to avoid conflicts with counter wall supports and surface raceways. Coordinate bushed openings in counters for cord & plug connections, where receptacles will be installed under counters.
- F. Acceptable manufacturers are Wiremold Company, Hubbell or approved equal.
- G. Fittings: Furnish manufacturer's standard couplings, elbows, outlet and device boxes, and connectors.
- H. Wireways shall be steel with rust inhibiting primer coating with gray enamel finish for general wiring in unfinished spaces. Provide as necessary per the job conditions.
- I. Install and mount products in accordance with the manufacturer's instructions. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level. Use suitable insulating bushings and inserts at connections to outlets and corner fittings. Close ends of wireway and unused conduit openings. Ground and bond under provisions of NEC 250.

## 2.3 DUCT BANK

- A. Verify that field measurements are as indicated. Verify routing and termination locations of duct bank prior to excavation for rough-in. Verify locations of manholes prior to excavating for installation. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system. Manhole locations are shown in approximate locations unless dimensions are indicated. Locate as required to complete duct bank system.
- B. Underground Warning Tape: Provide 3-inch-wide plastic tape 12" below finished grade, colored yellow with suitable warning legend describing buried electrical lines; Model #47586 as manufactured by Seton or equal.
- C. Install duct to locate top of duct bank at 30" below finished grade or at depths as indicated on drawings. Install duct with minimum slope of 4-inches per 100-feet. Slope duct away from building entrances.
- D. Provide suitable fittings to accommodate expansion and deflection where required. Terminate duct at manhole entries using end bell. Stagger duct joints vertically in concrete encasement 6 inches minimum. Use suitable separators and chairs installed not greater than 4 feet (1200 mm) on centers. Band ducts together before backfilling and placing concrete. Securely anchor duct to prevent movement during concrete placement.
- E. Place concrete as required and under provisions of Division 3. Use mineral pigment to color concrete red. Provide minimum 3-inch concrete cover at bottom, top, and sides of duct bank. Provide two No. 4 steel reinforcing bars in concrete ductbank under paved areas. Connect to existing concrete encasement using dowels. Connect to manhole wall using dowels.
- F. Provide suitable pull string in each empty duct except sleeves and nipples. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
- G. Backfill trenches as required and under provisions of Division 2. Interface installation of underground warning tape with backfilling specified in Division 2. Install warning tape 12-inches below finished surface.

## 2.4 BUILDING WIRE & CABLE

- A. Building Wire and Cable shall be copper with 600V insulation rated at 75°C minimum, Type XHHW insulation for feeders and branch circuits larger than #3 AWG; Type THHN/THWN insulation for feeders and branch circuits #4 AWG and smaller.

- B. Conductors shall be of soft drawn 98% minimum conductivity properly refined copper, solid construction where No. 10 AWG and smaller, stranded construction where No. 8 AWG and larger.
- C. Exterior of wires shall bear repetitive markings along their entire length indicating conductor size, insulation type and voltage rating.
- D. Exterior of wires shall be color coded, so as to indicate a clear differentiation between each phase and between each phase and neutral. In all cases, grounded neutral wires and cables shall be identified by the colors "white" or "gray". In sizes and insulation types where factory applied colors are not available, wires and cables shall be color coded by the application of colored plastic tapes in overlapping turns at all terminal points, and in all boxes in which splices are made. Colored tape shall be applied for a distance of 6 inches along the wires and cables, or along their entire extensions beyond raceway ends, whichever is less.
- E. Final connections to motors shall be made with 18" of neoprene sheathed flexible conduit.
- F. Minimum branch circuit conductor size shall be No. 12 AWG installed in conduit. Motor control circuit wiring shall be minimum No. 14 AWG installed in conduit.
- G. Fire alarm and security system wiring shall be No. 16 twisted non-shielded pairs for alarm and trouble circuits and a minimum of #14 AWG for device power, control and alarm annunciation circuits. Fire alarm system riser circuits shall be 2-hour rated, CI type (circuit integrity) cable per NFPA 72 and NEC 760.
- H. Other wires and cables required for the various systems described elsewhere in this section of the Specifications shall be as specified herein, as shown on the Contract Drawings, or as recommended by the manufacturer of the specific equipment for which they are used, all installed in conduit.
- I. Metal clad sheathed cable NFPA 70, type MC may be used for branch circuitry where shown and where run concealed and not subject to physical damage. All branch circuits shall be run in conduit from the panelboard to the first outlet. All type MC cable used shall contain a full-size insulated ground conductor. All conductors shall be copper. All type MC cable insulation used shall have voltage rating of 600 volts, shall have a temperature rating of 75° C, and shall be thermoplastic material. Armor material shall be steel and armor design shall be interlocked metal tape. Fire alarm rated MC cable may be used for fire alarm work where concealed and approved by the Authority Having Jurisdiction.
- J. Metal-Clad cable (Type MC) for circuits supplying computer equipment, electronic discharge lighting and other sensitive electronic equipment shall consist of 90°C THHN copper conductors with insulated ground and oversized neutral conductor (or one full size neutral conductor for each phase conductor). Cable shall be U.L. listed/labeled and shall meet the requirements of NEC Art. 334 and 675.
- K. Use armored cable (AFC Type HCF-90 or equal) for branch circuits and feeders in areas of patient care in hospitals, nursing homes and medical centers, medical office buildings and nurses' office areas of schools. This cable shall consist of 90°C THHN copper conductors with combined armor/bond wire (equipment) plus a green insulated ground (redundant). Use insulated bushings. Cable shall be U.L. listed/labeled, and shall meet the requirements of NEC Art. 333, 517 and 645.
- L. Use armored cable (AFC Type HCF-90 or equal) for branch circuits and feeders in all buildings in the following areas; data processing systems, places of assembly, under raised floors, above suspended ceilings and in other environmental air-handling spaces. This cable shall consist of 90°C THHN copper conductors with combined armor/bond wire (equipment) plus a green insulated ground (redundant). Use insulated bushings. Cable shall be U.L. listed/labeled, and shall meet the requirements of NEC Art. 333, 517 and 645.
- M. Wiring materials except MI cable shall be manufactured by Triangle, Essex, General Cable, AFC, Southwire or equal.
- N. Concealed Dry Interior Locations: Use only building wire Type THHN/THWN or XHHW insulation in raceway, or metal clad cable where concealed and code acceptable.
- O. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
- P. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway or metal clad cable where code acceptable.

- Q. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
- R. Exterior Locations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
- S. Underground Installations: Use only building wire, Type THHN/THWN or XHHW insulation, in raceway.
- T. Wiring methods, in general, are as follows:
  - 1. Galvanized rigid steel conduit shall be used for telephone system sleeves for main cable runs between floors, closets, etc. and for sweeps, bends, etc. in ductbanks and as specifically noted on the plans. EMT shall be used generally for exposed circuiting in unfinished spaces. Metal clad cable (type MC) may be used for branch circuiting and fire alarm rated MC cable for fire alarm circuiting where run concealed and where code acceptable.
  - 2. To prevent transmittal of vibration to conduit, connections to any vibration producing equipment (i.e. transformers, motors, etc.) shall be terminated by 18 inches of flexible metal conduit. Where flexible connections are exposed to grease and oil, liquid-tight flexible metal conduit shall be used.
  - 3. In general, no splices or joints shall be permitted in either feeders or branches except at outlets or accessible junction boxes. Splices in wire #8 AWG and smaller shall be pigtail type, made mechanically tight. All conduit systems shall be complete.
  - 4. Raceway, boxes, etc., run on walls in wet areas which are subject to being washed down, shall be mounted on the walls with 1/4" stand-offs. All boxes shall be cast type.
- U. Route wire and cable as required to meet the Project Conditions. Install cable in accordance with the NECA "Standard of Installation." Use solid conductor for feeders and branch circuits 10 AWG and smaller. Use stranded conductors for control circuits. Use conductor not smaller than 12 AWG for power and lighting circuits. Use conductor not smaller than 16 AWG for control circuits. Use 10 AWG conductors for 20 amperes, 120 volt branch circuits longer than 75 feet. Pull all conductors into raceway at same time. Use suitable wire pulling lubricant for building wire 4 AWG and larger. Protect exposed cable from damage.
- V. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system, cables that are not part of the ceiling system cannot be supported from ceiling supports. Do not rest cable on ceiling panels. Use suitable cable fittings and connectors. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- W. Clean conductor surfaces before installing lugs and connectors. Make splices, taps, and terminations to carry full ampacities of conductors with no perceptible temperature rise. Use suitable reducing connectors or mechanical connector adapters for connecting aluminum conductors to copper conductors. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape un-insulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.

## 2.5 BOXES

- A. Outlet Boxes:
  - 1. Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations shall be of cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps are not allowed in new construction.
  - 2. Each box shall have sufficient volume to accommodate number of conductors in accordance with requirements of NFPA 70. Boxes shall not be less than 1-1/2" deep unless shallower boxes are required by structural conditions and are specifically approved by Architect. Ceiling and

bracket outlet boxes shall not be less than 4" octagonal except that smaller boxes may be used where required by particular fixture to be installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by fixture terminal temperature requirements. Switch and receptacle boxes shall be 4" square or of comparable volume. Luminaire and equipment supporting boxes shall be rated for weight of equipment supported; include 1/2 inch (13 mm) male fixture studs where required.

3. Provide metallic boxes rated for 2-hour, fire-rated walls with gasket to reduce noise-transmission in all fire-rated walls. A minimum horizontal distance of 24-inches shall separate metallic boxes located on opposite sides of walls. This minimum horizontal spacing may be reduced using UL classified wall opening protective materials, commonly known as "putty pads" or "insert pads" pending written approval from the local authority having jurisdiction (AHJ). Refer to Architect's plans for all wall types prior to bid and any related work that will require 2-hour fire ratings.
4. Acceptable Manufacturers:
  - a. Appleton
  - b. Crouse Hinds
  - c. Steel City
  - d. RACO
- B. Pull and Junction Boxes: Where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, furnish and install appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code. Where intermediate cable supports are necessary because of box dimensions, provide insulated removable core brackets to support conductors. Junction boxes are to be equipped with barriers to separate circuits. Where splices are to be made, boxes shall be large enough to provide ample work space. All conductors in boxes are to be clearly tagged to indicate characteristics. Boxes shall be supported independently of raceways. Junction boxes in moist or wet areas shall be galvanized type. Boxes larger than 4-inches square shall have hinged covers. Boxes larger than 12-inches in one dimension will be allowed to have screw fastened covers, if a hinged cover would not be capable of being opened a full 90 degrees due to installation location.
- C. Fiberglass Handholes shall be die molded glass fiber. Cable Entrance shall be pre-cut 6-inch x 6-inch (150 mm x 150 mm) cable entrance at center bottom of each side. Cover shall be glass fiber weatherproof cover with nonskid finish.
- D. Install boxes in accordance with NECA "Standard of Installation." Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- E. Set wall mounted boxes at elevations to accommodate mounting heights indicated or specified in section for outlet device. Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 10-feet (3m) if required to accommodate intended purpose. Orient boxes to accommodate wiring devices. Maintain headroom and present neat mechanical appearance.
- F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 7.
- G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- H. Use flush mounting outlet box in finished areas. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening. Do not install flush mounting box back-to-back in walls; provide minimum 6-inches separation. Provide minimum

24 inches (600 mm) separation in acoustic rated walls. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use stamped steel bridges to fasten flush mounting outlet box between studs. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

- I. Use adjustable steel channel fasteners for hung ceiling outlet box. Do not fasten boxes to ceiling support wires. Support boxes independently of conduit. Use gang box where more than one device is mounted together. Do not use sectional box. Use gang box with plaster ring for single device outlets. Use cast outlet box in exterior locations exposed to the weather and wet locations. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations. Set floor boxes level.
- J. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- K. Adjust floor box flush with finish flooring material. Adjust flush-mounting outlets to make front flush with finished wall material. Install knockout closures in unused box openings.

## 2.6 WIRING DEVICES

- A. Provide wiring device type plates for all wall-mounted devices. All wall plates shall be either brushed aluminum or smooth high impact nylon for all public areas as directed by the Architect. Provide galvanized steel for all Utility, Electric and Mechanical Rooms. Colors of wall plates as directed by the Architect.
- B. Wiring devices standard for the project (i.e., with no specific type indicated) shall conform to the following:
  - 1. Visible part colors of wiring devices shall be as directed by the Architect for all public areas. Provide Ivory colored devices for all Utility, Electrical and Mechanical rooms.
  - 2. Exclude compact type devices.
- C. Wiring device switches shall be toggle type, A.C. quiet design, specification grade, 20 amps on 120-volt circuits. Switches shall be mounted 48-inches to center line above finished floor unless noted otherwise. Equivalent 277volt, 20 amp switches shall be used where required.
- D. Standard duplex convenience receptacles shall be 125volt, 20 amps, three wire (two circuit wires plus ground), "U-slot" ground NEMA configuration 5-20R, specification grade. Receptacles shall be mounted 18" to center line above finished floor unless noted otherwise. Where indicated on plans provide receptacles with ground fault current interrupters, UL Class A; 20A, 125V.
- E. Non-standard convenience receptacles and special purpose power supply receptacles shall be as listed on plans.
- F. Provide ground fault circuit interrupter (GFCI), weather-resistant type receptacles in all wet and damp locations as defined by the National Electrical Code. All outdoor receptacles and where indicated on the plans shall be installed in a weatherproof while-in-use enclosures.
- G. Weatherproof Receptacle Enclosures shall be NEMA 3R rated for rain-tight while-in-use, gasketed, impact resistant thermoplastic with hinged gasketed device cover.
- H. Provide extension rings to bring outlet boxes flush with finished surface. Clean debris from outlet boxes. Install devices plumb and level. Install receptacles with grounding pole on top. Connect wiring device grounding terminal to branch circuit equipment grounding conductor. Use jumbo size plates for outlets installed in masonry walls. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- I. Install wall switch 48 inches above finished floor to top of handle. On position, shall be up. Install convenience receptacles 18-inches above finished floor. Install convenience receptacle 6-inches above backsplash of counter. Install dimmer switches 48 inches above finished floor to top.
- J. Verify that each receptacle device is energized. Test each receptacle device for proper polarity. Test each GFCI receptacle device for proper operation.

## 2.7 CABINETS & ENCLOSURES

- A. Cabinets shall be as follows: Boxes: Galvanized steel. Box Size: As required and/or indicated on plans. Backboard: Provide 3/4-inch-thick plywood backboard for mounting terminal blocks. Paint matte white. Fronts: Steel, flush type with concealed trim clamps, door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel. Knockouts: As required and/or indicated on plans. Provide metal barriers to form separate compartments wiring of different systems and voltages. Provide accessory feet for free-standing equipment.
- B. Hinged Cover Enclosures shall be as follows: Construction: NEMA 250, Type 1, 3R, or 4 steel enclosure, as required and/or indicated on plans. Covers: Continuous hinge, held closed by flush latch operable by key or hasp and staple for padlock. Provide interior plywood panel for mounting terminal blocks and electrical components, finish with white enamel. Enclosure Finish: Manufacturer's standard enamel.
- C. Install in accordance with NECA "Standard of Installation." Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions of Section 16190. Install cabinet fronts plumb.
- D. Clean electrical parts to remove conductive and harmful materials. Remove dirt and debris from enclosure. Clean finishes and touch up damage.
- E. ICS 4 - Terminal blocks for industrial control equipment and systems. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts. Provide ground bus terminal block, with each connector bonded to enclosure.
- F. Provide grounding provisions for all cabinets/enclosures and bond to grounding system as required per Code.

## 2.8 GROUNDING & BONDING

- A. Ground all systems and equipment in accordance with best industry practice, the requirements of NFPA 70 and the following:
  - 1. The ground bus of the main switchboard shall be connected to the main grounding electrode specified below by means of insulated conductors run in conduit.
  - 2. The main grounding electrode shall be an accessible point on the nearest metallic main water service pipe. Connection shall be made on the street side of the main valve utilizing a ground clamp of a type specifically manufactured for the purpose. Bonding jumpers shall be provided around the water meters and around insulating joints and/or sections.
  - 3. Establish a ground bonding connection from the effectively grounded structural building steel to each cold-water main entering the building. Each bonding connection shall consist of insulated conductors run in conduit.
  - 4. The water pipe ground shall be supplemented by an additional electrode consisting of three (3) buried 3/4" diameter by 10'-0" long copperweld ground rods spaced 10'-0" apart and provided in sufficient quantity so as to have measured resistance to ground of not more than 10 ohms. Provide independent certification confirming this. Establish a bonding connection from the electrode consisting of green insulated conductors run in conduit and sized as indicated hereinafter for main and supply side of service bonding jumpers.
  - 5. Provide grounding bonds between all metallic conduits of the light and power system which enter and leave cable chambers or other non-metallic cable pulling and splicing boxes. Accomplish this by equipping the conduits with bushings of the grounding type individually cross connected.



6. Bond metallic conduits containing grounding electrode conductors and main bonding conductors to the ground bus service enclosure and/or grounding electrode at both ends of each run utilizing grounding bushings and jumpers.
7. Provide grounding bonds for all metallic conduits of the light and power system which terminate in pits below equipment for which a ground bus is specified. Accomplish this by equipping the conduits with bushings of the grounding type connected individually to the ground bus.
8. Provide supplementary ground bonding where metallic conduits terminate at metal clad equipment (or at the metal pull box of equipment) for which a ground bus is specified. Accomplish this by equipping the conduits with bushings of the grounding type connected individually by means of jumpers to the ground bus. Exclude the jumpers where directed. This exclusion will be required where an isolated ground for electronic equipment is to be maintained.
9. Each grounding type bushing shall have the maximum ground wire accommodation available in standard manufacture for the particular conduit size. Connection to bushing shall be with wire of this maximum size.
10. Bonding conductors on the load size of the service device and equipment grounding conductors shall be sized in relation to the fuses or trip size of the overcurrent device supplying the circuit.
11. The central equipment for the fire protective alarm system and telephone system shall have its grounding terminal connected to the grounding electrode by means of a No. 6 green coded insulated conductor, run in 3/4" conduit. Utilize a ground clamp of a type specifically manufactured for the purpose.
12. Install rod electrodes per this section & in compliance with Code. Install additional rod electrodes as required to achieve specified resistance to ground. Install 4/0 AWG bare copper wire in foundation footing as required. Provide isolated grounding conductor for circuits supplying personal computers as indicated on the plans. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. Provide a 3/4" raceway with #6 AWG ground wire from main telephone terminal board to the service ground.
13. Perform inspections and tests listed in NETA ATS, Section 7.13. Document test results in Record Documents.
14. Swimming Pools, fountains & similar installations: Refer to NEC 680 for requirements for grounding and bonding. Provide all grounding and bonding per NEC 680 and 250.
15. Grounding means shall never exceed 10 ohms when located outdoors, or 5 ohms when located indoors.
16. An acceptable means of grounding is to provide an underground 2" thick, concrete-encased electrode of either 1/2" diameter, electrically conductive reinforcing bar of #4/0 bare copper conductor (minimum of 20-feet in length) per NEC 250.52(A)(3).

## 2.9 EQUIPMENT WIRING SYSTEM

- A. Cords & Caps: Manufacturers: Hubbell, Pass & Seymour or Arrow Hart. Attachment Plug Construction: Conform to NEMA WD 1. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment. Cord Construction: ANSI/NFPA 70, Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Motor Control Equipment: Each motor shall have a starter furnished under this Section where it is not being supplied by other sections. Wire and installed under this Section, unless otherwise noted herein or on the drawings.
  1. Connect the motor starting devices for all motors, except where otherwise specifically provided for under other sections, furnish all necessary connections between controllers and motors, in conduit

- and leave motors ready to start. Change connections, if necessary, to secure proper rotation of motors.
2. Perform all the necessary wiring in connection with the motor starting and remote control equipment, where so designated, furnished under other sections. Where control or starting equipment is sent to the job as individual units, they shall be installed, wired up complete and left ready for operation under work of this section.
  3. Wiring to motor shall be in rigid conduit with watertight flexible conduit from wall to motor only.
- C. Included in the general requirements for motor control equipment wiring and connections, the following specified items shall be performed:
1. Installation and connection of motor controls which will be furnished under the heating, ventilating and air conditioning section and the plumbing section.
- D. Starters by This Contractor: Where starters are not provided under other sections, this Contractor shall furnish starters for motors 1/2 HP and larger and where required by the control sequence for smaller motors and shall be magnetic across the line starters with adjustable overload protection in each phase line, all in NEMA 1 enclosures. Starters shall be solid state or acceptable substitute. Combination starters shall be with fused or non-fusible disconnect as required.
1. Magnetic starters shall have 120 volt holding circuits, integral transformers, auxiliary contacts as required by the control sequence and integral selector switches with push-to-test pilot lights. One side of each pilot light shall be connected on the load side of the motor starter.
  2. Integral transformers shall have overload protection on the secondary section and, also, the secondary neutral shall be grounded.
  3. Starters shall be as manufactured by Square D Company, Siemens or General Electric.
- E. Temperature control wiring shall be by others as indicated under the heating, ventilating and air conditioning section.
- F. Provide a suitable plywood backboard on a wall and/or angle iron or unistrut framework with plywood for all starters. Starters will be installed and wired under this section.
- G. All starters shall be located next to the panel feeding same, if panel is in a closet or utility space, unless noted otherwise on the drawings. If panel is located in a finished space (i.e. corridor, gymnasium, etc.) starters shall be located in a nearby utility closet or space acceptable to the Engineer.
- H. Nameplates: Each starter shall have a 1.0" x 2.5" hot stamped nameplate identifying the unit and panel it is fed from. The lettering shall be white 1/2" high in a black background.
- I. Connections to systems: Make electrical connections in accordance with equipment manufacturer's instructions. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes. Install disconnect switches, controllers, control stations, and control devices as indicated. Modify equipment control wiring with terminal block jumpers as indicated. Provide interconnecting conduit and wiring between devices and equipment where indicated.

## 2.10 SUPPORTING DEVICES

- A. Materials and Finishes: Provide adequate corrosion resistance. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products. Steel channel shall be galvanized.
- B. Anchors and Fasteners:
1. Concrete Structural Elements: Use precast insert system, expansion anchors.
  2. Steel Structural Elements: Use beam clamps, or welded fasteners.
  3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.

4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
  5. Solid Masonry Walls: Use expansion anchors or preset inserts.
  6. Sheet Metal: Use sheet metal screws.
  7. Wood Elements: Use wood screws.
- C. Installation: Install products in accordance with manufacturer's instructions. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation". Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Do not use spring steel clips and clamps. Do not use powder-actuated anchors. Do not drill or cut structural members. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts. Install surface-mounted cabinets and panelboards with a minimum of four anchors. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall. Use sheet metal channels to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

## 2.11 ELECTRICAL IDENTIFICATION

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background. Locations: Each electrical distribution and control equipment enclosure, communication cabinets. Letter Size: Use 1/8-inch letters for identifying individual equipment and loads. Use 1/4 inch letters for identifying grouped equipment and loads.
- B. Labels: Embossed adhesive tape, with 3/16-inch white letters on black background. Use for identification of individual power receptacle faceplates indicating panel & circuit number the outlet is fed from and control device stations. In addition to nameplates as described above, use labels on all panelboards, disconnect switches and enclosed circuit breakers to identify where the equipment is fed from, voltage & phase.
- C. Wire markers: Tape, or tubing type wire markers. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection. Power and Lighting Circuits shall be marked with panel and branch circuit, or feeder number as indicated on drawings. Control Circuits shall be marked with control wire number indicated on schematic and interconnection diagrams on drawings.
- D. Conduit markers: Corrosion and abrasion resistant. Location: Furnish markers for each conduit longer than 6 feet (2 m). Spacing: 20 feet on-center. Indicate voltage and phase.
- E. All panelboards shall be provided with a typed (handwritten is not allowed) circuit directory indicating the load fed by each circuit breaker and its location in the building.

## 2.12 ENCLOSED SWITCHES

- A. Fusible Switch Assemblies shall be provided in accordance with the following. Description: NEMA KS 1, Type GD with externally operable handle interlocked to prevent opening front cover with switch in ON position, enclosed load interrupter knife switch. Handle lockable in OFF position. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses. Provide NEMA 3R where located outdoors, kitchens or other interior wet areas.
- B. Non-fusible switch assemblies shall be provided in accordance with the following. Description: NEMA KS 1, Type GD with externally operable handle interlocked to prevent opening front cover with switch in ON position enclosed load interrupter knife switch. Handle lockable in OFF position. Provide NEMA 3R where located outdoors, kitchens or other interior wet areas.
- C. Install in accordance with NECA "Standard of Installation". Install fuses in fusible disconnect switches. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

## 2.13 PANELBOARDS

- A. Description: NEMA PB1, circuit breaker type, lighting, and appliance branch circuit panelboard.
- B. Panelboard Bussing: Bus bars shall be copper. Provide copper ground bus bar in all panelboards.
- C. Minimum Integrated Short Circuit Rating: 10,000 amperes RMS symmetrical for 240 volt panelboards; and 65,000 amperes symmetrical for 480 volt panelboards or as indicated. If electrical serving utility company determines the maximum integrated short circuit rating is less than as specified, then the panelboards may be reduced pending approval by the Architect/Engineer.
- D. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.
- E. Enclosure: NEMA PB 1, Type 1.
- F. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards.
- G. Cabinet Front: Flush or Surface cabinet front as scheduled with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard ANSI 49 enamel.

#### 2.14 ENCLOSED CIRCUIT BREAKERS

- A. Enclosed Molded Case Circuit Breaker: Comply with NEMA AB 1. Include provisions for padlocking. Provide insulated grounding lug in each enclosure. Provide Products suitable for use as service entrance equipment where so applied. Fabricate enclosure from steel.
- B. Install enclosed circuit breakers where indicated, in accordance with manufacturer's instructions. Install enclosed circuit breakers plumb. Provide supports in accordance with these specifications. Height: 5 ft (1.6 M) to operating handle. Provide engraved plastic nameplates.
- C. Inspect each circuit breaker visually. Perform several mechanical ON-OFF operations on each circuit breaker. Verify circuit continuity on each pole in closed position. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements. Include description of testing and results in test report.

#### 2.15 FUSES

- A. All fuses shall be rated for proper voltage in which they are applied. Interrupting ratings shall be greater than the short circuit current available at the terminals of the switch.
- B. Fuse types:
  - 1. Fuses for branch circuits shall be time delay class J.
  - 2. Fuses for equipment other than motor loads shall be general fast acting RK-5 or Class J.
  - 3. Control power transformers for motor controller circuits shall be as recommended by motor starter and motor control center manufacturer.
  - 4. Fuses for motors shall be sized at 250% of the motor FLA.
  - 5. Fuses for non-motor loads shall be sized at 125% of the rated FLA of equipment served.
  - 6. Fuses for elevator lifts shall be dual element type and sized in accordance with the elevator manufacturer's recommendations.
- C. Spare Fuses
  - 1. Provide spare fuses in the amount of 20% (not less than three (3) nor more than nine (9) of all sizes and types).
  - 2. Spare fuses shall include general purpose fuses, motor fuses, and control fuses used in motor control centers, starters etc.
  - 3. A complete list and quantity of spare fuses shall be submitted with record drawings for review.

#### 2.16 ENCLOSED MOTOR CONTROLLERS

- A. The Electrical Contractor shall review the mechanical drawings and coordinate with the Mechanical Contractor for electrical components of the mechanical equipment and systems such as motors, factory mounted motor starters, factory mounted disconnect switches, variable frequency drives and controls to be provided under Division 15 (by the Mechanical Contractor).
- B. The Electrical Contractor shall provide motor starters, variable frequency drives and disconnect switches for equipment shown on the drawings where the Mechanical Contractor is not providing such equipment.
- C. The electrical contractor shall provide all power wiring for all HVAC equipment.
- D. Manual Motor Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller with thermal overload elements on each phase, red pilot light, NO, NC auxiliary contact, and push button or toggle operator.
- E. Fractional Horsepower Manual Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload elements on each phase, red pilot light, and toggle operator.
- F. Motor Starting Switch: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload elements on each phase, with red pilot light and toggle operator.
- G. Enclosures: NEMA ICS 6; Type 1 for indoors and Type 3R for outdoors and wet/damp locations (kitchens, mechanical rooms, pool equipment rooms, etc...).
- H. Automatic Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower. Reversing Controllers: Include electrical interlock and integral time delay transition between FORWARD and REVERSE rotation. Two Speed Controllers: Include integral time delay transition between FAST and SLOW speeds. Coil operating voltage: 120volts, 60 Hertz. Overload Relay: NEMA ICS; bimetal or melting alloy. Enclosure: NEMA ICS 6, Type 1 for indoors or Type 3R for outdoors and wet/damp locations (kitchens, mechanical rooms, pool equipment rooms, etc...).
- I. Product Options and Features as follows. Auxiliary Contacts: NEMA ICS 2, 2 each normally open and closed contacts in addition to seal-in contact. Cover Mounted Pilot Devices: NEMA ICS 2, standard duty type. Pilot Device Contacts: NEMA ICS 2, Form Z, rated A150. Pushbuttons: Recessed type. Indicating Lights: LED type. Selector Switches: Rotary type. Relays: NEMA ICS 2. Control Power Transformers: 120 volt secondary, in each motor starter. Provide fused primary and secondary, and bond un-fused leg of secondary to enclosure.
- J. Installation Requirements: Install enclosed controllers where indicated, in accordance with manufacturer's instructions. Install enclosed controllers plumb. Provide supports in accordance with these specifications. Height: 5 feet to operating handle. Install fuses in fusible switches. Select and install overload heater elements in motor controllers to match installed motor characteristics. Provide engraved plastic nameplates under these specifications. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

## 2.17 ENCLOSED CONTACTORS

- A. General purpose contactors: NEMA ICS 2, AC general purpose magnetic contactor. Coil Voltage as indicated. Poles as indicated. Size as indicated. Enclosure per ANSI/NEMA ICS 6, Type as scheduled.
- B. Lighting contactors: NEMA ICS 2, magnetic lighting contactor. Coil Voltage as indicated. Poles as indicated. Size as indicated. Contact Rating shall match branch circuit overcurrent protection, considering de-rating for continuous loads.
- C. Accessories: Provide Pushbuttons and Selector Switches per NEMA ICS 2, heavy duty type. Provide indicating lights per NEMA ICS 2, push-to-test type. Provide auxiliary contacts per NEMA ICS 2, Class A300 or A600 as required per equipment served.

## 2.18 INTERIOR LUMINAIRES

- A. Lighting fixtures shall be in accordance with identifications as follows:
- B. All lamping shall be of the highest quality available.
- C. Finishes shall be as selected by the Architect or as indicated on the plans.
- D. Any additional appurtenances required for installation and operation, where same are not covered by the identification used on the drawings, shall be included. Lighting fixtures and equipment shall be furnished complete, wired and assembled, including canopies, lamps and other incidental items. Install specified lamps in each luminaire.
- E. Recessed fixtures shall be coordinated with ceiling construction by the Electrical Contractor prior to Bid. Refer to the Architect's plans, details and elevations for ceiling types by area. Provide plaster trim kits as required by ceiling construction.
- F. Exact location of all fixtures shall be confirmed with Architect prior to rough-in. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- G. Recessed fixtures throughout shall have their components, wiring and external connections coordinated for use in ceilings utilized as air handling plenums. Install recessed luminaires to permit removal from below. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating. Install clips to secure recessed grid-supported luminaires in place
- H. Fixtures for use outdoors or in areas designated as damp locations, shall be suitably gasketed and UL listed for such applications.
- I. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire
- J. Emergency batteries for exterior fixtures shall be remote mounted within the building. Verify maximum distances for remote mounting the emergency batteries with the manufacturer prior to installation. Locate remote emergency batteries above accessible ceilings or utility rooms as required. Provide test switches for all emergency batteries as required.
- K. Unless noted otherwise, all fixtures shall be 3500K and have a minimum CRI of 85.
- L. The Contractor shall obtain all information relative to the exact type of hung ceilings and suspension systems to be installed before ordering any recessed fixtures. This Contractor shall furnish the proper type fixtures applicable to the ceiling framing system. If, other than the type of fixtures specified are required for installation due to the type of ceiling construction, this Contractor shall furnish and install the proper type fixtures and mounting appurtenances required at no extra charge.
- M. The Contractor shall coordinate the exact locations of all lighting fixtures with the ceiling pattern during the construction period and before installation of the fixtures. Interferences between lighting fixtures, and other equipment, shall be brought to the attention of the General Contractor.
- N. Include the aiming and/or adjustments of all lighting fixtures requiring same in accordance with instructions issued by the Architect in the field. Aim and adjust luminaries as indicated or as directed by the Owner, Architect or Engineer. Position exit sign directional arrows as indicated. Operate each luminaire after installation and connection. Ensure proper connection and operation.
- O. Lighting fixtures shall be supported from building structure only, not from hung or suspended ceiling, by means of chains or threaded rods. The use of tie wire will not be allowed. All fixtures shall include seismic clips and shall be supported to comply with seismic regulations. Install suspended luminaires using pendants supported from swivel hangers or other suitable leveling means. All rows of fixtures shall be level, aligned with building lines and run parallel to each other. Provide pendant length required to suspend luminaires at indicated height. Support luminaires to building structure, independent of ceiling framing.

## 2.19 FIRE ALARM SYSTEM

A. GENERAL

1. The contractor shall submit complete documentation for the Fire Alarm/Life Safety System Data Sheets for all items to ensure compliance with these specifications. Copies of this information shall be submitted as required to the Architect award of this work and shall be subject to the approval of the architect.
2. The contractor shall submit, as part of the complete bid documentation package, certification that the engineered system distributor is a fully authorized factory trained and certified distributor of the system detailed within this specification.
3. All equipment and material shall be new and unused, and listed by Underwriter's Laboratories for the specific intended purpose. All control panel components, field peripherals and interactive computer peripherals shall be designed for continuous duty operation without degradation of function or performance.
4. All equipment covered by this specification or noted on installation drawings shall be the best equipment suited for the application and shall be provided by a single manufacturer.
5. Provide all equipment and accessories and compatible devices for a complete and fully functioning fire alarm system. The fire alarm system shall be coordinated with and inspected by the local fire department, and any inconsistency mentioned during any inspection shall be corrected by contractor at no additional cost to owner.
6. Verify color of devices and wall plates, either white with red letters or red with white letters, with the Architect prior to ordering any material.
7. The control panel shall contain a microprocessor with 10/100 ethernet media access controller (MAC). The system shall be designed specifically for fire detection, and notification applications.
8. The installing contractor shall coordinate master-box, radio-box, and/or dialer requirements with local fire department
9. The audible alarm notification signals in sleeping rooms of dwelling units shall be a 520 Hz low-frequency signal.

B. FIRE ALARM LIFE SAFETY SYSTEM SEQUENCE OF OPERATION

1. Public Mode: The operation of a manual station or activation of any automatic alarm initiating device (system smoke, heat, waterflow) in the common areas of the building, shall automatically:
  - a. Initiate the transmission of the alarm to the Municipal Fire Station or approved Central Station via the Local Energy or Radio Master-box where required by Code.
  - b. Sound a code 3 temporal evacuation signal over all audible circuits.
  - c. Flash all visual signals throughout the building in a synchronized manner.
  - d. Flash an alarm LED and sound an audible signal at the FACP. Upon acknowledgement, the alarm LED shall light steadily and the audible shall silence. Subsequent alarms shall re-initiate this sequence.
  - e. Upon alarm initiation by an elevator lobby smoke detector or other designated recall device, recall all elevators that serve the floor of initialization to the main egress level. If the alarm initiates on the main egress level, return the elevator to the alternate floor as directed by the local authority having jurisdiction.
  - f. Visually indicate the alarm initiating device type and location via the LCD display located at the FACP (and at any remote annunciators) and (illuminate the appropriate alarm zone LED at the remote annunciator).
  - g. Automatically shut down or control HVAC equipment to initiate smoke control functions as required. Manual override controls and programmable relay interface shall serve as an interface to the Building Automation System.
  - h. Operate prioritized outputs to release all magnetically held smoke doors and magnetically locked doors throughout the building.
  - i. Activate the exterior weatherproof beacon.

2. Private mode: The activation of any automatic local alarm initiating device (sounder-base with smoke, or combination smoke/carbon monoxide device) within an apartment shall automatically:
  - a. Sound a code 3 temporal evacuation signal for smoke to all alarm devices within the apartment and a code 4 temporal evacuation signal for carbon monoxide to all alarm devices within the apartment.
  - b. Visually indicate a supervisory trouble condition of the type and location of the initiating device via the LCD display located at the FACP (and at any remote annunciators) and (illuminate the appropriate zone LED at the remote annunciator).

#### C. WIRING

1. Provide in accordance with manufacturer's instructions all wiring, conduit and outlet boxes required for the installation of complete system as described herein and as shown on the drawings. Wiring shall be Class A.
2. Installation and fire alarm system wiring shall be installed in metal raceway. An equipment bonding conductor shall be provided in all flexible metallic raceways.
3. Color code for fire alarm systems shall be per the State Fire Alarm code.
4. DC supply to the main fire alarm panel shall be white and black. Fire alarm primary power source shall be on dedicated branch circuit. Circuit breaker locks shall be used. If a separate feed is required for the battery charger it shall be black and white unless the main fire alarm panel required only AC feed. In this case the conductors to the battery charger shall be red and white and shall be on a circuit breaker of its own.
5. Conductors shall be minimum #14-gauge solid copper type THHN/THWN. Conductor's size shall be increased as required to maintain voltage drop to a maximum of 3%. All AC and DC portions of the system shall be installed in separate raceway. Addressable loop wiring may be #16 providing manufacturer's recommended distance is observed. Systems requiring shielded wiring for addressable loops shall not be acceptable.
6. Red painted terminal cabinets with hinged local covers shall be provided at all junction points. All conductor splices shall be made on screw type terminal blocks, wire nuts shall not be used. All terminals within terminal cabinets shall be properly labeled. Provide terminal cabinets at each building cable entrance and at other locations as required.
7. All fire alarm initiating zone and signal wiring shall be wired Class A.
8. Final connections between the equipment and the wiring system shall be made under the direct supervision of a representative of the manufacturer.
9. Upon completion of the installation of fire alarm equipment, the electrical contractor shall provide to the engineer a signed statement substantially in the form as follows:
  - a. The undersigned having been engaged as the electrical contractor on this project confirms the fire alarm equipment was installed in accordance with the specifications and in accordance with wiring diagrams, instructions, and directions provided to us by the manufacturer.

#### D. GUARANTEE AND FINAL TEST

1. All testing (pre-testing, final testing, quarterly testing and program change testing) to be coordinated with the owner and scheduled in advance so that owners and personnel can be present during testing. Contractor to certify that all tests comply with the "State Fire Code", latest edition.
2. Before this installation shall be considered complete and acceptable to the awarding authorities, a complete test on the system shall be performed as follows:
  - a. A pre-test will be held by the electrical contractor with the manufacturer's authorized representative present. After certification of a complete pre-test, the installing contractor shall inform the authority having jurisdiction of the outcome of the test and will re-inspect in the presence of the authority having jurisdiction and the manufacturer's authorized representative.
  - b. Final test: The electrical contractor in the presence of authorized representative of the manufacturer and the fire department shall operate every manual station, smoke detector, and thermal detector. Each station/detector circuit and horn circuit shall be opened in at least two



locations to check for the presence of correct supervisory circuitry. When this testing has been completed to the satisfaction of both the electrical contractor's job foreman and the representative of the manufacturer, a letter from the contractor cosigned by the manufacturer attesting to the satisfactory completion of said testing, shall be forwarded to the owner.

3. The electrical contractor shall guarantee all equipment and wiring to be free from inherent mechanical and electrical defects for a period of one year from the date of final acceptance.
4. The contractor shall provide the Owner with a formal written equipment guarantee upon completion of the installation and testing of the system. The guarantee period shall begin on the day of acceptance of the system by the Owner and shall provide for a period of one year. This guarantee shall be indicated in the manufacturer's submission prior to approval. This guarantee shall be as normal policy by the equipment manufacturer.
5. The manufacturer shall maintain a full-time service and parts facility, with seven days per week, 24 hour per day service available.
6. All service technicians shall be licensed by the State Fire Code covering service and maintenance of systems.
7. Include as part of the contract, the four quarterly tests following the final acceptance test. Provide quarterly testing in conformance with the State Fire Code latest addition.

## 2.20 DATA

- A. Service: Provide incoming data (internet) service raceways and cable as required by the Owner's representative and/or vendor or as required by the serving internet company from the utility pole to the building. Provide 3/4" plywood board (and one double duplex outlet) in weather-proof cabinet for internet service equipment. Provide a 3/4-inch-thick plywood board (8'-0" wide by 4'-0" high) inside of building. All plywood backboards shall be fire-retardant-treated and stamped FRT, securely anchored to the cabinet or wall. Provide a copper ground bar (1/4" thick x 4" high x 36" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each data cabinet or wall. Connect pig tail to building electrical service grounding system per the internet company's requirements.
- B. The Electrical Contractor shall provide and install data outlet backbox per the Owner's specifications and direction. Install 3/4" EMT conduit with pull string from backbox to above accessible ceiling. Provide bushed endcap on conduit (above ceiling end of conduit).

## 2.21 TELEPHONE

- A. Service: Provide incoming telephone service raceways and cable as required by the Owner's representative and/or vendor or as required by the serving telephone company from the utility pole to the building. Provide 3/4" plywood board (and one double duplex outlet) in weather-proof cabinet for telephone service equipment. Provide a 3/4-inch-thick plywood board (8'-0" wide by 4'-0" high) inside of building. All plywood backboards shall be fire-retardant-treated and stamped FRT, securely anchored to the cabinet or wall. Provide a copper ground bar (1/4" thick x 4" high x 36" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each telephone cabinet or wall. Connect pig tail to building electrical service grounding system per the telephone company's requirements.
- B. The Electrical Contractor shall provide and install data outlet backbox per the Owner's specifications and direction. Install 3/4" EMT conduit with pull string from backbox to above accessible ceiling. Provide bushed endcap on conduit (above ceiling end of conduit).

## 2.22 CABLE TELEVISION

- A. Service: Provide incoming CATV service raceways and cable as required by the Owner's representative and/or vendor or as required by the serving CATV company from the utility pole to the building. Provide ¾" plywood board (and one double duplex outlet) in weather-proof cabinet for CATV service equipment. Provide a ¾-inch-thick plywood board (8'-0" wide by 4'-0" high) inside of building. All plywood backboards shall be fire-retardant-treated and stamped FRT, securely anchored to the cabinet or wall. Provide a copper ground bar (1/4" thick x 4" high x 36" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each CATV cabinet or wall. Connect pig tail to building electrical service grounding system per the CATV company's requirements.
- B. The Electrical Contractor shall provide and install CATV outlet backboxes per the Owner's specifications and direction as shown on the plans. Install ¾" EMT conduit with pull string from backbox to terminal board. Provide bushed endcap on end of conduit). Provide a copper ground bar (1/4" thick x 2" high x 12" long) with wall mounting brackets, insulators and a #6AWG copper exothermically welded pigtail in each. Connect pig tail to ground bar in apartments panelboard.

## 2.20 TRANSFORMERS

- A. Division 1 - Material and Equipment: Product Options and Substitutions.
- B. Manufacturers:
  - 1. Square D Company.
  - 2. Cutler Hammer
  - 3. Siemens
  - 4. Substitutions: Under the provisions of Division 1.
- C. Description: NEMA ST 20, factory-assembled, air-cooled dry type transformers with copper windings, ratings as indicated in schedule on plans. Transformers shall comply with NEMA TP-1, Energy Star requirements, and latest Department of Energy (DOE) efficiency standards.
- D. Primary Voltage: 480 volts, 3 phase unless otherwise noted on plans.
- E. Secondary Voltage: 208Y/120 volts, 3 phase unless otherwise noted on plans.
- F. Insulation system and average winding temperature rise for rated kVA as follows:
  - 1. 1-15 kVA: Class 185 with 115 degrees C rise.
  - 2. 16-500 kVA: Class 220 with 115 degrees C rise.
- G. Case temperature: Do not exceed 35 degrees C rise above ambient at warmest point at full load.
- H. Winding Taps:
  - 1. Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
  - 2. Transformers 15 kVA and Larger: NEMA ST 20.
- I. Sound Levels: NEMA ST 20.
- J. Basic Impulse Level: 10 kV for transformers less than 300 kVA, 30 kV for transformers 300 kVA and larger.
- K. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- L. Mounting:
  - 1. 1-15 kVA: Suitable for wall mounting.
  - 2. 16-75 kVA: Suitable for wall, floor, or trapeze mounting.
  - 3. Larger than 75 kVA: Suitable for floor or trapeze mounting.
- M. Coil Conductors: Continuous windings with terminations brazed or welded.
- N. Enclosure: NEMA ST 20, Type 1. Provide lifting eyes or brackets.
- O. Isolate core and coil from enclosure using vibration-absorbing mounts.
- P. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

- Q. Set transformer plumb and level.
- R. Use flexible metal conduit, 2-feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- S. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by the manufacturer.
- T. Mount floor-mounted transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure. Provide 4" high concrete housekeeping pad for transformers.
- U. Mount trapeze-mounted transformers as indicated.
- V. Provide seismic restraints.
- W. Provide grounding and bonding per Code.

## 2.21 EMERGENCY RESPONDER RADIO ANTENNA / REPEATER SYSTEM

### 1. SUMMARY

- A. Furnish, install, and test a complete and operating Emergency Responder Radio Antenna/Repeater System. The system shall support only the Fire Department radio system. Provisions for supporting other public safety systems (e.g. police); cell phone carriers; the Owners' private security and/or maintenance personnel radio systems, etc. shall not be included.
- B. This Section includes the requirements for an Emergency Responder Radio Antenna/Repeater System for the purposes of amplifying Emergency Responder radio signals to achieve the required signal strength in all areas on each floor of the building per the fire department.
- C. Final acceptance and approval is required from the local Fire Department in writing prior to contract closeout.
- D. Section Includes
  - 1. Bi-directional amplifiers (BDA's)
  - 2. Distributed Antenna System
  - 3. Coaxial cables
  - 4. Splitters and direction couplers
  - 5. UPS and surge protection
  - 6. All other equipment and components necessary for a complete and functioning

### 2. REGULATIONS

- A. Codes, regulations, and standards referenced in the Section are:
  - 1. NFPA 1 – The National Fire Code (including Annex O from 2009)
  - 2. NFPA 70 – The National Electrical Code
  - 3. State and Local Fire Codes for Emergency Responder Radio Coverage
  - 4. NFPA 101, Life Safety Code.
  - 5. NFPA 72-07 National Fire Alarm Code
  - 6. FCC 47 CFR Private Land Mobile Radio
  - 7. 90.219-2007 Services-Use of Signal Boosters
  - 8. ICC International Fire Code, Code and Commentary
  - 9. ADA "Americans with Disabilities Act"
  - 10. FCC's OET 65 Standards "Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields".
  - 11. FCC Rules Part 22, Part 90 and Part 101.

### 3. DEFINITIONS

- A. Definitions:
  - 1. Bi-Directional Amplifier BDA: Device used to amplify band-selective or multi-band RF signals in the uplink, to the base station for enhanced signals and improved coverage.
  - 2. Emergency Responder Radio Coverage System: A two-way radio communication system installed to assure the effective operation of radio communications systems for fire, emergency

medical services or law enforcement agencies within a building or structure. A system used by firefighters, police, and other emergency services personnel.

3. Delivered Audio Quality Definitions (DAQ): This is a universal standard often cited in system designs and specifications.

a. DAQ 1: Unusable, speech present but unreadable.

b. DAQ 2: Understandable with considerable effort. Frequent repetition due to noise/distortion.

c. DAQ 3: Speech understandable with slight effort. Occasional repetition required due to noise/distortion.

d. DAQ 3.5: Speech understandable with repetition only rarely required. Some noise/distortion

e. DAQ 4: Speech easily understood. Occasional noise/distortion.

f. DAQ 4.5: Speech easily understood. Infrequent noise/distortion.

g. DAQ 5: Speech easily understood. Coupled Bonding Conductor (CBC) – The term "Coupled Bonding Conductor" shall mean a bonding conductor placed, e.g. strapped, on the outside of any technology cable, used to suppress transient noise.

4. FCC: Federal Communications Commission

5. OET 65 Standards: FCC's Bulletin 65 provides Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

6. Public Safety/First Responder: Public Safety or First Responder agencies which are charged with the responsibility of responding to emergency situations. These include, but are not limited to law enforcement departments, fire departments, and emergency medical companies.

#### 4. SUBMITTALS

A. Submit product data for each type of proposed system component specified, including dimensioned drawings showing minimum clearances and installed features to the local fire department, Architect and Engineer prior to supplying any material for review and approval.

B. Layout Drawings

1. Component specification sheets shall be 8.5-inch x 11 inch or greater, scaled or dimensioned, with dimensions or scale clearly noted.

2. Floor plan drawings shall be 24-inch x 36 inch minimum with drawings scaled to legible size.

3. Floor plan drawings may include elevation detail names for each elevation view. Sheet title shall include site name, address, sheet number, floor plan number and north arrow. Include site plan view of the subject buildings and surrounding property to clearly indicate the location and orientation of roof mounted outdoor antennas associated with the proposed system.

4. Include a minimum of (1) building elevation depicting the location of any outdoor antennas associated with the proposed system. Include height of antenna centerline above building, orientation, and location of all external grounding connections.

5. Include a detail plan view of all Telecommunications Spaces housing head-end and/or other consolidated equipment, showing the location of the rack(s) and/or enclosure(s) of the Emergency Responder Radio Antenna/Repeater System equipment.

6. Include a separate plan view of each interior floor where indoor antenna systems are proposed. Include antenna numbers, coaxial cable routes, and the locations of any other system components including splitters, couplers, filters, amplifiers, etc. All components shall be named or labeled for reference in power budget calculations tables. Overlay approximated coverage radii indicating –95 dBm downlink (base to mobile) signal strength around each proposed indoor coverage antenna. Include results of any previous coverage testing per grid, if available.

7. Include a minimum of one (1) detail elevation view(s) of all rack(s) and/or enclosure(s) housing the Emergency Responder Radio Antenna/Repeater System equipment. Identify each piece of equipment by brand, model number and equipment type (e.g. Acme BA123 RF amplifier).

8. Specify antenna grounding and surge protection in accordance with NEC Article 810.

9. Specify the backup power source (Life Safety), and include calculations to ensure the backup power requirements as specified in this standard are met.

C. Equipment Specification Sheets

1. Provide copies of manufacturer specification sheets of all system components, including:
    - a. Amplifiers
    - b. Antennas
    - c. Coaxial cable, couplers, splitters, combiners, or other passive components
  2. Operation and maintenance data
  3. Pass band curves in for the uplink and downlink portions of the NPSPAC band for any amplifiers, if not included in #1. Amplifiers may NOT amplify portions of other licensed services, including Nextel and Specialized Mobile Radio Licensee band, or Cellular A or B bands.
  4. Backup battery and charging system.
  - D. Submit wiring diagrams from manufacturer differentiating clearly between factory and field-installed wiring. Include diagrams for each component of the system with all terminals and interconnections identified. Make all diagrams specific to this Project.
  - E. Submit product certificates signed by the manufacturer of radio system components certifying that their products comply with specified requirements.
  - F. Submit agenda for training class and copies of all handouts for the class.
  - G. Maintenance data for radio system shall be included in the operation and maintenance manual. Include data for each type of product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations that carry stock of repair parts for the system to be furnished.
  - H. Record of field tests of the radio system shall be included in the operation and maintenance manuals.
  - I. Design Approval: Plans shall be submitted and approved prior to installation. The following information shall be provided to the local Fire Department unit representative by the system designer/Contractor:
    1. A minimum of three (3) copies of detailed drawings showing the location of the amplification equipment and associated antenna systems which includes a view showing building access to the equipment; and
    2. A minimum of three (3) copies of schematic drawings of the electrical system, backup power, antenna system and any other associated equipment relative to the amplification equipment including panel locations and labeling.
    3. A minimum of one (1) copy of the Manufacturer's data sheets on all equipment to be installed.
5. QUALITY ASSURANCE
- A. Installer Qualifications: Engage an experienced factory-authorized installer to perform work of this Section.
  - B. Single-Source Responsibility: Obtain radio system components from a single source who assumes responsibility for compatibility of system components.
  - C. All equipment shall be UL listed and labeled, and in accordance with applicable NEMA and ANSI Standards. Where copper cabling is routed to an area, either in another building, or with a separate electrical service, the Technology Contractor shall provide primary protective equipment.
  - D. All racks and enclosures shall be either welded or assembled with paint piercing ground washers, grounding strip and bonding jumper as indicated on the Drawings.
6. MANUFACTURERS
- A. Subject to compliance with requirements, available Integrators offering products that may be incorporated into the Work include, but are not limited to, the following:
    1. CommScope/Andrew
    2. Corning
    3. Times Microwave
    4. Tessco
    5. CCI (Communication Components Inc.)
    6. Solid Technologies

## 7. PRODUCTS GENERAL PERFORMANCE REQUIREMENTS

- A. Compatibility: The equipment, including but not limited to repeaters, transmitters, receivers, signal boosters, cabling, fiber distributed antenna system, etc., shall not interfere with any other communication systems.
- B. Power Supplies: At least two (2) independent and reliable power supplies shall be provided, one primary and one secondary. The primary power source shall be supplied from a dedicated 20 ampere branch circuit and comply with 4.4.1.4 of NFPA 72. The secondary power source shall be a dedicated battery, capable of operating the in-building radio system for at least 12 hours of 100% system operation. The battery system shall automatically charge in the presence of external power input. The battery system shall be contained in one NEMA 4 or 4X type enclosures. Monitoring the integrity of power supplies shall be in accordance with 4.4.7.3 of NFPA 72.
- C. Survivability
  - 1. Physical Protection: All wiring and fiber optics shall be installed in conduit.
  - 2. Fire Performance: All main risers or trunks of the antenna system shall be installed with resistance to attack from a fire using one of the following methods:
    - a. A 2-hour fire rated cable or cable system.
    - b. Routing the cable through a 2-hour fire rated enclosure(s) or shaft(s).
    - c. A system configured in a looped design, routed through 1-hour fire rated enclosure(s) or shaft(s). The circuit shall be capable of transmitting and receiving a signal during a single open or non-simultaneous single ground fault on a circuit conductor.
    - d. Performance alternative approved by the Authority Having Jurisdiction.
  - 3. Cabinet: The signal booster and all associated RF filters shall be housed in a single, NEMA 4 certified, painted steel weather tight box. The cabinet shall be large enough to dissipate internal heat without venting the inside of the cabinet to the outside atmosphere. Operating temperatures: – 22 degrees F to +120 degrees F (–30 degrees C to +50 degrees C) minimum temperature range, including microprocessors. Equipment installed on the roof of structures shall be rated for the expected extreme temperatures associated with rooftop installations.
  - 4. Passive Equipment: Passband shall be 700-900 MHz, IP rating of 2 GHz.
  - 5. Cable: Passband shall be 700-900 MHz. Cable shall be rated for fire plenum and riser rating.

## 8. SYSTEM COMPONENTS

- A. Signal Strength
  - 1. Downlink: A minimum signal strength of -95 dBm shall be provided throughout the coverage area.
  - 2. Uplink: Minimum signal strength of -95 dBm received at the local Fire Department Radio System from the coverage area.
  - 3. A donor antenna must maintain isolation from the distributed antenna system. The donor antenna signal level shall be a minimum of 15 dB above the distributed antenna system under all operating conditions.
- B. Permissible Systems
  - 1. Buildings and structures shall be equipped with an FCC Certificated Class B Bi-Directional UHF Amplifier(s) as needed.
  - 2. The distributed antenna system may utilize a radiating cable, fixed antennas or a combination of both.
- C. Supported Frequencies: The radio system shall support frequencies in the 700 and 800 MHz public safety bands as utilized by the local Fire Department.
- D. Reject Filters: Notch filter sections shall be incorporated to minimize adjacent channel cellular and SMR (Nextel) degradation of the signal booster performance. The minimum downlink band adjacent band rejection shall be 35 dB or greater at 865 MHz and 870 MHz.
- E. Band Migration Capability: The signal booster shall include re-tunable or replaceable filters to accommodate rapid and economic passband changes in the event of mandatory FCC changes within

the NPSPAC band. The use of non-adjustable and non-replaceable RF input and output filters is prohibited.

- F. Output Level Control: An automatic output leveling circuit shall be included for both passbands with a minimum dynamic range of 60 dB, less any gain reduction setting, to maintain FCC out of band and spurious emission compliance.
- G. Degraded Performance in Emergencies: The system shall be designed to allow degraded performance in adverse conditions, such as abnormally high temperatures resulting from nearby fires, extreme voltage fluctuations or other abnormal conditions that may occur during an emergency. Circuits that intentionally disable the signal booster in such situations (i.e. under/over voltage, over/under current, over/under temperature, etc.) will not be implemented as the standard mode for public safety applications.
- H. Mode of Operation: The system shall be normally powered on and shall continuously provide passing of frequencies within the Public Safety and First Responder bands.
- I. All in-building radio systems shall be compatible with both analog and digital communications simultaneously at the time of installation.

#### 9. SYSTEM MONITORING

- A. The distributed antenna system shall include a connection to the fire alarm system to monitor the integrity of the circuit of the signal booster(s) and power supplies and annunciate this malfunction on the fire alarm system shall comply with 4.4.7.1 of NFPA 72.
- B. A sign shall be located at the fire alarm panel with the name and telephone number of the local Fire Department indicating that they shall be notified of any failures that extend past the 2 hour time limit.

#### 10. INSTALLATION

- A. Distribution System Signal Wires and Cables
  - 1. Wires and cables shall enter each equipment enclosure, console, cabinet or rack in such a manner that all doors or access panels can be opened and closed without removal or disruption of the cables.
  - 2. Routing and Interconnection
    - a. Wires or cables routed between consoles, cabinets, racks, and other equipment shall be installed in an approved conduit or cable tray that is secured to building structure.
    - b. Completely test all of the cables after installation and replace any that are found to be defective.
  - 3. Install cables without damaging conductors, shield, or jacket.
  - 4. Do not bend cables, while handling or installing, to radii smaller than as recommended by manufacturer.
  - 5. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
- B. Product Delivery, Storage, and Handling
  - 1. Delivery: Deliver materials to the job site in OEM's original unopened containers, clearly labeled with the OEM's name and equipment model and serial identification numbers.
  - 2. Store and protect equipment in a conditioned space until installation.
- C. System Installation
  - 1. Coaxial antenna cabling shall not be installed in the same conduit, raceway, or cable trays used for other systems.
  - 2. All equipment shall be connected according to the OEM's specifications to insure correct installation and system performance.
  - 3. Coordinate all roof penetrations with Owner and roofing contractor.

#### 11. LICENSING

- A. All fees associated with the licensing shall be paid by the Owner.
- B. All testing must be done on frequencies authorized by the FCC.

#### 12. GROUNDING

- A. Ground cable shields and equipment per Manufacturer's requirements.

- B. Antenna mast shall be grounded per NFPA 70 NEC requirements, and antenna manufacturer's requirements. Provide grounding blocks and surge protection for outside coaxial cabling. Bond the antenna mast to the lightning protection system.

### 13. APPROVAL TESTING

- A. The local Fire Department shall review plans and specifications. Upon acceptance, plans shall be stamped to indicate approval. Stamped plans are required to be present at the acceptance test. Any field changes that occur during construction shall be incorporated into new As-Built plans, including any manufacturer's data sheets for any equipment changes not submitted in the original submittal. As-Built plans, if required due to system changes, shall be submitted to the local Fire Department for approval.
- B. Tests shall be made using frequencies close to the frequencies used by the Fire Department and appropriate emergency services. If testing is done on the actual frequencies, then this testing must be coordinated with the local Fire Department unit. All testing must be done on frequencies authorized by the FCC. A valid FCC license shall be required if testing is done on frequencies different from the police, fire or emergency medical frequencies.
- C. Testing Procedures
  - 1. Minimum Signal Strength: For testing system signal strength and quality, the testing shall be based on the delivered audio quality (DAQ) system. A DAQ level below 3.0 shall be considered a failed test for a given grid cell.
  - 2. Measurements shall be made with the antenna held in a vertical position at 3 to 4 feet above the floor to simulate a typical portable radio worn on the belt or turnout coat pocket.
- D. Final Acceptance Testing
  - 1. All acceptance testing shall be done in the presence of a local Fire Department representative or by the local Fire Department unit at no expense to the City or Town.
  - 2. Small scale drawings (11 inch x 17 inch maximum) of the structure shall be provided by the Contractor to the Owner. The plans shall show each floor divided into the grids as described above, and the results of the pre-testing. Each grid shall be labeled to indicate the DAQ result from the final acceptance testing.
  - 3. The Contractor shall provide the latest approved plans for the system, including any manufacturer's data sheets for any equipment changes not submitted in the original submittal to the Owner.
  - 4. Include testing results of the repeater (output wattage, gain level, etc) and connection to the fire alarm.

### 14. MAINTENANCE AND ANNUAL TESTING

- A. Annual tests will be conducted by the local Fire Department unit or authorized company.
  - 1. The re-testing will be done at no expense to the City or the appropriate emergency services departments as required in the original testing procedures.
- B. Maintenance Contract
  - 1. Maintenance contract with a Radio Service Provider in place with name of authorized company, who will provide a 24 hour by 7-day emergency response within two (2) hours after notification. The system shall be maintained in accordance with FCC requirements. The contract shall be for 5 years.
  - 2. All tests shall be conducted, documented, and signed by a person in possession of a current FCC General Radio telephone Operator License, or a technician certification issued by the Association of Public-Safety Communications Officials International (APCO) or equivalent as determined by the local Fire Department.
  - 3. Maintain a list of contact personnel with phone numbers at the radio repeater system cabinet. The contact personnel shall have knowledge of the building and the repeater system and be available to respond to the building in the case of an emergency.
  - 4. Radio Service Provider maintenance contract shall include but not limited to:
    - a. Annual Test



- 1) All active components of the distributed antenna system, including but not limited to amplifier, power supplies, and back-up batteries, shall be tested a minimum of once every 12 months.
- 2) Amplifiers shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance. The original gain shall be noted and any change in gain shall be documented.
- 3) Back-up batteries and power supplies shall be tested under load for a period of 1 hour to verify that they will operate during an actual power outage.
- 4) Active components shall be checked to determine that they are operating within the manufacturer's specifications for their intended purpose.
- 5) Documentation of the test shall be maintained on site and a copy forwarded to the local Fire Department Radio Supervisor upon completion of the test.
5. Fire Department Radio personnel, after providing reasonable notice to the Owner or their representative, shall have the right to enter onto the property to conduct field testing to be certain that the required level of radio coverage is present.

## 2.22 SHORT CIRCUIT/COORDINATION STUDY AND ARC FLASH RISK ASSESSMENT

### A. GENERAL

1. The electrical contractor shall retain the services of an independent third-party firm, or the equipment manufacturer's technical services group, to perform a short circuit/coordination study and arc flash risk assessment as described herein
2. Preliminary studies shall be submitted to the A/E prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment for manufacture to ensure the characteristics and ratings of the proposed overcurrent devices will be satisfactory. The final submittal shall capture any changes in circuit lengths, wire sizes, additional loads, etc. that may occur during the construction project
3. The studies shall include all portions of the electrical distribution system from the normal power source or sources, and emergency/standby sources, down to and including the smallest circuit breaker in the distribution system (for short circuit calculations). Normal system connections and those which result in maximum fault conditions shall be adequately covered in the study
4. The firm should be currently involved in medium- and low-voltage power system evaluation. The study shall be performed, stamped and signed by a registered professional engineer in the State of the project is located in. Credentials of the individual(s) performing the study and background of the firm shall be submitted to the A/E for approval prior to start of the work. A minimum of five (5) years experience in power system analysis is required for the individual in charge of the project
5. The firm performing the study should demonstrate capability and experience to provide assistance during start up as required
6. The study and assessment shall be performed on SKM Dapper, Captor and PowerTool software or EasyPower product suite software.

### B. REFERENCE STANDARDS

1. Standards listed in the IEEE "Buff Book", latest edition
2. National Fire Protection Association (NFPA) 70E, latest addition
3. IEEE 1584 – Guide for Performing Arc Flash Calculations

### C. DATA COLLECTION FOR THE STUDY

1. The contractor shall provide the required data for preparation of the studies. The engineer performing the system studies shall furnish the contractor with a listing of the required data immediately after award of the contract.
2. The contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to release of the equipment for manufacture.

### D. SUBMITTALS

### E. THIRD PARTY QUALIFICATIONS

1. Submit qualifications of individual(s) who will perform the work to the A/E for approval prior to commencement of the studies.
- F. PRELIMINARY REPORT
1. Submit a draft of the studies to the A/E for review prior to delivery of the final study to the Owner. Make all additions or changes as required by the reviewer.
- G. FINAL STUDY REPORT
1. Provide studies in conjunction with equipment submittals to verify equipment ratings required.
  2. The results of the power system studies shall be summarized in a final report and provided in the following formats. Provide (2) bound hard copies of the final report. Provide (2) electronic copies (on CD) of the final report and one-line diagrams in PDF format. Provide (2) electronic copies (on CD) of the final report in MS Word format and the one-line diagrams in CAD format.
  3. Also provide (2) electronic copies (on CD) of all files generated by the SKM or EasyPower software for all scenarios evaluated in the studies. The files shall permit the studies to be opened, reviewed or updated by any user of the analysis software used for the studies.
  4. The report shall typically include the following sections:
    - I. Overview
    - II. Short Circuit Study
      - SC-1 Purpose
      - SC-2 Explanation of Data
      - SC-3 Assumptions
      - SC-4 Analysis of Results
      - SC-5 Recommendations
      - SC-6 Fault Analysis Input Report from Software Program
      - SC-7 Fault Contribution Report
    - III. Protective Device Coordination Study
      - PDC-1 Purpose
      - PDC-2 Explanation of Data
      - PDC-3 Assumptions
      - PDC-4 Analysis of Results
      - PDC-5 Recommendations (Including NEC 700-27 Requirement)
      - PDC-6 Results from Software Program
      - PDC-7 Example Drawings
    - IV. Arc Flash Study
      - ARC-1 Purpose
      - ARC-2 Explanation of Data
      - ARC-3 Assumptions
      - ARC-4 Analysis of Results
      - ARC-5 Recommendations
      - ARC-6 Arc Flash Evaluation Report from Software Program
    - V. Prioritized Recommendations and Conclusions
    - VI. Appendices
      - APP-1 One-line Diagrams from Software Program
      - APP-2 AutoCAD One-line Diagrams
      - APP-3 Protective Device Summaries from Software Program
      - APP-4 Reference Data
      - APP-5 Sample Work Permit Form
      - APP-6 Copy of Warning Labels, including study date
  5. The above sections shall include the following items in detail:
    - a. Obtain available fault current from the local utility company.
    - b. Short circuit studies shall evaluate the available fault current at each bus (each change of impedance), including all three-phase motors.

- c. Coordination study recommendations for relay settings, breaker settings, and motor protection settings.
- d. Recommendations for improving the coordination and/or load distribution, as well as ground fault requirements.
- e. Worst case Arc Flash values (highest incident energy) for project specific scenarios (low short circuit and high short circuit for each possible power supply source).
- f. Arc flash values for two maintenance cases, which define the arc flash values available at the equipment that would be available if the instantaneous trip of the upstream circuit breaker is set at a minimum value. This is recommended if someone must work on live equipment.
- g. IEEE standard one-line diagram with equipment evaluation and circuit breaker settings that clearly define the system data and are easy to interpret. The diagrams should include the bus names and references used in the studies.
- h. Recommendations to reduce the arc flash incident energy in all areas that are subject to 8 calories per square centimeter or greater of available incident energy.
- i. Condition of Maintenance information for any existing equipment included in the study.
- j. Prioritized report summarizing all recommendations from this study. This shall include observed NEC code violations and their corrective action.
- k. The contractor shall provide a one-line diagram that meets IEEE/ANSI standard 141, mounted on 24" x 36" (minimum) Styrofoam backboard. This one-line diagram shall be mounted in each electrical room.

## H. EXECUTION

### 1. SHORT CIRCUIT AND COORDINATION STUDY

- a. The short circuit, coordination, and arc flash hazard studies shall be performed using SKM Dapper, Captor and PowerTool for Windows software or EasyPower product suite Windows based software packages. In the short circuit study, provide calculation methods and assumptions, the base per unit quantities selected, one-line diagrams, source impedance data including power company system characteristics, typical calculations, and recommendations. Calculate short circuit interrupting and momentary (when applicable) duties for an assumed 3-phase bolted fault at each supply switchgear lineup, unit substation primary and secondary terminals, low voltage switchgear lineup, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboard, and other significant locations throughout the system. Provide a ground fault current study for the same system areas, including the associated zero sequence impedance data. Include in tabulations fault impedance, X to R ratios, asymmetry factors, motor contribution, short circuit KVA, and symmetrical and asymmetrical fault currents.
- b. In the protective device coordination study, provide time-current curves graphically indicating the coordination proposed for the system, centered on conventional, full-size, log-log forms. Include with each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered by that particular curve sheet. Include a detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings.
- c. Include on the curve sheets power company relay and fuse characteristics, system medium-voltage equipment relay and fuse characteristics, low-voltage equipment circuit breaker trip device characteristics, pertinent transformer characteristics, pertinent transformer characteristics, pertinent motor and generator characteristics, and characteristics of other system load protective devices. Include at least all devices down to largest branch circuit and largest feeder circuit breaker in each motor control center, and main breaker in branch panelboards.
- d. Include all adjustable settings for ground fault protective devices. Include manufacturing tolerance and damage bands in plotted fuse characteristics. Show transformer full load and 150,

400, or 600 percent currents, transformer magnetizing inrush, ANSI transformer withstand parameters, and significant symmetrical and asymmetrical fault currents. Terminate device characteristic curves at a point reflecting the maximum symmetrical or asymmetrical fault current to which the device is exposed.

- e. Select each primary protective device required for a delta-wye connected transformer so that its characteristic or operating band is within the transformer characteristics, including a point equal to 58 percent of the ANSI withstand point to provide secondary line-to-ground fault protection. Where the primary device characteristic is not within the transformer characteristics, show a transformer damage curve. Separate transformer primary protective device characteristic curves from associated secondary device characteristics by a 16 percent current margin to provide proper coordination and protection in the event of secondary line-to-line faults. Separate medium-voltage relay characteristic curves from curves for other devices by at least a 0.4-second time margin.
- f. Include complete fault calculations as specified herein for each proposed and ultimate source combination. Note that source combinations may include present and future supply circuits, large motors, or generators as noted on drawing one-lines.
- g. Utilize equipment load data for the study obtained by the Contractor from contract documents, including contract addendums issued prior to bid openings.
- h. Include fault contribution of all motors in the study. Notify the Engineer in writing of circuit protective devices not properly rated for fault conditions.
- i. Provide settings for the chiller motor starters or obtain from the mechanical contractor, include in the study package, and comment.
- j. When an emergency generator is provided, include phase and ground coordination of the generator protective devices, to meet NEC 700.27 requirements. Show the generator decrement curve and damage curve along with the operating characteristic of the protective devices. Obtain the information from the generator manufacturer and include the generator actual impedance value, time constants and current boost data in the study. Do not use typical values for the generator.
- k. Evaluate proper operation of the ground relays in 4-wire distributions with more than one main service circuit breaker, or when generators are provided, and discuss the neutral grounds and ground fault current flows during a neutral to ground fault.
- l. For motor control circuits, show the MCC full-load current plus symmetrical and asymmetrical of the largest motor starting current to ensure protective devices will not trip major or group operation.

#### I. FIELD SETTINGS

- 1. The Contractor shall perform field adjustments of the protective devices as required to place the equipment in final operating condition. The settings shall be in accordance with the approved short circuit study, protective device coordination study and arc flash risk assessment.
- 2. Necessary field settings and adjustments of devices and minor modifications to equipment to accomplish conformance with the approved short circuit and protective device coordination study shall be carried out by the Contractor at no additional cost to the owner.

#### J. ARC FLASH RISK ASSESSMENT

- 1. As part of the short circuit and coordination study, arc flash risk assessment shall be included. The study shall include the following:
  - a. Determine and document all possible utility and generator/emergency sources that are capable of being connected to each piece of electrical gear. Calculations shall be based on highest possible source connection.
  - b. Calculations to conform to National Fire Protection Association (NFPA) 70E recognized means of calculation standards. All incident energy units shall be calculated in calories per square centimeter.

- c. Provide recommended boundary zones and personal protective equipment (PPE) based on the calculated incident energy and requirements of NFPA 70E for each piece of electrical gear.
- d. Electrical Contractor shall provide warning labels as required by OSHA based upon the results of the arc flash risk assessment. At a minimum, the labeling shall contain the following information: nominal system voltage, arc flash boundary, limited approach boundary, restricted approach boundary, available incident energy and the corresponding working distance or the arc flash PPE category, minimum arc rating of clothing, and study date. Label shall also include the name or logo and the phone number of the company performing the study.
- e. Arc flash warning labels shall be affixed to all electrical equipment that is likely to require examination, adjustment, servicing or maintenance while energized. This includes, but is not limited to, medium-voltage switchgear, transformers, switchboards, panel boards, three-phase disconnect switches, transfer switches, motor control centers, motor controllers, and three-phase motor disconnect switches.

## PART 3 – EXECUTION

### 3.1 BASIC REQUIREMENTS

- A. Adhere to best industry practice and the following:
  - 1. All work shall be concealed.
  - 2. Route circuitry runs embedded in concrete to coordinate with structural requirements.
  - 3. Equip each raceway intended for the future installation of wire or cable with a nylon pulling cord 3/16" in diameter and clearly identify both ends of the raceway.
  - 4. Provide all outlet boxes, junction boxes, and pull boxes for proper wire pulling and device installation. Include those omitted from the drawings due to symbolic methods of notation.
  - 5. Utilize lugs of the limited type to make connections at both ends of cables installed on the line side of main service overcurrent and switching devices. Provide cable limiters for each end of each service entrance cable.
  - 6. Beyond the termination of raceways, fireproof the following:
    - a. All wires and cables within pad-mounted transformer enclosure.
    - b. All service feeder cables ahead of main service overcurrent protection devices, and elsewhere where not in raceways.
  - 7. Fireproofing of wires and cables shall be by means of a half-lapped layer of arcproof or by means of sleeving of a type specifically manufactured for the purpose. Ends of tape or sleeving shall be severed with twine. Fireproofing shall be extended up into raceways. After conductors have been finally shaped into their permanent configuration, fireproofing tape or sleeving shall be coated with silicate of soda (water glass). Fireproofing shall be applied in an overall manner to raceway groupings of conductors.
  - 8. Provide all sleeves through fireproof and waterproof slabs, walls, etc., required for electric work.
  - 9. Provide waterproof sealing for the sleeves through waterproof slabs, walls, etc.
  - 10. Provide fireproof sealing for the sleeves through fireproof walls, slabs, etc.
  - 11. Provide fireproof sealing for the openings in fireproof walls, slabs, etc., resulting from removal of existing electrical sleeves, conduits, poke-thru's etc.
  - 12. No splicing of wires will be permitted in the Fire Alarm System.
  - 13. Bundle wiring passing through pull boxes and panelboards in a neat and orderly manner with plastic cable ties. Cable ties shall be by Ty-Raps as manufactured by Thomas & Betts, Holub Industries Inc., Quick Wrap, Bundy Unirap, or equal.
  - 14. Turn branch circuits and auxiliary system wiring out of wiring gutters at 90 degrees to circuit breakers and terminal lugs.

### 3.2 TESTING REQUIREMENTS & INSTRUCTIONS

- A. Where any repairs, modifications, adjustments, tests or checks are to be made, the Contractor shall contact the Engineer to determine if the work should be performed by or with the Manufacturer's Representative.
- B. Tests are to:
  - 1. Provide initial equipment/system acceptance.
  - 2. Provide recorded data for future routine maintenance and troubleshooting.
  - 3. Provide assurance that each system component is installed satisfactorily and can be expected to perform, and continue to perform its specified function with reasonable reliability throughout the life of the facility.
- C. At any stage of construction and when observed, any electrical equipment or system determined to be damaged, or faulty, is to be reported to the Engineer. Corrective action by the Contractor requires prior Engineer approval, retesting, and inspection.
- D. When the electrical tests and inspections specified or required within Division 16 are completed and results reported, reviewed, and approved by the Engineer, the Contractor may consider that portion of the electrical equipment system or installation electrically complete. The Contractor will then affix appropriate, approved, and dated completion or calibration labels to the tested equipment and notify the Engineer of electrical completion. If the Engineer finds completed work unacceptable, he will notify the Contractor in writing of the unfinished or deficient work, with the reason for his rejection, to be corrected by the Contractor. The Contractor will notify the Engineer in writing when exceptions have been corrected. The Contractor will prepare a "Notification of Substantial Electrical Completion" for approval by the Engineer following Engineer's acceptance of electrical completion. If later in-service operation or further testing identified problems attributable to the Contractor, these will be corrected by the Contractor, at no additional cost to the Authority.
- E. Grounding Systems:
  - 1. Test main building loops and major equipment grounds to remote earth, directly referenced to an extremely low resistance (approximately 1 ohm) reference ground benchmark. Perform a visual inspection of the systems, raceway and equipment grounds to determine the adequacy and integrity of the grounding. Ground testing results shall be recorded, witnessed, and submitted to the Engineer.
  - 2. Perform ground tests using a low resistance, null-balance type ground testing ohmmeter, with test lead resistance compensated for. Use the type of test instrument which compensates for potential and current rod resistances.
  - 3. Test each ground rod and measure ground resistance. If resistance is not 10 ohms or less, drive additional rods to obtain a resistance of 10 ohms or less. Submit tabulation of results to Engineer. Include identification of electrode, date of reading and ground resistance value in the test reports.
  - 4. Test each building and major equipment grounding system for continuity of connections and for resistance. Ground resistance of conduits, equipment cases, and supporting frames, shall not exceed 5 ohms to ground. Submit all readings to the Engineer.
  - 5. Where ground test results identify the need for additional grounding conductors or rods that are not indicated or specified, design changes will be initiated to obtain the acceptable values. The Contractor is responsible for the proper installation of the grounding indicated and specified.
  - 6. Operating Instructions: Furnish operating instructions to Owner's designated representative with respect to operations, functions and maintenance procedures for equipment and systems installed. Cost of such instruction up to a full five (5) days of Electrical Subcontractor's time shall be included in contract. Cost of providing a Manufacturer's Representative at site for instructional purposes shall also be included.

### 3.3 BRANCH CIRCUITRY

- A. For all lighting and appliance branch circuitry, raceway sizes shall conform to industry standard maximum permissible occupancy requirements except where these are exceeded by other requirements specified elsewhere.
- B. Circuits shall be balanced on phases at their supply as evenly as possible.
- C. Feeder connections shall be in the phase rotation which establishes proper operation for all equipment supplied.
- D. Reduced size conductors indicated for any feeders shall be taken as their grounding conductors.
- E. Feeders consisting of multiple cables and raceways shall be arranged such that each raceway of the feeder contains one (1) cable for each leg and one (1) neutral cable, if any.
- F. For circuitry indicated as being protected at 20 Amps or less, abide by the following:
  - 1. All 20 amp, 120/208 volt, 3-phase, 4-wire combined branch circuit homeruns shall be provided with a #8 AWG neutral conductor.
  - 2. Minimum conductor size shall be No. 12 AWG cooper.
  - 3. Conductors operating at 120 volts extending in excess of 100 ft. or at 277 volts extending in excess of 200 ft., or the last outlet or fixture tap shall be No. 10 AWG cooper throughout.
  - 4. Lighting fixtures and receptacles shall not be connected to the same circuit.
- G. Type MC Cable Installation:
  - 1. Where cable is permitted under the products section, the installation of same shall be done in accordance with code and the following:
    - a. Cable shall be supported in accordance with code. Tie wire is not an acceptable means of support. Cable supports such as Caddy WMX-6, MX-3, and clamps such as Caddy 449 shall be used. Where cables are supported by the structure and only need securing in place, then ty-raps will be acceptable. Ty-raps are not acceptable as a means of support. All fittings, hangers, and clamps for support and termination of cables shall be of type specifically designed for use with cable, i.e., romex connectors not acceptable.
    - b. Armor of cable shall be removed with rotary cutter device equal to roto-split by Seatek Co.; not with a hacksaw.
    - c. Use split "Insuliner" sleeves at terminations.

### 3.4 REQUIREMENTS GOVERNING ELECTRICAL WORK IN DAMP OR WET LOCATIONS

- A. Outlets and outlet size boxes shall be of galvanized cast ferrous metal only.
- B. The finish of threaded steel conduit shall be galvanized only.
- C. Wires for pulling into raceways for lighting and appliance branch circuitry shall be limited to "THWN".
- D. Wires for pulling into raceways for feeders shall be limited to "THWN".
- E. Plates for toggle switches and receptacles shall have gasketed snap shut covers suitable for wet locations while in use.
- F. Final connections of flexible conduit shall be neoprene sheathed.
- G. Apply one (1) layer of half looped plastic electric insulating tape over wire nuts used for joining the conductors of wires.
- H. Enclosures, junction boxes, pull boxes, cabinets, cabinet trims, wiring troughs and the like, shall be fabricated of galvanized sheet metal, shall conform to the following:
  - 1. They shall be constructed with continuously welded joints and seams.
  - 2. Their edges and weld spots shall be factory treated with cold galvanizing compound.
  - 3. Their connection to circuitry shall be by means of watertight hub connectors with sealing rings.
- I. Enclosures for individually mounted switching and overcurrent devices shall be NEMA Class IV weatherproof construction.
- J. The covers, doors and plates and trims used in conjunction with all enclosures, pull boxes, outlet boxes, junction boxes, cabinets and the like shall be equipped with gaskets.
- K. Panels shall be equipped with doors without exception.
- L. The following shall be interpreted as damp or wet locations within building confines:

1. Spaces where any designations indicating weatherproof (WP) or vapor proof appear on the drawings.
2. Below waterproofing in slabs applied directly on grade.
3. Spaces defined as wet or damp locations by Article 100 of the National Electric Code.
4. Parking garage.

### 3.5 REQUIREMENTS GOVERNING ELECTRIC WORK IN AIR HANDLING SPACES

- A. Within air handling ductwork or plenums (other than spaces within suspended ceilings used for air handling purposes), Area "B" and the media shall comply with requirements for return air plenums.
- B. Abide by the requirements specified for electric work in damp locations within building confines.
- C. Where circuitry passes through duct walls, include, in accordance with instructions issued in the field, airtight sealing provisions which allow for a relative movement between the circuitry and the duct walls.
- D. Exclude the installation of type NM or NMC cable.
- E. In spaces within suspended ceilings used for air handling purposes, abide by the requirements specified for normal electric work conditions except:
- F. Lighting fixtures recessed into the ceilings shall be certified as being suitable for this purpose.

### 3.6 UNDERGROUND CONDUIT DUCT BANKS

- A. The electrical work required in conjunction with underground conduit banks shall include providing all conduits.
- B. Conduits for underground banks shall be:
  1. Trade diameter size as indicated but in no case less than one inch.
  2. Polyvinyl chloride Schedule 40 (approved for encased burial) duct, rigid steel conduit for vertical elbows and straight sections used to penetrate equipment pads, building foundation walls and concrete slabs.
- C. All conduits indicated as being incorporated into conduit banks unless specifically noted as rigid steel conduits shall be encased in a concrete envelope which accommodates the indicated configuration of conduits and which encompasses dimensions as follows:
  1. Outside surfaces of conduits to outside surface of envelope where reinforcement of encasement is required – 6" minimum.
  2. Outside surfaces of conduits to outside surface of envelope where no reinforcement of encasement is required – 3" minimum.
  3. Spacing between centerlines of conduits assigned to different categories of use primary feeders, secondary feeders, communications and signaling – 10-1/2" minimum.
  4. Spacing between centerlines of conduits assigned to the same category of use – 7-1/2" minimum.
- D. Reinforcement of the concrete encasement for conduit banks where required shall consist of No. 4 longitudinal reinforcing bars located 3" from the outside surface of the envelope and spaced 6" on centers all around. No. 8 wire reinforcing hoops set 8" apart shall be used to tie the longitudinal bars together.
- E. Install conduit in such a manner as to provide a minimum cover of 30 inches after final grading except the cover may be reduced to a minimum of 18 inches to:
  1. Tie into existing work.
  2. Pass over other underground utilities.
  3. Pass over underground obstructions.
  4. Assist in the avoidance of low points.
- F. Increase the minimum cover where required by field conditions.
- G. Lay conduit to avoid low points during run. Pitch at a minimum of 3 inches per 100 feet away from building.



- H. Provide reinforcement for the concrete encasement of a conduit bank where:
  - 1. It passes under or over underground utilities.
  - 2. It passes under or over underground obstructions.
  - 3. Its cover is reduced to less than 30 inches.
  - 4. It runs through foundation walls and other building construction.
- I. Concrete encasement reinforcing shall extend in each case 5 feet beyond the points at which the determining conditions terminate.
- J. Bends in conduit shall have minimum radii as follows:
  - 1. For primary feeder 15'-0" except where specifically indicated otherwise or where turning up at termination point.
  - 2. For primary feeder turning up at termination point – 4'-0".
- K. Install conduit so that adjacent joints are staggered at least 6 inches from one another.
- L. Offsets to accommodate field conditions shall be accomplished with two (2) bends of not more than ten (10) degrees each.
- M. Plug both ends of all conduit stubs.
- N. Seal the end of each conduit run terminating inside a building utilizing a water and gas-tight sealant manufactured specifically for the purpose.
- O. After conduit has been installed with concrete encasement completed, clear each conduit of all obstructions and foreign matter by pulling a flexible mandrel (12" minimum length and a diameter 1/4" less than that of the conduit) and brush through it. In the event that obstructions are encountered in any conduit which will not permit the mandrel to pass, remove and replace the blocked section. Include in the electric work all excavation, backfilling, repair of concrete encasement and restoration of surface at grade involved in the conduit replacement.
- P. Provide a nylon cord for the pulling of cable in each conduit in which no cable is to be installed as part of the electric work.
- Q. The Electrical Sub-Contractor shall provide all insulated racks as required for proper support of all cables and wires.
- R. Provide a continuous nylon warning tape above each full length of duct bank 12 inches below grade.

### 3.7 LIMITING NOISE PRODUCED BY ELECTRICAL INSTALLATION

- A. Perform the following work, in accordance with field instructions issued by the Architect to assure that minimal noise is produced by electrical installations due to equipment furnished as part of the electrical work.
- B. Check and tighten the fastenings of sheet metal plates, covers, doors and trims used in the enclosures of electrical equipment.
- C. Remove and replace any individual device containing one or more magnetic flux path metallic cores (e.g., discharge lamp ballast, transformer, reactor, dimmer, and solenoid) which is found to have a noise output exceeding that of other identical devices installed at the project.

### 3.8 SUPPORTS AND FASTENINGS

- A. Support work in accordance with best industry standards, and Local Electric Code.
- B. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a free standing position.
- C. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members. They shall be rigidly bolted or welded together and adequately braces to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of all equipment mounted on them.
- D. No work intended for exposed installation shall be mounted directly on any building surface. In such locations, flat bar members or spaces shall be used to create a minimum of 1/4" air space between the

building surfaces and the work. Provide 3/4" thick exterior grade plywood painted with two (2) coats of fire-retardant gray paint for mounting of panelboards.

- E. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric conduits, raceways or cables for support.
- F. Nothing shall rest on, or depend for support on, suspended ceiling media.
- G. Support less than 2" trade size, vertically run, conduits at intervals no greater than 8'. Support such conduits, 2-1/2" trade size or larger, at intervals no greater than they story height, or 15', whichever is smaller.
- H. Where they are not embedded in concrete, support less than 1" trade size, horizontally run, conduits at intervals no greater than 7'. Support such conduits, 1" trade size or larger, at intervals no greater than 10'.
- I. Support all lighting fixtures directly from structural slab, deck or framing member.
- J. Where fixtures and ceilings are such as to require fixture support from ceiling openings frames, include in the electric work the members necessary to tie back the ceiling opening frames to ceiling suspension members or slabs so as to provide actual support for the fixtures noted above.
- K. As a minimum procedure, in suspended ceilings support smalls runs of circuitry (e.g., conduit not in excess of 1" trade size) from ceiling suspension members as defined above. Support larger runs of circuitry directly from structural slabs, decks or framing members.
- L. Fasten electric work to building structure in accordance with the best industry practice.
- M. Floor mounted equipment shall not be held in place solely by its own dead weight. Include floor anchor fastenings in all cases.
- N. For items which are shown as being ceiling mounted at locations where fastenings to the building construction element above is not possible, provide suitably auxiliary channel or angle iron bridging tying to building structural elements.
- O. As a minimum procedure, where weight applied to the attachment points is 100 lbs. or less, fasten to concrete and solid masonry with bolts and expansion shields.
- P. As a minimum procedure, where weight applied to building attachment points exceed 100 lbs., but is 300 lbs. or less, conform to the following:
  - 1. At field poured concrete slabs, utilize inserts with 20' minimum length slip-through steel rods, set transverse to reinforcing steel.

### 3.9 SPLICING AND TERMINATING WIRES AND CABLES

- A. Maintain all splices and joints in removable cover boxes or cabinets where they may be easily inspected.
- B. Locate each completed conductor splice or joint in the outlet box, junction box, or pull box containing it, so that it is accessible from the removal cover side of the box.
- C. Join solid conductors No. 8 AWG and smaller by securely twisting them together and soldering, or by using insulated coiled steel spring "wire nut" type connectors. Exclude "wire nuts" employing non-expandable springs. Terminate conductors No. 8 AWG and smaller by means of a neat and fast holding application of the conductors directly to the binding screws or terminals of the equipment or devices to be connected.
- D. Join, tap and terminate standard conductors No. 6 AWG and larger by means of solder sleeves, taps, and lugs with applied solder or by means of bolted saddle type or pressure indent type connectors, taps and lugs. Exclude connectors and lugs of the types which apply set screws directly to conductors. Where equipment or devices are equipped with set screw type terminals which are impossible to change, replace the factory supplied set screws with a type having a ball bearing tip. Apply pressure indent type connectors, taps and lugs utilizing tools manufactured specifically for the purpose and having features preventing their release until the full pressure has been exerted on the lug or connector.
- E. Except where wire nuts are used, build up insulation over conductor joints to a value, equal both in thickness and dielectric strength, to that of the factory applied conductor insulation. Insulation of

conductor taps and joints shall be by means of half-lapped layers of rubber tape, with an outer layer of friction tape; by means of half-lapped layers of approved plastic electric insulating tape; or by a means of split insulating casings manufactured specifically to insulate the particular connector and conductor, and fastened with stainless steel or non-metallic snaps or clips.

### 3.10 PULLING WIRES INTO CONDUITS AND RACEWAYS

- A. Delay pulling wires or cables in until the project has progressed to a point when general construction procedures are not liable to injure wires and cables, and when moisture is excluded from raceways.
- B. Utilize nylon snakes or metallic fish tapes with ball type heads to set up for pulling. In raceways 2" trade size and larger, utilize a pulling assembly ahead of wires consisting of a suitable brush followed by a 3-1/2" diameter ball mandrel.
- C. Leave sufficient slack on all runs of wire and cable to permit the secure connection of devices and equipment.
- D. Include circular wedge-type cable supports for wires and cables at the top of any vertical raceway longer than 20 feet. Also include additional supports spaced at intervals which are no greater than 10'. Supports shall be located in accessible pull boxes. Supports shall be of a non-deteriorating insulating material manufactured specifically for the purpose.
- E. Pulling lubricants shall be used. They shall be products manufactured specifically for the purpose.

### 3.11 REQUIREMENTS FOR THE INSTALLATION OF JUNCTION BOXES, OUTLET BOXES AND PULL BOXES

- A. Flush wall-mounted outlet boxes shall not be set back to back but shall be offset at least 12" horizontally regardless of any indication on the drawings.
- B. Locate all boxes so that their removable covers are accessible without necessitating the removal of parts of permanent building structure, including piping, ductwork, and other permanent mechanical elements.
- C. In conjunction with concealed circuitry, abide by one of the following instructions (as may be applicable to the conditions) in order to assure the aforementioned accessibility. (Not required for circuitry concealed by removable suspended ceiling tiles.)
- D. For a small (outlet size) box on circuitry concealed in a partition or wall, locate box or fitting so that its removable cover side, (or the face of any applied raised cover) penetrates through to within 1/8" of the exposed surface of the building materials concealing the circuitry and apply a blank or device plate to suit the functional requirements.
- E. For a large box on circuitry concealed in a partition, suspended ceiling, or wall, locate box totally hidden but with its removable cover directly behind an architectural access door or panel (included for the purpose, separate from the electric work) in the building construction which conceals the circuitry.
- F. Include all required junction and pull boxes regardless of indications on the drawings (which, due to symbolic methods of notation, may omit to show some of them).
- G. Unless noted below or otherwise specifically indicated, include a separate outlet box for each individual wiring device, lighting fixture and signal or communication system outlet component. Outlet boxes supplied attached to lighting fixtures shall not be used as replacements for the boxes specified herein.
- H. Utilize an outlet box no smaller than 5" square by 2-1/2" deep.
- I. Allow no fixture to be supplied from an outlet box in another room.
- J. Multiple local switches indicated at a single location shall be gang-mounted in a single outlet box.
- K. Install junction boxes, pull boxes and outlet boxes in conjunction with concealed circuitry.
- L. Close up all unused circuitry openings in outlet boxes. Unused openings in cast boxes shall be closed with approved cast metal threaded plugs. Unused openings in sheet metal boxes shall be closed with sheet metal knock-out plugs.
- M. Outlet boxes for switches shall be located at the strike side of doors. Indicate door swings are subject to field change. Outlet boxes shall be located on the basis of final door swing arrangements.

- N. Boxes and plaster covers for duplex receptacles shall be arranged for vertical mounting of the receptacle.
- O. Equip outlet boxes used for devices which are connected to wires of systems supplied by more than one set of voltage characteristics with barriers to separate the different systems.
- P. Barriers in junction and pull boxes of outlet size shall be of the same metal as the box.
- Q. Barriers in junction and pull boxes which are larger than outlet size shall be of the polyester resin fiberglass of adequate thickness for mechanical strength, but in no case less than 1/4" thick. Each barrier shall be mounted, without fastenings, between angle iron guides so that they may be readily removed.

### 3.12 LOCATING AND ROUTING OF CIRCUITRY

- A. In general, all circuitry shall be run concealed except that it shall be run exposed where the following conditions occur:
  - 1. Horizontally at the ceiling of permanently unfinished spaces which are not assigned to mechanical or electrical equipment.
  - 2. Horizontally and vertically in mechanical equipment spaces.
  - 3. Horizontally and vertically in electric equipment rooms.
- B. Concealed circuitry shall be so located that building construction materials can be applied over its thickest elements without being subject to spalling or cracking.
- C. All circuitry and raceways shall not be run within slabs. If field conditions requires raceways to be embedded in field-poured structural building construction concrete fill or slab shall conform to the following:
  - 1. Where turned up or down into a wall or partition they shall, before entering same, be routed parallel for a long enough distance to assure that no relocation of the wall or partition will be necessary to conceal the required bend.
  - 2. They shall be routed in such a manner as to coordinate with the structural requirements of the building.
  - 3. They shall be routed in accordance with field instructions issued by the Architect where such instructions differ from specifications set forth herein.
- D. Circuitry run exposed shall be routed parallel to building walls and column lines.
- E. Circuitry shall be routed so as to prevent electric conductors from being subject to high ambient temperature. Minimum clearances from heated lines or surfaces shall be maintained as follows:
  - 1. Crossing where uninsulated: 3".
  - 2. Crossing where insulated: 1"
  - 3. Running parallel where uninsulated: 36".
  - 4. Running parallel where insulated: 6".
- F. Circuitry shall not be run in elevator shafts, hoistways, and the like. Where outlets for trail cables, pit lights, run be level lights, and the like, are involved, only the "final connection" outlet boxes themselves shall be located within or open into, the confines of the shaft.

### 3.13 INSTALLING CIRCUITRY

- A. The outside surface of circuitry, which is to be embedded in cinder concrete, shall be coated with asphaltum paint.
- B. In runs of conduit or raceway including flexible limit the number of bends between cable access points to a total which does not exceed the maximum specified for the particular system. Where no such maximum is specified, limit the number to four (4) right angle bends or the equivalent thereof.
- C. In each conduit or raceway assigned for the future pulling in of wires, include a nylon drag cord. In raceways 2" trade size and larger, the cord shall be pulled in utilizing a suitable brush, followed by an 85% diameter ball mandrel ahead of the cord in the pulling assembly. In the event that obstructions are

encountered, which will not permit the drag cord to be installed, the blocked section of raceway shall be replaced and any cutting and patching of the structure involved in such replacement shall be included as part of the electric work.

- D. Circuitry shall be arranged such that conductors of one feeder or circuitry carrying “going” current are not separated from conductors of the same feeder or circuitry carrying “return” current by any ferrous or other metal. Where not within raceways, all “going” and “return” current conductors of one feeder or circuit shall be laced together so as to minimize induction heating of adjacent metal components.
- E. Sleeves used where circuitry is to penetrate waterproof slabs, decks and walls, shall be of a type selected to suit the water condition encountered in the field.

END OF SECTION